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The Relationships between School District Characteristics and Microcomputer Use

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THE RELATIONSHIPS BETWEEN SCHOOL DISTRICT CHARACTERISTICS AND MICROCOMPUTER USE

by

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VITA

The author, Theodore L. Sanders, is the son of Ruth (Logsdon) Sanders and the late Eugene Sanders. He was born November 10, 1951, in Pana, Illinois.

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INTRODUCTION

Many educators have ceased questioning the appropriateness of using microcomputers in the schools and have begun examining how microcomputers can be put to their best use. Unfortunately, many of the experts in the field disagree not only on how microcomputers should be used but also on how microcomputer implementation should proceed. The conflict among the experts coincides with differences which have occurred in the extent and quality of microcomputer use among school districts. Educators have had to proceed with the information that they think best fits their individual situations. As a result, school districts are at very different points along a developmental continuum regarding microcomputer use.

The wide variance in microcomputer use in school districts should be cause for concern for a number of reasons. First, financial resources have become more and more precious in all school districts, even the ones normally considered to be wealthy. For this reason, it has become increasingly difficult for many school districts to maintain programs already in place. Any new programs, including those using microcomputers, have had to compete

with established programs for available funds. Second, even though breakthroughs in microcomputer technology have made computer hardware less expensive than it was a few years ago, it is still a very costly matter to purchase computer hardware, to purchase computer software, to design an appropriate curriculum, and to train the teaching staff in the appropriate uses of the new technology. Since money must be reallocated from the support of other programs for the purchase of microcomputers, some school districts have approached microcomputer implementation less aggressively than others. Finally, many people within and outside education have agreed that children need to become familiar with computers since computers have become an integral part of our society. The extent of the support for computer instruction was reflected in the 1984 Gallup Poll in the Phi Delta Kappan where 68% of the respondents felt that computer training should be required. (Gallup, 1984, p. 31)

As a result of the increasing importance being placed upon computer use in the schools, some educators have begun to question the inequities that have arisen. Several authors have expressed this concern. Anderson, Welch, and Harris addressed the problem in the following manner:

> Educational computer inequity threatens to separate groups and communities by giving some people more effective tools for living in the age of computer information systems. (Anderson, Welch & Harris, 1984, p. 10)

Lipkin (1984, p. 19) underlined this concern and added that

the real question is not whether inequities exist but how to provide adequate opportunities to all children.

Equality of educational opportunity has always been a stated goal of the American educational system. Given the concern that students may not be receiving equal opportunities in the area of instructional computing, it would seem appropriate to undertake research to determine ways of reducing or eliminating the inequities. This study was a thorough examination of some of the underlying school district characteristics and how they relate to the extent and quality of a school district's microcomputer use.

Statement of Problem

In an effort to gain insight into the dynamics of school district-based microcomputer use, this study examined the relationships among selected school district characteristics, the extent and quality of microcomputer use in school management, and the extent and quality of microcomputer use in instruction. It was hoped that relationships might be found so that some means of intervention could be suggested that would allow school districts to proceed with the implementation of microcomputer use on a more equal basis. For instance, if the relative wealth of the school district were related to microcomputer use, then an appropriate intervention might be

to provide poor school districts with money specifically for the purpose of implementing computer-based programs. If no relationships were found, direction for future research could be provided.

Procedures

This study was an attempt to establish a foundation work that can be built upon by later research. The examination of the relationship between school district characteristics and microcomputer use was seen as the first step toward a broader understanding of the implementation task which lies ahead. The study can be viewed as having two separate but interlocking parts: the development of two formulas which measure the extent and quality of a school district's microcomputer use and a comparison of school district characteristics to the extent and quality of the school district's microcomputer use.

The development of the formulas was necessitated by the need for a means to measure the extent and quality of school district microcomputer use. Since no commonly accepted methods existed that would adequately perform this task, they had to be created. The formulas were designed in such a manner so that school districts could be placed along a developmental continuum which allows for direct comparison of each school district's microcomputer-based programs.

After the method for measuring the extent and quality of a school district's microcomputer use had been devised, comparisons were made between school district characteristics and the extent and quality of the school district's microcomputer use in instruction and administration. Care was taken in choosing the samples and in developing the surveys used with the samples. A complete description of the method and procedures used in this study can be found in Chapter III.

CHAPTER II

RELATED LITERATURE

Educational publications have been featuring an increasing number of articles on microcomputer usage in the schools. In fact, the entire October, 1983, issue of the Phi Delta Kappan was devoted to this topic, which is indicative of its acceptance into the mainstream of American educational thought. Interestingly, the emphasis of the vast majority of the recent articles has been on how (or how much) to use microcomputers in the schools rather than on whether microcomputers should be used in the schools.

This chapter presents an overview of the literature relating to instructional and administrative uses of microcomputers. Like much educational literature, a great deal of what has been written on these topics is anecdotal in nature. Many articles have been based more upon experience (and conjecture) than upon research. As a result, instructional computing and administrative computing are represented within the literature by people expressing their opinions of what computers should be able to do for education rather than by people summarizing what the research indicates computers can do for education. Accordingly, the literature has been organized into four

sections: a brief historical perspective, the present status of administrative microcomputer use, the present status of instructional microcomputer use, and the characteristics of microcomputer-using school districts.

Historical Perspective

To gain an historical perspective of microcomputer use in education, one must examine two separate areas: the general history of computer development and the history of educational computing.

Although the development of computers is viewed as a recent occurrence that has happened within a relatively short time-span and at a precipitously fast pace, the first real step toward the development of computers came in 1642 when Blaise Pascal, a French mathematician, developed the first mechanical calculating machine capable of performing addition and subtraction. (Parker, 1984, p. 56) Since that time, steady progress has been made in the development of computers. The major events in this development are represented in the time line in Table 2.1.

Time-period	Event
1642	Blaise Pascal, a French mathematician, invented the first mechanical calculating machine capable of addition and subtraction.
late 1600's	Gottfried von Leibniz built a machine that could multiply and divide as well as add and subtract.
early 1800's	Joseph Jacquard invented a punched-card controlled loom.
mid-1800's	Charles Babbage designed two steam powered calculating machines, one called the difference engine and the other called the analytical engine.
1890's	Herman Hollerith built a tabulating machine for the United States Census Bureau and established a company that later came to be known as International Business Machines.
1939	John Atanasoff and Clifford Berry of Iowa State University built the first vacuum tube-based computer.
1946	J. Presper Eckert and John Mauchly built ENIAC, a very large vacuum tube-based computer, for the U. S. Army.
1951-1958	Era of the First Generation computers based upon vacuum tube technology.
1959-1964	Era of the Second Generation computers based upon the transistor.
1965-1970	Era of the Third Generation computers based upon the integrated circuit.
1971-present	Era of the Fourth Generation computer based upon the microminiaturized integrated circuit.

Historical Time Line
Table 2.1 (data taken from Parker, 1984, pp. 56-85)

The groundwork laid by Pascal, Jacquard, and Babbage was very important to the development of the modern computer. These pioneers were able to conceptualize novel methods of utilizing mechanical processes in an attempt to free man from the drudgery of calculating large amounts of data by hand.

In the last forty years, four changes, or generations, in modern computers have occurred with each generation bringing developmental changes more significant than the changes that occurred during the previous three hundred years of development (see Table 2.1). This rapid acceleration in computer development may account for many of the perceptions that people have about the origin of computers. They fail to recognize that although change is occurring at a very rapid pace today, centuries of technological progress were required for this development to occur. The twentieth century just happened to be the time when the necessary factors, abilities, and technologies have come together to allow the current technological revolution to take place.

While the history of educational computing is correlated with the history of computer development, educational computing did not get under way until the 1960's when the second and third generations of the modern computer came into being. Prior to that time the high cost of computers limited their distribution to governmental and

research installations. However, the decade of the sixties brought a general cultural and social experimentation which had as one of its manifestations educational experiments involving the use of computers. The following passage best summarizes those experiments:

> During the sixties, a major effort was launched to harness the educational potential of computers. Involving government agencies, university researchers, and computer manufacturers, it ended up costing many millions of dollars. With much fanfare, an "educational revolution" was declared, although its actual realization always seemed "just around the corner." (Coburn et al., 1982, p. 169)

As this passage indicates, the sixties experimentation with computers was heralded as a revolutionary move for education. Vast sums of money were spent to gather information about educational computing but the expected revolution in education never materialized. A 1972 study conducted by the Educational Testing Service concluded that the computerized approaches pioneered during the sixties did not become more widely adopted because:

1) Hardware and software costs were too high.
2) Teachers were afraid of technology.
3) Teacher training was inadequate.
4) Computer assisted instruction proponents' claims about its effectiveness were exaggerated.
5) Schools are fundamentally conservative. (Coburn et al., 1982, p. 170)

Therefore a combination of cost, which is always a problem for education, a lack of training on the part of teachers, and an unwillingness on the part of the educational system itself combined to thwart efforts to introduce computers in the schools. Although vast sums of money had been spent on

developing models for computer education, the factors listed above combined to prevent any of those models from being replicated in the schools.

The decade of the seventies continued to produce a series of experiments in educational computing. Unlike the projects of the sixties, the projects of the seventies were more cautious in their initial expectations. The failures of the sixties had made the experimenters more cautious in their claims. A representative group of these mainframe-based, federally funded programs were (a) the Huntington I and Huntington II projects started by Ludwig Braun at the State University of New York at Stonybrook; (b) the Solo Project started by Thomas Dwyer at the University of Pittsburgh; (c) the Education Technology Center at the University of California at Irvine started by Alfred Bork; (d) the PLATO project at the University of Illinois; and (e) the Minnesota Educational Computing Consortium. (Coburn et al., 1982, p. 171)

It would be difficult to imagine what the impact of these mainframe-based projects might have been since their initial mission became obsolete with the introduction of the microcomputer in the mid-seventies. By the late 1970's, microcomputer hardware was available at a low enough cost that many school districts could realistically consider purchasing them. Over the past five or six years, hundreds of thousands of microcomputers have been purchased by

schools across the country.

Status of Administrative Microcomputer Use

Even before the advent of the microcomputer, many large school districts used computers to assist with administrative tasks. School district management is not markedly different from the management of other types of organizations in that there are certain repetitive record-keeping tasks which must be done. Computers can perform this type of task very efficiently. However, for many years only very large school districts could justify the initial cost of the hardware and the continued personnel and maintenance costs associated with operating a mainframe computer installation. Although the microcomputer has greatly reduced the hardware and personnel costs of computerizing school management functions, the literature presents two issues for which administrators are still seeking resolution: administrator training and the best uses for microcomputers in school administration.

Unquestionably, one of the significant problems which school district administrators face is the ever-increasing load of paper work required of them. Records must be kept regarding students, personnel, and budgets while reports must be produced from those same records. There is no doubt that microcomputers can help administrators deal with this

paper work much more efficiently. Unfortunately, most school administrators have had little or no training in the selection and use of computer hardware and software. Therefore, the training of administrators must be considered a major issue if school districts are to take full advantage of this new tool. Uhlig (1982, p. 109) has gone so far as to suggest that all administrators become computer literate by gaining a knowledge of (a) the selection and evaluation of hardware configurations; (b) the role of microcomputers in school administration; and (c) methods of cost benefit analysis. One might also add software evaluation and use to that list. It would hardly be appropriate for administrators to gain the skills necessary to the selection process and not gain the skills needed for proper implementation.

As would be expected, the literature contains many lists of administrative uses of microcomputers. Some of these lists are "wish lists" while others are based on research of one type or another. In Illinois, a group called the Illinois Superintendents' Round Table surveyed 173 suburban Chicago school districts and found the following administrative functions being performed by computer: payroll, budget, scheduling, student attendance, student records, registration, personnel records, inventory, and health records ("Chicago Survey," 1982, p. 14). Although no distinction was made as to whether the districts

used mainframe, minicomputers, or microcomputers, microcomputer software is available for all of these functions. A University of Alabama study (1982, p. 4) on administrative uses of microcomputers found that "Typically, this support on the district level involves the management of payroll, personnel files, student test scores, attendance records, and basic student demographic information." Other lists of administrative microcomputer uses are found in Watts (1981), Huago (1981), Marshall (1982), Pitts (1982), and Kehner and Schepis (1982).

While the microcomputer holds much promise for improving the efficiency of many administrative tasks, the key may well be whether proper training is provided to the administrators in time for them to begin using this new tool. The fact that administrators do not have the skills needed to use microcomputers might account for the results of a recent Electronic Learning survey that found that "...by a wide margin, computers are being used mostly for instructional, rather than administrative purposes in precollegiate education." ("EL Survey Shows," 1982, p. 12)

Status of Instructional Microcomputer Use

Educators have focused more on ways to use computers with children as part of the instructional program than on

other possible applications. This literature divides into the following categories: implementation and planning, training, computer literacy, computer assisted instruction, and the future of instructional computing.

Implementation and Planning

In the past, educators have been criticized for the way in which innovations and/or curricular changes have been implemented. There often has not been enough time or enough money (or both) committed to the implementation project to allow for proper planning. At other times naivete or foolishness have interfered with the development of proper implementation models. In the case of instructional computing, Eisele expressed the problem well in the following passage:

> The opening line goes something like, "Now that we have received our three microcomputers, what should we do with them in our school?..."
>
> As implied by the question raised above, a common practice in education is to take action first, then plan later. This approach leads, often, to attempting to mold the new to fit the old and, eventually, to a waning interest and abandonment of a potentially useful aid to teaching. (Eisele, 1981, p. 24)

Indeed there have been examples of poor or improper implementation of instructional computing. Sturdivant (1980, p. 219) stated that "There is some evidence to suggest that schools are accepting the use of microcomputers before the resources are available to support their use." Kelman wrote that:

> Part of the problem is that the "revolution" was declared too soon. The state of computer technology is simply not ready for widespread, quality educational application. While it is likely that computers will some day be a major force in education, they are not yet ready for schools, nor are the schools ready for them. (Kelman, 1982, p. 10)

While Kelman expressed concern for availability of resources, Ohanian has expressed concern for the mistakes of the past:

> One time the administrators were so confident of their product that they abolished all remedial teaching positions at the same time that they handed out the new manuals....This time the product is so wondrous that few people are asking whether it's messiah or monster. The administrators in my district, however, are a bit more cautious. Instead of abolishing the remedial positions immediately, they are installing the computers in all the remedial labs. (Ohanian, 1983, p. 23)

As should now be apparent, the major concerns expressed in the literature have involved the credibility of educational innovation in general, the availability of resources to effect the change, and the appropriateness of the timing of this change.

A slightly different perspective than the ones previously offered is represented by Walker who contended that not all school districts need to get involved immediately in using microcomputers. However, he proposed that some school districts must become involved with microcomputers or a golden opportunity will be lost forever:

> For some communities, some schools, and some teachers, computers are not worth it-not now, not today's microcomputers. They can wait and see what happens, buying in later if things go well....
> But it is very important, I think, for some

> communities, some schools, and some teachers to embrace computer-based education wholeheartedly, to strive to make it work for them....
>
> Here is a chance for those favored by circumstance to indulge their spirit of adventure and discovery while at the same time contributing to the general welfare. (Walker, 1983, p. 107)

Obviously, Walker thinks that it is important for those school districts and teachers who are ready to begin incorporating microcomputers into the instructional process. However, he cautions that not everyone is ready.

On the other side of the issue, people like Melmed (1984) have argued for the immediate inclusion of microcomputers in the instructional process because they can increase student and teacher productivity so that (a) students can get more time-on-task; (b) the student/teacher ratio can be reduced for direct instruction; and (c) fewer teachers will be needed allowing a savings in salaries that could be used to fund teacher pay increases and to fund the implementation of the technology itself. Sturdivant (1980, p. 221) reinforced the importance of this increase in efficiency by writing that "Education and training are gradually shifting from a teacher-centered orientation to a student-centered one. The productivity of students, rather than the productivity of teachers, is becoming the basic focus in evaluating the success and efficiency of instruction." Agreeing with the importance of implementing instructional computing in the schools, a study committee recently recommended to the Florida legislature that

microcomputers be used in the schools as both a medium for instruction and as an object of instruction. The committee stated that Florida "cannot afford not to invest immediately in technology for schools." (cited in Roblyer, 1980, p. 186)

It is interesting to note that the literature has advocated the implementation of instructional computing while at the same time either flatly stating that the schools are implementing incorrectly or stating that the implementation will probably not go well because so many innovations have been poorly handled in the past. It is no wonder that educators have expressed some exasperation and confusion regarding the use of microcomputers in the schools. One can only hope that this confusion will eventually be sorted out and resolved in a positive manner.

While some authors argue about how microcomputer implementation should take place, Bork and Franklin (1979) argue that personnel will be the key to successful instructional computing implementation. They pointed out the importance of an enlightened leadership as follows:

> The computer is the first technological innovation which allows education of large numbers of people in a manner which is truly responsive to the individual learner. But only the involvement and commitment of educators of vision can ensure that it is used in that manner. (Bork & Franklin, 1979, p. 30)

Willis agreed with this assessment but contended that

> Principals, vice-principals and school administrators are key implementation agents. Their active, supportive participation and leadership is vital because they are the "gate-keepers"; the facilitators in the implementation process. (Willis,

1982, p. 95)

Willis believed that administrators must provide the leadership for the successful implementation of instructional computing to take place.

In addition to the preceding implementation issues, the experts have presented various scenarios regarding the best method of proceeding with the implementation of instructional computing. Holmes has argued for the addition of instructional computing as a supplement to rather than a replacement for traditional methodology:

> The picture is clear: any attempt at implementation of a CAI system is more likely to succeed if the system is viewed as a supplement to traditional modes of instruction. This does not mean, of course, that it cannot be a compulsory supplement and constitute a full-fledged component in a systems approach. It is not inconceivable that, if the computer proves useful in a supplemental role, teachers will welcome its extended use. (Holmes, 1982, p. 12)

Therefore, the computer should be introduced into the educational system in strictly a subordinate role to maximize the acceptance by the teaching staff. Holmes viewed this acceptance as essential to the successful implementation of an instructional computing plan.

In addition to the context within which the implementation should occur, some authors have written about the need for planning. For example, Grady has called for more long-range planning by stating that "They [school administrators] should also realize that while hardware purchased this year will probably have a wear life of five

to seven years, it will be technologically obsolete within three. Long-range plans should reflect these facts." (Grady, 1983, p. 19))

Stevens has also called for long-range planning as follows:

> ...administrators must prepare long-range plans pertaining to budgets, curriculum modifications, and staff development programs. Without such plans, the maximum benefits of computers as instructional tools may not be realized. (Stevens, 1981, p. 24)

In addition to these types of exhortations, many people have tried to provide school districts with a step-by-step approach to the planning and implementation of educational computing. Three such guides are by Morgan (1981), by Elseroad (1981), and by the Texas Education Agency (Guide for selecting...,1982). All of these guides provide good implementation plans for instructional computing. The Texas Education Agency plan is the most comprehensive.

In addition to the discussions in the literature as to whether instructional computing should take place, who should provide leadership, and how to approach the implementation if it is to occur, some researchers have been studying what occurs as instructional computing is implemented. Sheingold found the following in a study of three school districts:

> What is clear from our study, however, is that microcomputers on their own will not promote any particular outcomes. Their impact will depend, not only on hardware and software, but, to a large extent, on the educational context within which they are embedded. (Sheingold, 1981, p. 19)

Therefore, school districts cannot expect to simply place microcomputers into the school environment and wait for the miracles to begin. The implementation of instructional computing must be planned very carefully with special attention being given to the over-all educational context that will eventually include instructional computing.

In a broader-based study, Tinker and Naisan have identified three problems that most school districts have encountered when they have implemented instructional computing:

> 1) How to train teachers so that they can be comfortable with micros (sic) and stay ahead of their students....
> 2) How to learn about, select, exchange, or write software....
> 3) How to find money to acquire more machines.... (Tinker & Naisan, 1980, p. 30)

Although these problems may not be surprising nor unique to instructional computing, careful attention to these problems at the planning stages of the implementation model might very well lessen the impact of the difficulties with instructional computing implementation that have been previously described.

Whether school districts are doing a good job or a poor job, the fact remains that they are implementing instructional computing through the use of microcomputers. Although liberal amounts of advice have been given as to how this objective can best be accomplished, in the final analysis, one of the greatest problems encountered to date

is the knowledge-base of educators who are trying to bring about this change.

Training

There is general agreement in the literature regarding the need for teacher training in the instructional uses of microcomputers. Basically, the experts seem to agree that most teachers have little or no formal training in the area of instructional computing and that it will be a massive task to retrain the vast numbers of teachers required to make this particular innovation a success. The importance of undertaking the training itself was expressed by Stevens in the following passage:

> Success or failure and the speed at which changes occur in education depend upon the attitudes and expertise of educators and administrators; otherwise the process is painfully slow. (Stevens, 1982, p. 1)

In an area where the vast majority of educators have little or no expertise, Steven's assessment may be doubly accurate since a certain amount of knowledge about a topic is required before educators can develop attitudes based upon objectivity rather than superstition. Winner expressed a similar sentiment as follows:

> The need for training in intelligent computer use is apparent, as it is the classroom teacher who will have the final say on the use of computers in the elementary school. It would be a misuse merely to add the microcomputer to the current curriculum. Add-on curriculum innovations have been attempted before with poor results. (Winner, 1983, p. 154)

Therefore, it is not enough merely to add the use of

computers to the curriculum; one must also provide the teachers that will be delivering that curriculum with the appropriate training. Becker (1982, p. 69) supported this idea and used the term "computer literacy" when referring to the skills that educators should develop.

Another proponent of teacher training is David Moursund, whose credentials include the post of editor of The Computing Teacher. He has written with enthusiasm about the possibilities of using microcomputers in the schools. However, his enthusiasm has been tempered with a warning that the most serious problems to be faced involve the training of the teaching and administrative staff. Moursund stated that opinion as follows:

> The barriers to progress in making increased instructional use of computers can be divided into two categories. Into one category we put things like hardware, software, and courseware. Each lends itself to group effort, mass production, or more money as a solution. Into the other category we put those barriers that depend upon knowledge of the individual teacher or school administrator. And it is here that we find the major and continuing bottleneck. Without knowledgeable teachers and supportive administrators, progress will be painfully slow. With them, progress is rapid, even in light of inadequate hardware, software and courseware. (Moursund, 1981, p. 116)

Moursund contended that the greatest hurdle yet to be faced in implementing microcomputer usage is the lack of trained personnel to actually carry out the implementation. Hard work, cooperation, and money will solve the other problems but it will all be to no purpose if the people being asked to implement the change do not have the required

competencies.

The massiveness of the training task ahead was outlined by Grossnickle and Laird as follows:

> An unprecedented re-tooling of the present teaching force will be required as most educators completed teacher-training prior to the emergence of computers, of any kind, on the college campus. (Grossnickle & Laird, 1983, p. 127)

An obviously difficult task is made even more difficult by the fact that the teachers who need this training have had absolutely no prior training in this area. Also, this problem is being made even more acute by the fact that most school districts across the country have been experiencing a steady, long-term decline in enrollments that have forced them to fire their youngest teachers as unneeded positions are eliminated, further exacerbating the problem by the release of the few teachers who may have had some pre-service training in the use of computers.

In addition to the need for training, the content and method of the training has also been addressed in the literature. Apparently, there are two types of personnel to be trained: the district microcomputer coordinator and the classroom teacher. Hoover and Gould (1983) stated that the roles of the district microcomputer coordinator include planning, fund raising, purchasing, equipment maintenance, training and information distribution, and administration. Obviously, the coordinator's training would have to be different from the classroom teacher's training who Martin

and Heller (1982, p. 46) have indicated as needing (a) to be able to read and write a simple program; (b) to have experience using educational software and documentation; (c) to have a working knowledge of computer terminology; (d) to be able to discuss the history of computers; and (e) to be able to discuss the moral or human impact issues related to computers and society. Therefore, the classroom teacher's knowledge must be that of a practitioner while the coordinator's knowledge must be much broader. By necessity, their training would be of a different nature.

After the content of the training has been determined, a decision must be made as to the best methods for delivering the training. Some alternatives include the use of professional inservice days, the use of special resource centers made available to staff, the use of district resource staff made available to teachers, the use of teacher meetings, and the use of a designated resource teacher within each school. (Martin & Heller, 1982)

As one can see, the literature suggests that training is a major issue facing the educational community, an issue that may decide whether or not the implementation of instructional computing will be successful. The importance of this training must be realized by school district administrators, teachers, and teacher training institutions so that a coordinated, concerted effort may be made to upgrade the knowledge-base of educators in the field.

Computer Literacy

The two major instructional applications of microcomputer technology discussed in the literature are computer literacy and computer assisted instruction. This section reviews the literature associated with computer literacy. For the purposes of this work, computer literacy instruction is defined as any activity which has as its central objective gaining knowledge about computers, how to program computers, or how to use computers.

Arthur Luerhmann has consistently advocated that the most important issue facing the schools today is computer literacy which he has defined as learning about computers and how to manipulate them. His point-of view was perhaps best summarized in the paragraph that follows:

> I am not quarreling with CAI or CMI; both will improve instruction in traditional subjects. My point here today is that neither CAI nor CMI will teach people to use the powerful personal computers which American technology is now capable of delivering to our citizenry. While it is true that a person taking a CAI lesson will learn rudimentary typing skills and rules about interacting with a computer, he or she will not learn how to write interesting computer programs, or how to structure a problem for computer solutions or how to evaluate other people's programs. When I use the phrase "education in computer use," I am referring to the development of these latter skills and abilities - programming, structural thinking, and critical evaluation of computer applications. It is these skills that are presently lacking in the public and are needed if the public is to benefit from the personal computer. (Luehrmann, 1980, p. 132)

Obviously, Luehrmann urged that schools must begin to provide computer literacy opportunities to children and adults alike. He insisted that using the computer to learn

the content from traditional subject areas (CAI and CMI) is a secondary goal to producing citizens capable of coping with our newly created technological society.

Other authors have supported Luehrmann's position on computer literacy. For example, Stevens reinforced Luehrmann's point by stating that:

> Computer literacy is essential for students. Computers have shown promise as valuable instructional tools. Because these statements are true, each school must become involved in acquisition of hardware and software and in training of teachers to use computers as instructional tools. (Stevens, 1981, p. 24)

Gaushell restated the same sentiment in a slightly different manner when he wrote:

> Computer literacy is necessary to provide administrators, teachers, and students with the fundamentals with which to apply microcomputers to education. (Gaushell, 1982, p. 3)

Therefore, Stevens and Gaushell have advocated computer literacy because they view it as a necessary tool for the future success of students in the learning enterprise.

Basing his comments on research rather than on opinion, Bell (1980, p. 28) wrote about the appropriateness of providing students with computer literacy by saying that "...our research over the past ten years provides strong support for integrating computer literacy and computer-based learning activities into high school mathematics programs." After performing ten years of research into the matter, Bell is still convinced of the importance of computer literacy.

Like Bell, Koetke provided a research-based perspective

of computer literacy in the following passage:

> With the advantage of a 20-year perspective, I continue to believe that we should be teaching children to program. Arguments against doing this are primarily analogies: I can drive a car without knowing how to repair the engine; I can use a microwave oven without the slightest idea of how the food is really heated; and so forth. These arguments sound pretty good until you realize that the analogies just don't apply. Automobiles, microwave ovens, and all the other devices commonly noted are not interactive, intellectual tools. (Koetke, 1984, p. 164)

Koetke dispelled the arguments against computer literacy by pointing out that the analogies most commonly used simply do not apply. Instead, he pointed to the fact that the computer is a powerful intellectual tool that students must be taught how to use.

Not all of the experts have included computer literacy as an end-in-itself for education. Some, most notably Seymour Papert, would include computer literacy as an admirable goal but one that must be achieved en route to some more important goal. Although Papert has represented a position that de-emphasized the importance of computer assisted instruction, he also has not been overly concerned about producing individuals that are computer literate. Instead, he has emphasized the use of the computer as a medium for the development of thinking processes. This point-of-view was well stated in the following paragraph:

> The purpose of this essay is to present a grander vision of an educational system in which technology is used not in the form of machines for processing children but as something the child himself will learn to manipulate, to extend, to apply projects, thereby gaining a greater and more articulate mastery of the

> world, a sense of power of applied knowledge and a self-confidently realistic image of himself as an intellectual agent. Stated more simply, I believe with Dewey, Montessori, and Piaget that children learn by doing and by thinking about what they do. And so the fundamental ingredients of educational innovation must be better things to do and better ways to think about oneself doing these things. (Papert, 1980, p. 161)

Papert felt intensely that the proper place for the computer in the school should be as a tool for the student to use to develop and explore his thinking and problem-solving skills. Computer literacy should be only a means to that end, providing the student with the skills needed to interact with the computer. The computer itself should provide only the framework within which the student may work and explore.

As one can see, a consistent view is that the schools should serve as the appropriate medium for the introduction of computer literacy. Apparently, most teachers agree that computer literacy is important but, as has been pointed out previously, have some concern about their own computer literacy skills. In fact a survey conducted by the Teacher College at the University of Nebraska at Lincoln (cited in Stevens, 1980) found that the respondents felt that computer literacy is important but did not feel qualified to teach it. Again, the lack of teacher preparedness surfaced as not only a problem perceived by detached observers but also by the classroom teachers themselves.

Computer Assisted Instruction

Computer Assisted Instruction is represented by the largest single body of work within the literature related to instructional computing. As has been discussed previously, the earliest projects involving the use of computers in instructional settings involved the use of computer assisted instruction. For the purposes of this study, the term "computer assisted instruction" will refer to any activity that involves the use of the computer to teach, reinforce, or practice a skill or concept included as part of the standard school curriculum. This discussion is limited to the effectiveness of computer assisted instruction and the possible social and emotional outcomes of widespread computer use by students.

An examination of the literature relating to the effectiveness of computer assisted instruction reveals that there is a considerable amount of evidence to support the idea that this mode of instruction is effective. In fact the general tenor of the literature supports the idea that computer assisted instruction consistently produces as good or better results than traditional instruction alone. For example, using meta-analysis to review the results of fifty-one studies, Kulik (cited in Bracey, 1982, p. 52) found computer assisted instruction to be more effective than traditional instruction alone. In another meta-analysis study, Grayson (1984, p. 83) found "the effectiveness of

computer-based teaching at the elementary level has shown gains of at least one half of a standard deviation in favor of computer-supplemented teaching of children." Citing similar results, a study performed for the state of Florida (cited in Roblyer, 1980) concluded that computer-based methodology was consistently as good or better than non-computer based methodology and that the amount of time for learning was generally lower and student motivation was generally higher. Vinsonhaler and Bass (1972) compared ten studies involving thirty experiments with over ten thousand subjects involved and found that computer assisted instruction increased learning over just traditional instruction alone. A study performed by the Educational Testing Service (cited in Bracey, 1982, p. 52) found that (a) computer assisted instruction was effective over the short term and long term; (b) computer assisted instruction could be easily replicated; (c) computer assisted instruction was not proved to be more or less cost-effective than other methods; and (d) increasing the time allocated to computer assisted instruction increased student learning gains.

While these and other studies have concentrated strictly on the effectiveness of computer assisted instruction, other researchers have examined the factors that surround and interrelate with computer assisted instruction. In reviewing the research on computer

education over the past twenty years, Kearsley, Hunter, and Seidel (1983) concluded that (a) computers can be used to make instruction more effective and efficient; (b) we know very little about how to individualize instruction; (c) we do not understand much about the effects of the major instructional variables underlying computer based instruction; (d) we have learned many lessons about institutional and organizational inertia; (e) there is a need for new courseware development tools; (f) we have developed mechanisms to disseminate information and courseware; (g) computer based instruction has had a significant effect on the entire field of educational research; (h) the federal government has played a pivotal role in advancing computer based instruction; and (i) we have just barely scratched the surface in research on this topic. It is apparent that much information has been gained while the effectiveness of computer assisted instruction was being investigated.

These studies are representative of a considerable body of literature, most of it research-based, that points to the effectiveness of computer assisted instruction. Although some of these studies do not differentiate between mainframe computer-based and microcomputer-based instruction, there appears to be no reason to make such a distinction. Apparently the effects on student performance are fairly consistent from one type of computer to another. The

quality of the software and other factors appear to be more significant. In fact, Fisher tempered his enthusiasm for computer assisted instruction with the following:

> Essentially, the research shows that CAI is effective when the following conditions are met:
> .when it is aimed at specific student-body groups;
> .when it is fully integrated into the regular classroom curriculum;
> .when certain subject areas are selected; and
> .when the proper setting and scheduling is established." (Fisher, 1983, p. 82)

Although Fisher did not dispute the effectiveness of computer assisted instruction, he warned that there are intervening variables that must be considered and controlled for the computer to be effective in the improvement of student performance.

Some authors have expressed concern that factors other than the academic performance of students must be considered. In fact, some have expressed concern for the social and emotional development of the student when the student spends a significant amount of his/her learning time with a computer. Becker (1982, p. 63) represented this school of thought in expressing concern for the well-being of the student when he wrote that "...computer-based learning can be isolating and can have deleterious effects on the interpersonal social skills of students." Of course, there are others that do not agree. When writing about observations taken during research into the effects of computer assisted instruction, White (1983, p. 15) indicated that "...children who work around computers tend to talk to

each other more than they do in the classroom...."

Some authors called for immediate, widespread use of microcomputer-based instruction because of its effectiveness. Others warned that too much time spent with computers might prove unhealthy to the social and emotional development of students. Still others indicated that children who use computers together interact and socialize more than they would in a regular classroom. Once again conflicting reports from supposed experts cause one to wonder exactly how schools are reacting to the general confusion that exists.

Future of Instructional Computing

The literature relating to the future of instructional computing is as diverse as it is interesting. Authors have written about how instructional computing will become integrated into the schools, whether there will be sufficient funding, how education as a whole must be altered to best use this new tool, and what might happen if educators do not accept instructional computing.

Several authors have addressed the future integration of computers into the schools. For example, Bork has been one of the most optimistic authors in addressing the future of instructional computing. He has stated unabashedly that "By the year 2000 the major way of learning at all levels, and in almost all subject areas will be through the

interactive use of computers." (Bork, 1980, p. 53) Although this statement might appear rash, others have indicated similar sentiments. For instance, Leuhrmann (1984, p. 24) has speculated that every student may some day have his/her own microcomputer. In a like manner, Kemeny has stated that:

> We now have an opportunity to integrate the use of computers into the curriculum to the point where asking a student to carry out a computer assignment will be as routine as asking him to read a book. (Kemeny, 1984, p. 173)

The same general idea has been addressed in a different way by each of these authors. They have predicted that the use of microcomputers will become an integral part of standard school practices.

Not all authors have taken the optimistic view. Sturdivant (1982, p. 41) has questioned whether sufficient funds will be available in light of the budget cuts that have taken place in recent years. Of course, Bork has considered that problem and has answered with the following:

> Because hardware will become cheaper, and because we are becoming more skillful in developing computer based curriculum material, the computer will eventually become, in almost every area of education, the cheapest learning delivery system. (Bork, 1984, p. 178)

Only time will tell which one has made the correct assumptions and drawn the correct conclusions.

Other authors have called for a rethinking of current educational goals and practices in light of new opportunities presented by instructional computing. O'Brien

stated this idea in the following manner:

> Perhaps instead of using new technology to achieve old goals, we should entirely rethink the goals of education. Perhaps we should enlist this fabulously versatile new machine, the micro [sic], to tackle a new goal: teaching students the methods for weaving a fabric of relational knowledge, rather than teaching inert associations to be stored (or not) in memory bins. (O'Brien, 1983, p. 26)

O'Brien has urged that educators consider restructuring education to accommodate the new possibilities created by the microcomputer rather than fashioning microcomputer use to conform to traditional educational goals and practices.

While some authors have written about the future of education with the microcomputer, others have concentrated on the future of education without the microcomputer. Podemski (1982, p. 16) has intimated that the leadership role in instructional computing could be lost by educators because "If professional education does not accept this challenge then others will." Supporting Podemski's position, Koetke warned in the passage that follows that educators do not have much time in which to regain the leadership role:

> Although predicting the future is an inaccurate business, my experience suggests that schools have only two or three years left in which they will be able to again grasp the reins of educational leadership, and that can only be done by making rapid changes in an institution traditionally slow to respond. (Koetke, 1984, p. 169)

Both authors expressed concern for the continued leadership role of the educational establishment. Podemski and Koetke articulated the fear that educators may find in the not too

distant future that the leadership role in education has quietly been taken away from them.

The authors who write about the future of instructional computing have an advantage since time must pass before anyone will know if their predictions are correct. In the final analysis, White may have made the safest prediction by writing:

> What the new technology can do and what form it will take is anyone's guess at this point, but we do know that it is going to change. Schools will never be the same. (White, 1983, p. 15)

Characteristics of Microcomputer-Using School Districts

A good deal of energy seems to have gone into determining exactly how many microcomputers are finding their way into the nation's schools and into which school districts those microcomputers are finding their way. Interestingly enough, the reports conflict on how many microcomputers have been placed in the nations school districts. TALMIS ("U.S. Approaching," 1984, p. 9) reported that there were 730,000 microcomputers in the nations schools at the end of the 1983-84 school year while Ingersoll and Smith (1984, p. 86) reported 500,000 microcomputers by the end of the same year and projected that the number of microcomputers in schools could top one million by the end of the 1985-86 school year. That prediction could prove to be quite conservative if the TALMIS figure for the number of computers at the end of the

1983-84 school year is the more accurate and if Grayson's assertion (1984, p. 80) that "the number of microcomputers in elementary and secondary schools is tripling every 18 months" proves to be true.

In addition to simply trying to determine how many microcomputers are in the schools, researchers also seem interested in determining what type of school districts are the most active participants in microcomputer purchasing. In most cases this inquiry has been limited to counting the number of microcomputers owned by different types of districts or determining which districts have microcomputers and which ones do not. Market Data Retrieval (cited in "55,000 Schools," 1984, p. 49) reported in 1983 "that 80% of the 2,000 largest, richest high schools used computers for instruction, while only 40% of the smaller, poorer high schools did." Protheroe, Carroll, and Zoetis (1982, p. 9) found that computer use decreased as the size of the school district decreased and per pupil expenditures decreased. Hayes (1982) found that (a) school districts with larger enrollments were more likely to have microcomputers; (b) urban and suburban school districts were more likely to have microcomputers than rural school districts; (c) per pupil expenditures were correlated with microcomputer use; and (d) the wealthier the community, the more likely it was that the schools would have microcomputers. A similar study at the Center for the Social Organization of Schools at the Johns

Hopkins University (1983) reported similar results. However, Hall (1982) found that the average per pupil expenditures of a school district was not related to microcomputer ownership.

All of these studies have one thing in common: they all have taken a very surface approach to the use of microcomputers. They do not go beyond simply counting the microcomputers in a school and examining factors that relate to that one number. It would seem that it is time to move beyond that stage and to begin examining how schools are using microcomputers and the factors that relate to their use.

Summary

This review of the literature related to instructional computing has revealed that although the literature is diverse there are common themes that have been repeated by several authors. Eight of the themes from the literature that relate to the topic of this study follow:

1.0 There is general agreement that microcomputers can improve the efficiency of school management functions.

2.0 There is general agreement that the use of computers can be an effective instructional tool.

3.0 The implementation of educational computing is taking varying forms in different school districts with mixed results relative to efficiency and effectiveness.

4.0 Some concern has been expressed that not all students are being provided with equal opportunities.

5.0 General interest has been expressed in the number of microcomputers being purchased by school districts and in which type of school district has been purchasing the most microcomputers.

6.0 There has been interest in the characteristics of microcomputer-using school districts with the size and wealth of the districts being of particular interest.

7.0 Concern has been expressed regarding the current level of teacher training and expertise.

8.0 Concern has been expressed regarding the availability of funding for educational computing.

The interrelationships between funding, teacher training, school district characteristics, and the implementation of microcomputer use in the schools were an integral part of this study. These themes from the literature relate to this study in that it was an attempt to examine in more depth than has been done previously the relationships between school district characteristics and the extent and quality of microcomputer use.

CHAPTER III

METHODOLOGY

The method used for this study was complicated by the type of information sought. Since a comparison was made between school district characteristics and the extent and quality of school district microcomputer use, some means had to be devised to measure the extent and quality of a school district's microcomputer use. As no method of measurement was available in the literature related to this topic, theoretical formulas were developed to provide a method of measuring administrative and instructional microcomputer use. Using a modified Delphi approach, the theoretical formulas were converted to applied formulas that differentiated between school districts based upon their microcomputer use. After that differentiation was made, the scores that individual school districts received on the scale were compared to selected school district characteristics. In order to more completely explain the actual method used, this description consists of four parts: (a) the research questions, variables, and samples; (b) the Delphi methodology; (c) measurement of the factors and applying the formulas; and (d) the comparison of microcomputer use to school district characteristics.

Research Questions, Variables, and Samples

The problem suggested three research questions:

1.0 Is there a relationship between school district characteristics and the extent and quality of microcomputer use in instruction?

2.0 Is there a relationship between school district characteristics and the extent and quality of microcomputer use in school management?

3.0 Is there a relationship between the extent and quality of microcomputer use in school management and the extent and quality of microcomputer use in instruction?

The problem suggested two dependent variables: (a) the extent and quality of microcomputer use in school management and (b) the extent and quality of microcomputer use in instruction. These variables were multivariate in nature in that many factors were considered in measuring them.

In the problem statement, the term "school district characteristics" was used to represent a group of independent variables that may have exhibited some relationship to the two dependent variables. For this study the school district characteristics that were used as independent variables were: (a) the size of the school district (as measured by average daily attendance); (b) the relative wealth of the school district (as measured by assessed valuation per pupil); (c) the district's per pupil expenditures; (d) the district's student-to-teacher ratio;

(e) the district's administrator-to-teacher ratio; (f) the funding source for microcomputer use (as measured by the percent of the total microcomputer budget paid from local, federal, or other sources); (g) the district's investment in mini or mainframe computers (as measured by current expenditures); and (h) the longevity of the district's superintendent.

Each of these characteristics was chosen for study for a particular reason. Size, wealth, and per pupil expenditures were chosen for study because they represented the demographic characteristics most commonly used in other studies found in the literature. Student-to-teacher ratio and administrator-to-teacher ratio were selected as a means of determining whether there was any interaction with school district staffing patterns. Funding source was chosen as a way to determine whether or not the source of funding for microcomputer use was related to the actual use of microcomputers. Investment in mini or mainframe computers was selected as a means to determine whether the use of mini or mainframe computers indicated that school districts would be more or less inclined to use microcomputers. Superintendent longevity was chosen as a means of measuring relative stability or change in school district leadership and whether any relationship existed with microcomputer use.

These research questions were investigated through the use of three samples. Since Illinois allows three

organizational patterns for school districts, a sample was taken from each one: unit districts (grades K-12), elementary districts (grades K-8), and high school districts (grades 9-12). All samples were random samples with no stratification procedure used. Sample size and specific procedures are included later in this chapter.

Delphi Methodology

A fundamental component of this study was the requirement that a means be developed for measuring the extent and quality of microcomputer use in school districts. The literature related to this topic contains research on the number of microcomputers used by school districts and summaries of how school districts use microcomputers. A review of the related literature revealed no previous attempt to measure the total administrative and instructional computing program of a school district. Because no method of measurement was found in the literature, a modified Delphi technique was employed as an independent way of developing the necessary measurement scale.

The Delphi Technique was developed by the Rand Corporation in 1950 as a way to eliminate the problems associated with using panels in decision making processes. (Riggs, 1983, p. 89) Delphi is a method of achieving a group consensus among experts of some discipline without

having the group dynamics of the traditional panel interfere with the process. (Preble, 1983, p. 75; Dodge & Clark, 1977, p. 58) Judd gives a good summary of the Delphi Technique as follows:

> To review the Delphi method, Delphi is characterized by: anonymity of response; multiple iterations; convergence of the distribution of answers, and a statistical group response (median, interquartile range) preserving intact a distribution that may still remain wide. (Judd, 1972, p. 35)

Several studies have been conducted to determine the effectiveness of the Delphi Technique in education and other disciplines. (e.g. Hartman, 1981; Weaver, 1971; Cyphert and Gant, 1971) For the most part, the Delphi methodology has been shown to be reliable in bringing a group of people who are knowledgeable about a topic to consensus. By eliminating actual contact among the participants, dominance of the group by one strong personality is prevented.

The panel used for this study was taken from the nineteen directors of the state supported computer consortia in the state of Illinois. These individuals hold their positions because of a common expertise in the uses of microcomputers in educational settings. Because of their involvement with large numbers of school districts, these individuals should have a unique perspective of the state-of-the art in educational microcomputer use. The procedures used with the panel follow:

1.0 The instructional and administrative surveys found on pages 128 and 129 in Appendix A were mailed to all

nineteen consortia directors in the state of Illinois. The surveys contained a list of twelve factors for instructional computing and a list of twenty-eight factors for administrative computing compiled from the literature. A letter (p. 126, Appendix A) soliciting the directors' participation in the study and outlining the extent of commitment that would be required of them accompanied the surveys.

1.1 The consortia directors were asked to indicate the factors on each survey that they considered important when one measures the extent and quality of microcomputer use and to add any factors that they thought were missing. Ten of the directors returned the first round of surveys. No attempt was made to follow-up with the individuals who did not return the first survey since that was an indication that they did not want to become members of the panel.

2.0 The thirty-four instructional factors and the thirty-seven administrative factors that the participants indicated as being important in the first round of surveys were compiled to form a second set of surveys. Tables 3.1 and 3.2 contain a summary of the factors and an indication of which ones were derived from the literature and which ones were contributed by the panel. After the compilation, the surveys found on pages 132 and 135 in Appendix A were mailed to the ten panelists.

2.1 The participants were asked to assign a weight to each factor on the surveys using a scale of 0 to 10 with 10 being high. Their responses were to be based on the relative importance that they would place on each factor. Eight of the ten participants returned the second round of surveys.

3.0 Means and medians of the weights assigned to the factors during the second round of surveys were reported to the panelists in the surveys found on pages 139 and 142 in Appendix A. Also included were their own responses for each of the factors included in the surveys.

3.1 The participants were asked to make any changes in the weights they had assigned to each factor based upon the overall group response. All eight of the remaining participants returned the third and last survey.

4.0 The means of the panelists' final weights for the factors and the actual factors identified by the panel were used to create the applied formulas for measuring the extent and quality of administrative and instructional microcomputer use.

Factors Selected from the Literature:
Drill and practice
Tutorial
Computer managed instruction
Simulations
Teaching computer-related information skills (editing text, retrieving information)
Computer programming
Computer science
Computer awareness and literacy
Computer assisted instruction
Written curriculum
Inservice program
Number of students receiving various types of instruction

Factors Contributed by the Delphi Panel:
Keyboarding
Problem solving
Business Education department usage of computers in typing, accounting, and filing instruction
Type and variety of students using computers
Number of computers per student
Extent of use of existing computers (percent of available time used)
Number and types of teachers using computers
Subjects in which computers are used
Computer applications - word processing, databases, electronic spreadsheets
Number of days spent on each instructional topic per grade
Arrangement of computers (class, lab, learning center)
Computer coordinator on staff
Budget amounts for hardware, software, materials, and maintenance over the last three years
Average amount of time students are on the computer
Number of software packages used in each grade
Percent of staff involved with instructional use of computers
Existence of computer curriculum task force
Local evaluation process of computer curriculum
Balance of literacy, programming, applications, and CAI in K-12 curriculum
Percent of staff using teacher utility programs, word processing, database management programs, gradebook programs, and software creation aids to support the instructional process
Computer clubs and after hours student use of computers
Examples of assignments from various classes where software or other computer usage is necessary

Instructional Computing Factors
Identified by the Delphi Panel
Table 3.1

Factors Selected from the Literature:
Student attendance
Enrollment projections
Health records
Grades
Scheduling
School calendar
Student records
Testing program (construction, analysis, evaluation)
Payroll
Personnel records
Salary simulation (projections for negotiations)
Energy management
Facilities/equipment inventory
Maintenance records and scheduling
Accounting
Financial forecasting
Vendor reports/purchase orders
Bus routing
Mailing lists/labels
Project planning and budgeting
Research/statistical analysis
Word processing
Curriculum planning and production
Professional development
Database access
Public relations/information
Use of microcomputers in library management
Inservice program for administrators (topics and number enrolled)
Number of administrative microcomputers (in each building and in central office)

Factors Contributed by the Delphi Panel:
Maintenance of school cafeteria expenditures/costs/receipts
Extent of centralization of computer use vs. decentralization
Use of off-campus computer services to do any of the above (purchased services)
Introduction to computers for administrators
Number of staff assigned to manage computer usage by administration
Percent of secretaries using microcomputers for word processing, etc.
Number of years each application has been used
Training for secretaries (number of workshops, number of staff attended, number offered during the day, number offered after hours)

Administrative Computing Factors
Identified by the Delphi Panel
Table 3.2

The specific formulas derived from the Delphi study followed two general formulas that had been hypothesized when this study was undertaken. The general case of the formula for instruction was hypothesized as $f(x) = ((c_1x_1 + c_2x_2 + \ldots + c_nx_n) / B) * 100$ where c represents the weight for each factor, x is the measure of the factor contributing to the extent and quality of a school district's microcomputer use, and B represents the maximum possible value for the summation of c_1x_1 to c_nx_n. The general case for the management formula was hypothesized as $f(x) = (((c_1x_1 + \ldots + c_nx_n) * A) / (B * D)) * 100$ where c represents the weight of the factor, x represents the measure of the factor contributing to the extent and quality of a school district's microcomputer use, B represents the maximum possible value for the summation of c_1x_1 to c_nx_n, A represents the number of administrative microcomputers, and D represents the number of administrators in the school district. After the completion of the Delphi study, the instructional formula was supported while the management formula was changed to follow the same format as the instructional formula. Since the ratio A/D in the originally hypothesized formula was identified as only a moderately weighted factor by the panel, it was clear that the originally hypothesized formula gave too much weight to the microcomputer-to-administrator ratio. Therefore, the microcomputer-to-administrator ratio became just another

factor in the $c_i x_i$ summation causing the final administrative formula to become $f(x) = ((c_1x_1 + \ldots + c_nx_n) / B) * 100$. Therefore, the same general formula was applied to both cases. The actual weights and factors used in the applied formulas were determined by the Delphi panel.

Measuring the Factors and Applying the Formulas

The actual measurement of each factor used in the formulas was a fairly simple matter. Each question in each of the final school district surveys was designed to yield a quantity that could easily be used in the formula. Three types of response were used: (a) percentages; (b) counts; and (c) yes or no.

Each type of response had a special type of application within the formula. Percentage answers were simply multiplied by the weight of the factor. Counts were divided by some arbitrary standard or maximum and then multiplied by the weight of the factor. Yes and no responses were assigned values of one and zero, respectively, and then were multiplied by the weights of the factors. It should be noted that in each case these procedures yielded a value from zero to the maximum value of the factor's weight. The resultant quantities were then substituted in the formula and a final value representing the extent and quality of microcomputer use was calculated for each school district.

Comparison of Microcomputer Use to District Characteristics

Once the formulas to measure a school district's extent and quality of microcomputer use were developed, the second part of this study was undertaken. The extent and quality of school microcomputer use was compared to the selected school district characteristics. Through mailed surveys and telephone surveys, data were gathered to provide the information needed in the formulas and to provide the information needed to measure the characteristics. After these data were gathered, they were analyzed using multiple regression analysis to determine the extent and relative relationships among the variables. The procedures used to gather the data follow:

1.0 Illinois law permits three organizational patterns for school districts: elementary (grades K-8), high school (grades 9-12), and unit (grades K-12). Since each kind serves a different type of student population and is governed by slightly different laws, they were treated as three separate populations. The selection of samples from the three populations was randomized as follows: (a) the districts were ranked by size (average daily attendance); (b) three lists of random numbers were generated using the random number generator resident in Applesoft BASIC (Apple //e); (c) each list of random numbers was restricted to the range from zero to the

total number of school districts in that classification; and (d) the school districts to be surveyed were then selected from the rank-order list by matching their positions on the list to the list of random numbers.

1.1 The surveys found on pages 152 and 161 in Appendix A were mailed to a random sample of 41 elementary school districts within the state of Illinois along with the letter on page 151.

1.2 The surveys found on pages 158 and 161 in Appendix A were mailed to a random sample of 22 high school districts within the state of Illinois along with the letter on page 151.

1.3 The surveys found on pages 155 and 161 in Appendix A were mailed to a random sample of 42 unit districts within the state of Illinois along with the letter on page 151.

1.4 In each of the mailings, the respondents were asked to return the surveys by a given date. All surveys were mailed to the superintendents of the school districts asking that the superintendent have the most appropriate person(s) complete the surveys and return them.

2.0 A telephone survey was used to follow-up with all of the school districts that did not return the mailed survey by the specified date.

3.0 The data were analyzed using multiple regression analysis to establish the extent and relative

relationships among the variables.

CHAPTER IV

RESULTS

The very nature of this study has caused the presentation and analysis of the data to be somewhat complicated. The preliminary work that created the measurement formulas for the dependent variables, the multivariate nature of the study itself, the multiple factors that were finally used in the formulas, and the multiple samples used all contributed to this problem. In order to simplify this discussion as much as possible, two major divisions are presented: (a) the development of the measurement formulas for the dependent variables and (b) the comparison of school district characteristics to the extent and quality of microcomputer use.

Formula Development

The formulas used to measure the dependent variables were developed through the application of a modified Delphi technique. A panel of experts was surveyed multiple times to determine the factors to include in the formulas and to determine the weights each factor would have within the formulas. This discussion will focus on the two components of the formulas that were derived using this technique:

(a) the factors used in the formulas and (b) the weights assigned to each of the factors in the formulas.

Identification of the Factors

The factors used within the two formulas were identified as follows:

1.0 The literature was searched for possible factors. That information was incorporated in the surveys found on pages 128 and 129 in Appendix A which were used for the first round of surveys with the Delphi panel.

2.0 During the first round of surveys, the Delphi panel members were asked to indicate which factors were important and to add any factors that might have been missing. These factors are listed in the surveys on pages 132 and 135 in Appendix A.

3.0 Before finalizing the formulas, duplication or overlap of factors was eliminated and factors which were beyond the scope of this study were eliminated.

3.1 The factors eliminated from the instructional list generated by the Delphi Panel (see Table 3.1 for the complete list) were:

(a) Examples of assignments would have been too difficult to quantify.

(b) After hours use of the microcomputers was deemed too nebulous to use.

(c) Number of software packages used was deemed unnecessary since the extent of student use of microcomputers and the pervasiveness of the program were to be measured.

(d) Average time spent on a microcomputer by each

student was considered redundant since the ratio of microcomputer time used to the amount of time available was to be measured as was the computer-to-student ratio.

(e) Number of days spent on each topic was deemed unnecessary since the extent of student use of microcomputers was to be measured.

(f) Type and variety of students using microcomputers was considered redundant since the percent of students using microcomputers in various ways was to be measured.

(g) Typing and filing instruction would have duplicated the keyboarding and database factors.

(h) Computer related information skills was measured by the database and spreadsheet items.

3.2 The factors eliminated from the administrative list generated by the Delphi panel (see Table 3.2 for the complete list) were:

(a) Extent of centralization of computer use was deemed too difficult to quantify.

(b) Use of off-campus computer services was deemed inappropriate for the formula intended to measure microcomputer use.

(c) Number of staff employed to manage computer use was deemed too difficult to quantify since an appropriate ratio (or standard) would have been almost impossible to establish.

The factors finally used in the formulas are listed in Table 4.1 (instruction) and Table 4.2 (administration).

No.	Weight[2]	Factor Name
1[1]	51	Microcomputer use for drill and practice programs
2[1]	71	Microcomputer use for tutorial programs
3[1]	62	Microcomputer use for computer managed instruction
4[1]	70	Microcomputer use for computer assisted instruction
5[1]	76	Microcomputer use for simulations
6	88	Computer awareness and literacy
7	75	Keyboarding
8	71	Problem solving
9[1]	52	Number of students enrolled in computer science/programming classes[3]
10	86	Instruction in word processing[3]
11	88	Use of microcomputers in accounting classes[3]
12	86	Instruction in data base management[3]
13	86	Instruction in the use of spreadsheets[3]
14[1]	68	Extent of formal curriculum
15[1]	88	Staff inservice
16	85	Microcomputer-to-student ratio
17	89	Amount of available time the microcomputers are used
18	73	Staff use in classrooms
19	84	Location of computers
20	70	Presence of a computer education coordinator
21	68	Computer education expenditures per student
22	64	Presence of a curriculum task force
23	78	Presence of a formal evaluation process for the computer education program
24	79	Use by teachers for utility programs
25	79	Use by teachers for word processing
26	79	Use by teachers for data base management
27	79	Use by teachers for grade books
28	79	Use by teachers for authoring languages

Instructional Computing Factors
Used in the Measurement Formula

Table 4.1

[1] Factors selected from the literature and suggested to the panel. All others were suggested by the panel.

[2] Means of final panel weights multiplied by ten to convert from a one-to-ten scale to a one-to-one hundred scale.

[3] Not used for elementary districts.

No.	Weight[2]	Factor Name
1	76	Student attendance
2	75	Enrollment projections
3	70	Health records
4	80	Grades
5	80	Scheduling
6	50	School calendar
7	78	Student records
8	81	Testing program
9	74	Payroll
10	76	Personnel records
11	85	Salary simulations for negotiations
12	78	Energy management
13	79	Facilities/equipment inventories
14	76	Maintenance records and schedules
15	81	Accounting
16	89	Financial forecasting
17	75	Vendor reports/purchase orders
18	56	Bus routing
19	78	Mailing lists/labels
20	83	Project planning and budgeting
21	74	Research/statistical analysis
22	94	Word Processing
23	71	Curriculum planning and production
24	62	Professional development
25	75	Data base access
26	42	Public relations/information
27[1]	79	School cafeteria expenditures, costs, receipts
28[1]	81	Library management
29	70	Administrator inservice
30	65	Microcomputer-to-administrator ratio
31[1]	81	Administrators introduced to microcomputers
32[1]	81	Percent of secretaries using microcomputers
33[1]	51	No. of years microcomputers have been used for administration
34[1]	78	Secretary inservice

Administrative Computing Factors
Used in the Measurement Formula

Table 4.2

[1] Factors suggested by the panel. All others were selected from the literature and suggested to the panel.

[2] Means of final panel weights multiplied by ten to convert from a one-to-ten scale to a one-to-one hundred scale.

Assigning Weights to the Factors

As part of the formula development process, the factors identified by the Delphi panel were also assigned weights by the panel members. The procedures that were followed are described in Chapter III. The data for each of the intermediary stages are found in Appendix A and referenced in the procedures found in Chapter III. The weights for the factors used in the formulas are listed in Tables 4.1 and 4.2. These weights were derived from the means of the final panel weights by multiplying each mean by a factor of ten to simplify computation and presentation of the data.

The final weights for the instructional factors ranged from 51 to 89 with a mean of 75.9 and a standard deviation of 10.36. The final weights for the administrative factors ranged from 42 to 94 with a mean of 74.2 and a standard deviation of 10.99. The way that the factors and their weights were applied in the formula is deferred until the next section.

Comparison of School District Characteristics to the Extent and Quality of Microcomputer Use

The comparison of school district characteristics to the extent and quality of microcomputer use consisted of two major parts: (a) the application of the evaluative formulas to the raw data to yield the measures of the dependent

variables and (b) multiple regression analyses using the measurements of the dependent and independent variables. Prior to these discussions the following general information about the raw data may be helpful:

1.0 The raw data were gathered from three random samples each representing one of the three organizational patterns of school districts permitted by Illinois law: unit districts (grades K-12), elementary districts (grades K-8), and high school districts (grades 9-12).

2.0 The data were gathered by mailed surveys and by telephone surveys.

2.1 T-tests were performed on the data resulting from the application of the formulas to the measures of the factors to determine whether any differences existed between the two types of data (see Appendix C).

2.2 No statistically significant difference was found between mail-gathered and phone-gathered data (see Appendix C), so the data were merged and treated equally.

3.0 The overall return rate (mailed plus phone) for each sample was 83.3% (35 out of 42) for unit districts, 75.6% (31 out of 41) for elementary districts, and 77.3% (17 out of 22) for high school districts.

3.1 The returns represented 7.8% (35 out of 450) of the total unit districts in the state of Illinois, 7.1% (31 out of 435) of the total elementary districts, and 13.5% (17 out of 126) of the total high school districts. A

higher percentage of high school districts was surveyed because of the smaller population of high school districts. A smaller sample would have made meaningful statistical analysis very difficult and would have increased the chance of sampling error.

3.2 The raw data used in the formulas begins on page 164 in Appendix B.

Application of the Formulas to the Dependent Variables

Once the factors and weights had been determined for the formulas, they were applied to the raw data. Following are examples representing the application of the instructional formula and the administrative formula to one case each.

The general case of the instructional formula was $f(x) = ((c_1x_1 + \ldots + c_nx_n) / B) * 100$ where x_i represents the measure of the individual factor, c_i represents the factor's weight in the formula, and B represents the maximum that $(c_ix_i + \ldots + c_nx_n)$ can equal. In all cases, the x values were transformed to scales ranging from 0 to 100 so that in actuality B equaled $(c_1 + \ldots + c_n)$.

Each of the following four tables represents a different portion of the application of the formulas to the factors. Table 4.3 demonstrates how the instructional factors were measured. Table 4.4 demonstrates how the administrative factors were measured. Table 4.5

demonstrates the application of the instructional formula to all of the factors of a single case taken from the raw data found on page 164 in Appendix B. Table 4.6 demonstrates the application of the administrative formula to all of the factors of a single case taken from the raw data found on page 175 in Appendix B. Tables 4.5 and 4.6 also contain explanations of some of the score transformations that might not be clear without some study. The transformations that may be difficult to follow set up some type of ratio that is then multiplied by the weight of the factor. However, the score transformations performed on the data were arithmetic in nature and did not alter the nature of the distributions. (Minium, 1978, p. 67) The purpose of these data and the formulas was to show the relative positions of the school districts being studied on a scale ranging from 0 to 100 with 100 being the maximum. Since the score transformations performed on the data did not alter the nature of the distributions, they did not affect the integrity of the relative positions represented by the measurements.

Factors[1]	Method of Measurement[2]	Survey Question[3]
1-5	Number of subjects multiplied by the percent of students using microcomputers for that purpose	#2 and #3
6-8	Percentage as reported in survey	#4
9	Percentage as reported in survey	#5
10-13	Yes/no as reported in survey (1,0)	#6
14	Number of grades reported	#7
15	Total percent of staff involved	#8
16	Number of microcomputers reported	#9
17	Number of hours used	#10
18	Percent as reported in survey	#11
19	Sum of values assigned: classroom 1 lab 3 learning center 2	#12
20	Actual f.t.e. reported	#13
21	Actual expenditures reported	#14
22	Yes/no as reported in survey (1,0)	#15
23	Yes/no as reported in survey (1,0)	#16
24-28	Percent as reported in survey	#17

Measuring the Factors for Instruction
Table 4.3

[1] Please see table 4.1 for factor names.

[2] Measurements reported represent raw data generated for Appendix B.

[3] Survey questions from pages 155-157 in Appendix A.

Factors[1]	Method of Measurement[2]	Survey Question[3]
1-28	Yes/no as reported in survey (1,0)	#2
29	Number of inservice activities multiplied by the percent of participating administrators	#3
30	Number of microcomputers reported	#4
31	Percent of participating administrators	#5
32	Percent reported in survey	#6
33	Number of years reported	#7
34	Sum of percents reported	#8

Measuring the Factors for Administration
Table 4.4

[1] Please see table 4.2 for factor names.

[2] Measurements reported represent raw data generated for Appendix B.

[3] Survey questions from pages 161-162 in Appendix A.

No. of Factor	Measure[1]	Score Transformation	Result
1	30	(30/300) x 51 [2]	5.1
2	40	(40/300) x 71	9.5
3	0	(0/300) x 62	0
4	0	(0/300) x 70	0
5	0	(0/300) x 76	0
6	12	(12/100) x 88	10.56
7	12	(12/100) x 75	9
8	8	(8/100) x 71	5.68
9	20	(20/100) x 52	10.4
10	1	1 x 86	86
11	1	1 x 88	88
12	1	1 x 86	86
13	1	1 x 86	86
14	4	(4/13) x 68	20.9
15	20	(20/200) x 88	8.8
16	18	((18/501[3]) x 10) x 85	30.53
17	6	(6/8) x 89	66.75
18	10	(10/100) x 73	7.3
19	4	(4/6) x 84	56
20	0	0 x 70	0
21	7232	((7232/501[3])/100) x 68	9.81
22	0	0 x 64	0
23	0	0 x 78	0
24	0	(0/100) x 79	0
25	0	(0/100) x 79	0
26	0	(0/100) x 79	0
27	0	(0/100) x 79	0
28	0	(0/100) x 79	0
		Sum	596.33

f(x) = (596.33 / 1808) * 100 = 32.98

Applying the Instructional Formula
for the Dependent Variable

Table 4.5

[1] Data taken from Unit District case #1 in Appendix B. The derivation of the data has been described in Table 4.3.

[2] The measure of this factor, 30, was generated by multiplying a count by a percentage (see Table 4.3). Three hundred was the maximum value found in the data for this factor. 51 is the factor's weight from Table 4.1.

[3] 501 was the district's ADA.

No. of Factor	Measure[1]	Score Transformation	Result
1-28	524	none	524 [2]
29	0	(0/200) x 70 [3]	0
30	1	(1/2 [4]) x 65	32.5
31	100	(100/100) x 81	81
32	0	(0/100) x 81	0
33	3	(3/5) x 51	30.6
34	0	(0/200) x 78	0
		Total	668.1

$$f(x) = (668.1 / 2524) * 100 = 26.47$$

Applying the Administrative Formula for the Dependent Variable

Table 4.6

[1] Data taken from Unit District case #2 in Appendix B. The derivation of the data is described in Table 4.4.

[2] $(c_1x_1 + c_{28}x_{28})$

[3] The measure of the factor, 0, was derived by multiplying a count by a percentage. Two hundred was the maximum value found in the data for this factor. 70 is the factor's weight.

[4] 2 was the number of administrators in the district.

Multiple Regression Analysis

The final analyses of the data used multiple regression analysis to determine whether any relationships existed among the variables. The results of the analyses are organized according to the research questions.

Research Question Number One

Is there a relationship between school district characteristics and the extent and quality of microcomputer use in instruction?

The results of the investigation relative to this research question are presented separately for each sample. The samples were taken from the three organizational patterns of school districts allowed within the state of Illinois: unit districts (grades K through 12), elementary districts (grades K through 8), and high school districts (grades 9 through 12).

Name	Represents
LOCFUN	Proportion of computer education budget paid from local funds
OTHCOM	Annual expenditures for a mini or mainframe computer for instructional use
SUPT	Superintendent longevity
ADA	Average daily attendance[1]
EAVPER	Per pupil equalized assessed valuation[2]
EXPPER	Per pupil expenditures[3]
STU/TCHR	Student-to-teacher ratio[4]
TCHR/ADM	Teacher-to-administrator ratio[4]
DEPVAR	Score derived for a particular school district using the measurement formula for instruction.
FEDFUN	Proportion of computer education budget paid from federal funds
OTHFUN	Proportion of computer education budget paid from sources outside standard revenue sources (PTA, booster clubs, etc.)

[1] Data provided by the Illinois State Board of Education.

[2] Data from Annual State Aid Statistics, 1983-84.

[3] Data from Illinois Public Schools Financial Statistics 1981-1982 School Year.

[4] Calculated values.

Variable Names - Instruction

Table 4.7

Unit Districts

The data collected from unit districts relating to the dependent and the independent variables are in Table 4.8 along with the means and standard deviations for each variable. Please note that zeros represent values and were used in computations. An explanation of the abbreviations for the variable names is, again, in Table 4.7.

The data in Table 4.8 were analyzed in two ways. First, correlation coefficients were computed among all the variables. The correlation matrix for these variables is shown in Table 4.9. Secondly, the data were analyzed using a stepwise multiple regression analysis procedure. This procedure selects variables from the set of predictor variables according to their ability to contribute to the regression equation at a pre-determined level of statistical significance (F-value). (Madigan & Lawrence, 1983, pp. 34-36) In this manner, any statistically significant combination of predictor variables can be identified. The results of this procedure for the unit district data are in Table 4.10.

As can be seen in Table 4.10, a statistically significant relationship (.05 level) was found between the dependent variable and two of the predictor variables: the student-to-teacher ratio (STU/TCHR) and the average daily attendance (ADA). About 16% of the variance in the dependent variable was associated with change in the two

predictor variables. Although the relationship was statistically significant, these independent variables would not make particularly good predictors of the dependent variable because of the amount of the dependent variable's variance that was not related to them. However, in general as the district size increased and the student-to-teacher ratio decreased, the extent and quality of microcomputer use for instruction increased.

These results are interesting in that the relative wealth of the school districts and the funding source for computer education was not found to be related to the extent and quality of instructional microcomputer use. Instead, district size and the student-to-teacher ratio were more reliable predictors of the extent and quality of instructional microcomputer use. The relationship to the size of the district was perhaps the most expected one. A relationship to district wealth or size would be the most common hypothesis.

The relationship to the student-to-teacher ratio is harder to understand. Two possible explanations suggest themselves immediately. First, the smaller student-to-teacher ratio could mean smaller class sizes in the districts with a higher commitment to computer education. It would not be surprising to find that such districts made a commitment to computer education because of a long-standing commitment to quality education. Second, the

smaller student-to-teacher ratio could indicate that these districts do not necessarily have smaller classes but instead may simply have more teachers of special subjects. Again it may simply represent a desire for quality education that is also reflected by an aggressive approach to computer education implementation.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
1	25	0	8	501	17940	2420	12.525	13.333	32.982	75	0
2	0	0	5	295	63510	3269	13.409	11	36.236	100	0
3	25	0	19	776	44605	2200	15.52	12.5	31.555	25	25
4	10	0	18	719	65309	2824	14.38	11.111	36.850	80	10
5	10	14000	9	3633	43606	2447	15.329	14.812	36.263	65	25
6	100	0	4	386	54804	2965	12.866	15	27.089	0	0
7	70	0	1	553	49342	2161	20.481	13.5	17.480	20	10
8	0	0	1	1852	54746	2129	17.308	21.4	19.481	0	100
9	0	0	11	412	41833	3830	15.259	9	9.7820	100	0
10	10	0	9	737	42688	2578	5.6259	10.076	33.342	45	45
11	0	0	1	510	56777	2847	12.75	16	32.870	75	25
12	20	1000	3	468	56166	2950	15.6	12	7.7588	80	0
13	50	0	8	759	75168	2645	13.8	13.75	22.835	50	0
14	0	0	1	244	49708	2410	5.1914	15.666	53.134	50	50
15	50	0	3	244	49708	2410	9.76	12.5	13.834	0	50
16	0	0	21	759	75168	2645	16.148	15.666	11.517	20	80
17	100	0	4	994	21264	2359	16.566	15	13.602	0	0
18	5	0	1	1012	8194	3650	13.493	12.5	14.850	95	0
19	60	0	12	1738	93189	2739	10.862	13.333	33.703	40	0
20	10	0	17	832	48875	2277	16.979	9.8	17.595	90	0
21	50	0	5	607	64699	2460	13.795	14.666	11.282	50	0
22	80	0	7	711	46322	2453	13.941	17	26.116	20	0
23	50	0	3	509	65227	2115	13.051	13	35.894	50	0
24	90	0	4	1638	54139	2898	13.65	12	51.766	10	0
25	100	0	1	2015	19152	2629	16.791	24	30.252	0	0
26	50	0	1	1605	53899	3367	12.346	13	33.812	25	25
27	10	0	2	3333	38388	2572	22.22	15	34.717	85	5
28	10	0	11	707	10909	2925	12.854	13.75	24.043	90	0
29	0	0	12	439	45192	2325	11.864	12.333	19.586	100	0
30	0	0	19	591	51822	2582	13.133	15	24.852	100	0
31	5	0	3	7373	51767	3008	14.542	12.675	30.516	80	15
32	99	0	13	1937	28565	2469	16.415	11.8	52.389	1	0
33	50	0	4	829	29442	2309	15.351	18	34.702	50	0
34	100	200	17	724	49353	2561	14.48	16.666	23.967	0	0
35	30	500	27	1336	29394	2807	14.212	15.666	17.967	50	20

	Variable	Mean	S.D.
X1	LOCFUN	36.257	36.377
X2	OTHCOM	448.571	2365.484
X3	SUPT	8.143	7.013
X4	ADA	1193.657	1334.748
X5	EAVPER	47167.714	18499.751
X6	EXPPER	2663.857	406.759
X7	STU/TCHR	14.071	3.238
X8	TCHR/ADM	14.072	3.004
X9	DEPVAR	27.275	11.778
X10	FEDFUN	49.171	35.842
X11	OTHFUN	13.857	24.286

Unit Districts - Instructional Data
Table 4.8

	LOCFUN	OTHCOM	SUPT	ADA	EAVPER	EXPPER
LOCFUN	1.000					
OTHCOM	-.1279	1.000				
SUPT	-.1512	.0320	1.000			
ADA	-.0686	.3112	-.1404	1.000		
EAVPER	-.0731	-.0331	.0865	-.0440	1.000	
EXPPER	-.1956	-.0825	-.0751	.0769	-.0710	1.000
STU/TCHR	.1565	.0741	.0182	.2776	-.1381	-.1136
TCHR/ADM	.2788	.0398	-.2091	.1037	-.1585	-.3339
DEPVAR	.1401	.1066	-.1335	.2173	.0262	-.1140
FEDFUN	-.7608*	.0843	.1251	.0426	-.0639	.3732*
OTHFUN	-.3657*	.0729	-.0051	.0493	.2081	-.2232

	STU/TCHR	TCHR/ADM	DEPVAR	FEDFUN	OTHFUN
STU/TCHR	1.000				
TCHR/ADM	.2194	1.000			
DEPVAR	-.2598	-.0009	1.000		
FEDFUN	-.0564	-.4532*	-.1069	1.000	
OTHFUN	-.1648	.2671	-.0631	-.3159	1.000

Correlation Matrix
Unit Districts - Instruction

Table 4.9

* $|r| > .349$ significant at $p < .05$ (Glass & Stanley, 1970, p. 536)

Source	DF	SS	MS
Regr.	2	974.7905	487.3953
Resid.	32	3741.9048	116.9345

$F(2,32) = 4.168$ $P = .0241$

Multiple Correlation $R = .4546$

R-Squared $R^2 = .2067$ (.1571 adjusted for sample size)

Standard Error S.E. = 10.9867

Variable	Coefficient	T	S.E.	P
STU/TCHR	-1.261738	-2.083	.6057	.0430
ADA	.002767	1.883	.0015	.0658
CONSTANT	41.726852			

Step	Action	F	P	Overall F	R
1	Add STU/TCHR	2.39	.1282	2.39	.260
2	Add ADA	3.45	.0694	3.00	.398

F(Enter) = 2.3
F(Remove) = 2.2

Stepwise Multiple Regression Analysis
Unit Districts - Instruction

Table 4.10

Elementary districts

Table 4.11 contains the data collected from elementary districts relating to the dependent variable and the independent variables. Please note that zeros represent values and were used in computations. The mean and standard deviation for each variable are included also. These data were analyzed in two different ways. First, correlation coefficients were computed among all the variables. The correlation matrix for these data is in Table 4.12. The second analytic procedure performed on these data was a stepwise multiple regression analysis. The results of the regression analysis are in Table 4.13.

Two of the predictor variables, teacher-to-administrator (TCHR/ADM) and superintendent longevity (SUPT), combined to form a statistically significant relationship (at the .05 level) with the dependent variable. Approximately 39% of the variance in the dependent variable was associated with change in the two predictor variables. In general, as the teacher-to-administrator ratio increased and superintendent longevity decreased, the quality and extent of microcomputer use increased.

As was the case with unit districts the strongest relationships found were related to personnel. The greater teacher-to-administrator ratio in districts with a higher measure on the computer education scale may be indicative of districts that operate more efficiently administratively and

make more of a commitment to instruction. Alternatively, it may only indicate that these districts built larger schools or have not had the decline in enrollments prevalent in so many school districts.

The relationship between superintendent longevity and the measure of the computer education program may imply that superintendents with less tenure in a school district may be more willing to embrace innovation than others. It might also indicate that superintendents with less time in a district might be working harder to impress the board of education than would a superintendent who has been in the position longer.

In addition, it must also be noted that the teacher-to-administrator ratio and superintendent longevity were both moderately related to the district size. These relationships indicated that these variables and district size may have been measuring the same things to some extent.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
1	70	0	11	62	153882	2727	9.5384	8.125	21.004	30	0
2	40	0	3	1172	28933	1717	15.626	18.75	29.147	40	20
3	0	0	9	2477	73769	2536	16.850	13.363	40.897	50	50
4	80	0	1	172	77274	2464	12.285	14	65.833	0	20
5	0	1000	4	113	79165	2295	12.555	9	60.148	100	0
6	0	0	12	2224	77596	2023	19.339	11.5	39.656	15	85
7	50	1900	17	206	36493	2030	15.846	13	29.392	50	0
8	50	0	3	1029	64699	2194	18.052	19	53.602	0	50
9	25	0	7	151	27379	2041	15.1	10	19.810	75	0
10	0	0	0	34	157101	3132	11.333	3	0	0	0
11	60	0	17	4159	73404	3157	18.484	13.235	24.699	40	0
12	90	0	6	340	131804	3064	11.333	15	48.448	10	0
13	0	0	11	2051	76543	2262	12.818	20	57.496	0	0
14	10	0	0	125	30542	2523	12.5	10	41.616	90	0
15	40	0	27	1043	31941	2146	13.906	18.75	38.398	50	10
16	5	0	21	700	43474	1944	17.5	13.333	30.492	95	0
17	40	0	1	102	31829	1821	18.545	5.5	18.606	30	30
18	100	0	4	630	261524	4593	9	17.5	38.936	0	0
19	10	0	16	1110	55585	2552	13.875	11.428	26.270	90	0
20	100	0	11	312	265396	4163	9.75	16	49.099	0	0
21	0	0	2	118	114815	1868	11.8	10	28.965	0	0
22	0	0	0	115	44105	1954	9.5833	12	16.083	80	20
23	0	0	18	142	109517	2084	14.2	5	0	0	0
24	0	0	12	1966	94169	2498	17.872	15.714	47.746	50	50
25	20	0	3	140	31535	1755	12.727	11	51.735	80	0
26	0	0	1	147	52042	2207	14.7	5	25.611	100	0
27	10	0	1	361	72861	2267	15.695	11.5	41.576	10	80
28	50	0	9	157	77077	2355	19.625	8	13.952	50	0
29	50	0	10	4751	65596	2244	13.574	17.5	22.07	50	0
30	15	0	23	2129	30597	2078	17.032	13.888	38.457	75	10
31	100	0	0	50	103691	3038	10	5	27.308	0	0

	Variable	Mean	S.D.
X1	LOCFUN	32.742	43.709
X2	OTHCOM	93.548	380.294
X3	SUPT	8.387	7.619
X4	ADA	912.516	1210.771
X5	EAVPER	83043.161	59920.143
X6	EXPPER	2442.968	651.454
X7	STU/TCHR	14.227	3.157
X8	TCHR/ADM	12.100	4.622
X9	DEPVAR	33.776	16.288
X10	FEDFUN	40.645	35.818
X11	OTHFUN	13.710	24.220

Elementary Districts - Instructional Data

Table 4.11

	LOCFUN	OTHCOM	SUPT	ADA	EAVPER	EXPPER
LOCFUN	1.000					
OTHCOM	.0001	1.000				
SUPT	-.0703	.1378	1.000			
ADA	-.0563	-.1551	.4025*	1.000		
EAVPER	.5045*	-.1351	-.1219	-.1404	1.000	
EXPPER	.6220*	-.1255	-.0738	.0089	.8641*	1.000
STU/TCHR	-.3384	.0390	.3389	.3851*	-.5411*	-.4732*
TCHR/ADM	.2225	-.0263	.3087	.4856*	.0265	.1010
DEPVAR	.1522	.0971	-.0738	.0708	.0306	.0950
FEDFUN	-.4445*	.1887	.1792	.0260	-.5810*	-.3934*
OTHFUN	-.2564	-.1439	-.1182	.1906	-.1528	-.2197

	STU/TCHR	TCHR/ADM	DEPVAR	FEDFUN	OTHFUN
STU/TCHR	1.000				
TCHR/ADM	.0563	1.000			
DEPVAR	-.0526	.5777*	1.000		
FEDFUN	.2008	-.1161	-.0411	1.000	
OTHFUN	.4827*	.1624	.2537	-.2171	1.000

Correlation Matrix
Elementary Districts - Instruction

Table 4.12

* |r| > .355 significant at p < .05 (Glass & Stanley, 1970, p. 536)

Source	DF	SS	MS
Regr.	2	3438.5868	1719.2934
Resid.	28	4520.3066	161.4395
Total	30	7958.8934	

F(2,28) = 10.65 P = <.001

Multiple Correlation R = .6573

R-Squared R^2 = .4320 (.3915 adjusted for sample size)

Standard Error S.E. = 12.9390

Variable	Coefficient	T	S.E.	P
TCHR/ADM	2.339033	4.353	.5373	<.001
SUPT	-.595826	-1.828	.3260	.0751
CONSTANT	10.471871			

Step	Action	F	P	Overall F	R
1	Add TCHR/ADM	14.53	<.001	14.53	.578
2	Add SUPT	3.30	.0767	9.49	.636

F(Enter) = 2.5
F(Remove) = 2.5

Stepwise Multiple Regression Analysis
Elementary Districts - Instruction

Table 4.13

High school districts

Table 4.14 contains the data collected from high school districts relating to the dependent and independent variables as well as the mean and standard deviation for each variable. The correlation matrix for these data is represented by Table 4.15. For this sample, the stepwise multiple regression analysis failed to yield a statistically significant regression equation so the data were subjected to a backward regression analysis procedure. In this procedure, all of the variables are entered into the regression equation and then removed one at a time so that each step improves the significance of the relationship of the variables left in the equation. When the last variable that will improve the significance of the equation has been removed, the procedure stops. (Madigan & Lawrence, 1983, p. 33)

The results of the backward multiple regression analysis did not yield results that were significant at the .05 level. However, since the sample size was small and the p-value of the regression equation that was produced was .0567, the results of the analysis have been included in Table 4.16

Unlike the results for elementary and unit districts, the more successful predictor variables for high school districts did not involve personnel. Rather, the variables were associated with funding and district size. In general,

the extent and quality of instructional microcomputer use increased as (a) funding for mini and mainframe computers increased; (b) district size decreased; (c) district wealth increased; and (d) the percent of computer education funding paid by federal funding decreased. In other words, smaller, wealthier high school districts which were also using mini or mainframe computers were found to be more likely to score well on the instructional computing measurement scale. Again, these results were interesting but have no proven statistical significance.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
1	100	1000	13	479	79571	2837	14.515	16.5	61.698	0	0
2	95	0	20	2865	252039	3893	15.078	17.272	37.872	5	0
3	95	0	15	836	112690	3511	12.861	32.5	26.144	5	0
4	80	0	8	349	46731	4394	8.725	13.333	17.359	20	0
5	90	500	9	152	172406	4306	7.2380	21	78.141	10	0
6	50	0	1	80	154979	4357	6.6666	6	46.007	50	0
7	100	34000	1	2177	90720	3055	17.277	9	43.455	0	0
8	85	0	20	856	71542	3065	14.266	15	23.014	15	0
9	85	0	2	1294	189235	4222	12.323	17.5	34.324	15	0
10	50	15000	2	1763	157093	4059	12.592	10.769	10.657	50	0
11	64	0	23	1158	58356	2746	17.283	13.4	34.133	36	0
12	90	15000	12	2556	86101	2720	15.975	26.666	28.970	0	10
13	50	0	6	175	128911	3323	14.583	12	34.227	30	20
14	75	50000	15	2395	76287	4031	13.305	13.846	58.517	25	0
15	99	0	4	748	115159	4210	14.96	10	62.981	1	0
16	95	0	13	1430	105824	2821	15.052	15.833	37.949	5	0
17	95	0	21	536	108793	2950	13.4	20	43.949	5	0

	Variable	Mean	S.D.
X1	LOCFUN	82.235	18.040
X2	OTHCOM	6794.118	14410.347
X3	SUPT	10.882	7.482
X4	ADA	1167.588	897.898
X5	EAVPER	118025.706	53067.445
X6	EXPPER	3558.824	646.988
X7	STU/TCHR	13.300	3.115
X8	TCHR/ADM	15.919	6.514
X9	DEPVAR	39.965	17.580
X10	FEDFUN	16.000	16.808
X11	OTHFUN	1.765	5.286

High School Districts - Instructional Data

Table 4.14

	LOCFUN	OTHCOM	SUPT	ADA	EAVPER	EXPPER
LOCFUN	1.000					
OTHCOM	-.0248	1.000				
SUPT	.2706	-.1423	1.000			
ADA	.2113	.6002*	.1566	1.000		
EAVPER	-.0559	-.2386	-.2141	.1783	1.000	
EXPPER	-.2642	.0070	-.5181*	-.1753	.4599	1.000
STU/TCHR	.2973	.2272	.3484	.5524*	-.2427	-.7271*
TCHR/ADM	.4636	-.1676	.4403	.1149	.0251	-.2658
DEPVAR	.3473	.1191	-.0361	-.1963	.1205	.1378
FEDFUN	-.9564*	.0405	-.2475	-.2020	.0671	.3589
OTHFUN	-.3717	-.0442	-.1366	-.0786	-.0226	-.2395

	STU/TCHR	TCHR/ADM	DEPVAR	FEDFUN	OTHFUN
STU/TCHR	1.000				
TCHR/ADM	.0630	1.000			
DEPVAR	-.1603	-.0724	1.000		
FEDFUN	-.3817	-.5142*	-.3252	1.000	
OTHFUN	.1990	.0528	-.1511	.0844	1.000

Correlation Matrix
High School Districts - Instruction

Table 4.15

* $|r| > .482$ significant at $p < .05$ (Glass & Stanley, 1970, p. 536)

Source	DF	SS	MS
Regr.	4	2515.8001	628.9500
Resid.	12	2428.8404	202.4034
Total	16	4944.6405	

F(4,12) = 3.107 P = .0567

Multiple Correlation R = .7133

R-Squared R^2 = .5088 (.3451 adjusted for sample size)

Standard Error S.E. = 14.2269

Variable	Coefficient	T	S.E.	P
OTHCOM	.000956	2.670	.0004	.0196
ADA	-.017044	-2.937	.0058	.0121
EAVPER	.000166	2.132	.0001	.0522
FEDFUN	-.592492	-2.614	.2266	.0217
CONSTANT	43.268088			

Step	Action	F	P	Overall F	R
1	Enter All	1.31	.3682	1.31	.792
2	Remove STU/TCHR	.00		1.68	.792
3	Remove EXPPER	.00		2.16	.792
4	Remove LOCFUN	.06		2.77	.790
5	Remove TCHR/ADM	1.87	.1822	2.73	.744
6	Remove SUPT	1.11	.4081	3.11	.713

F(Remove) = 3.0

Backwards Multiple Regression Analysis
High School Districts - Instruction

Table 4.16

Research Question Number Two

Is there a relationship between school district characteristics and the extent and quality of microcomputer use in administration?

The results of this study relative to this research question are presented separately for each sample. The three samples for the study were taken from unit districts (grades k-12), elementary districts (grades k-8), and high school districts (grades 9-12).

Unit Districts

The data collected from unit districts related to the dependent and predictor variables are presented in Table 4.18. An explanation of the variable names is given in Table 4.17.

The raw data from Table 4.18 were analyzed in two ways. First, correlation coefficients were computed among all of the variables and are reported in the correlation matrix in Table 4.19. Second, the data were analyzed using a stepwise multiple regression procedure. The results of this analysis are in Table 4.20. Four of the predictor variables (percent of the administrative computing budget paid by local funding, percent of the administrative computing budget paid by federal funding, per pupil expenditures, and average daily attendance) were found to have a statistically significant relationship (at the .05 level) to the dependent variable. Forty-eight percent of the variance in the

dependent variable was associated with change in the predictor variables.

In general, the extent and quality of administrative microcomputer use increased as (a) the percent of funding from federal sources increased; (b) the percent of funding from local sources increased; (c) school district size increased; and (d) per pupil expenditures decreased. It was not surprising to find that administrative microcomputer use was related to funding source and district size. However, at first examination, it was somewhat surprising to find that an inverse relationship existed between per pupil expenditures and administrative microcomputer use. Perhaps school districts with lower per pupil expenditures tend to have less administrative or clerical help and therefore feel more pressure to automate their offices.

Name	Represents
LOCFUN	Proportion of administrative computing budget paid from local funds
OTHCOM	Annual expenditures for a mini or mainframe computer for administrative use
SUPT	Superintendent longevity
ADA	Average daily attendance[1]
EAVPER	Per pupil equalized assessed valuation[2]
EXPPER	Per pupil expenditures[3]
STU/TCHR	Student-to-teacher ratio[4]
TCHR/ADM	Teacher-to-administrator ratio[4]
DEPVAR	Score derived for a particular school district using the measurement formula for administration.
FEDFUN	Proportion of administrative computing budget paid from federal funds
OTHFUN	Proportion of administrative computing budget paid from sources outside standard revenue sources (PTA, booster clubs, etc.)

[1] Data provided by the Illinois State Board of Education.

[2] Data taken from Annual State Aid Statistics, 1983-84.

[3] Data taken from Illinois Public Schools Financial Statistics 1981-1982 School Year.

[4] Calculated values.

Variable Names - Administration

Table 4.17

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
1	0	0	8	501	17940	2420	12.525	13.333	0	0	0
2	0	0	5	295	63510	3269	13.409	11	26.469	100	0
3	100	0	19	776	44605	2200	15.52	12.5	34.696	0	0
4	0	0	18	719	65309	2824	14.38	11.111	0	0	0
5	20	2500	9	3633	43606	2447	15.329	14.812	41.858	80	0
6	100	0	4	386	54804	2965	12.866	15	20.273	0	0
7	100	0	1	553	49342	2161	20.481	13.5	38.124	0	0
8	0	0	1	1852	54746	2129	17.308	21.4	0	0	0
9	100	0	11	412	41833	3830	15.259	9	5.5055	0	0
10	100	24000	9	737	42688	2578	5.6259	10.076	45.455	0	0
11	0	0	1	510	56777	2847	12.75	16	1.6045	0	0
12	100	1500	3	468	56166	2950	15.6	12	14.635	0	0
13	100	0	8	759	75168	2645	13.8	13.75	10.715	0	0
14	100	0	1	244	49708	2410	5.1914	15.666	45.570	0	0
15	0	0	3	244	49708	2410	9.76	12.5	0	0	0
16	100	0	21	759	75168	2645	16.148	15.666	17.817	0	0
17	0	15000	4	994	21264	2359	16.566	15	0	0	0
18	100	1500	1	1012	8194	3650	13.493	12.5	18.963	0	0
19	100	0	12	1738	93189	2739	10.862	13.333	44.536	0	0
20	10	0	17	832	48875	2277	16.979	9.8	33.510	90	0
21	100	8800	5	607	64699	2460	13.795	14.666	22.606	0	0
22	0	0	7	711	46322	2453	13.941	17	16.278	100	0
23	100	0	3	509	65227	2115	13.051	13	29.057	0	0
24	100	0	4	1638	54139	2898	13.65	12	51.763	0	0
25	100	0	1	2015	19152	2629	16.791	24	39.690	0	0
26	0	0	1	1605	53899	3367	12.346	13	3.2091	0	0
27	95	10000	2	3333	38388	2572	22.22	15	32.311	5	0
28	0	30000	11	707	10909	2925	12.854	13.75	0	0	0
29	0	8000	12	439	45192	2325	11.864	12.333	0	0	0
30	100	0	19	591	51822	2582	13.133	15	16.574	0	0
31	0	35000	3	7373	51767	3008	14.542	12.675	6.5471	0	0
32	100	5000	13	1937	28565	2469	16.415	11.8	75.760	0	0
33	0	0	4	829	29442	2309	15.351	18	40.590	0	0
34	100	0	17	724	49353	2561	14.48	16.666	20.182	0	0
35	0	0	27	1336	29394	2807	14.212	15.666	18.019	100	0

	Variable	Mean	S.D.
X1	LOCFUN	55.000	49.601
X2	OTHCOM	4037.143	8799.635
X3	SUPT	8.143	7.013
X4	ADA	1193.657	1334.748
X5	EAVPER	47167.714	18499.751
X6	EXPPER	2663.857	406.759
X7	STU/TCHR	14.071	3.238
X8	TCHR/ADM	14.072	3.004
X9	DEPVAR	22.066	18.890
X10	FEDFUN	13.571	33.466
X11	OTHFUN	00.000	00.000

Unit Districts - Administrative Data
Table 4.18

	LOCFUN	OTHCOM	SUPT	ADA	EAVPER	EXPPER
LOCFUN	1.000					
OTHCOM	-.1814	1.000				
SUPT	.0054	-.0887	1.000			
ADA	-.1394	.5168*	-.1404	1.000		
EAVPER	.2113	-.2745	.0865	-.0440	1.000	
EXPPER	.0537	.0675	-.0751	.0769	-.0710	1.000
STU/TCHR	.0213	-.1111	.0182	.2776	-.1381	-.1136
TCHR/ADM	-.0506	-.1723	-.2091	.1037	-.1585	-.3339
DEPVAR	.5323*	-.1313	.0183	.1042	.0190	-.2296
FEDFUN	-.4102*	-.1666	.2872	.0325	-.0191	.0024
OTHFUN[1]						

	STU/TCHR	TCHR/ADM	DEPVAR	FEDFUN	OTHFUN[1]
STU/TCHR	1.000				
TCHR/ADM	.2194	1.000			
DEPVAR	.0264	-.0180	1.000		
FEDFUN	.0917	-.0513	.0987	1.000	
OTHFUN[1]					

Correlation Matrix
Unit Districts - Administration

Table 4.19

[1] Not applicable.

* |r| > .349 significant at p < .05 (Glass & Stanley, 1970, p. 536)

Source	DF	SS	MS
Regr.	4	6582.4868	1645.6217
Resid.	30	5550.4292	185.0143
Total	34	12132.9160	

F(4,30) = 8.895 P = <.001

Multiple Correlation R = .7366

R-Squared R^2 = .5425 (.4815 adjusted for sample size)

Standard Error S.E. = 13.8345

Variable	Coefficient	T	S.E.	P
LOCFUN	.281926	5.310	.0531	<.001
FEDFUN	.223520	2.873	.0778	.007
EXPPER	-.013325	-2.272	.0059	.0288
ADA	.003065	1.701	.0018	.0959
CONSTANT	35.363235			

Step	Action	F	P	Overall F	R
1	Add ALOC	13.04	.001	13.04	.532
2	Add AFED	6.49	.0152	10.85	.636
3	Add EXPPER	4.25	.0454	9.38	.690
4	Add ADA	2.86	.0977	8.17	.722

F(Enter) = 2.3
F(Remove) = 2.2

Stepwise Multiple Regression Analysis
Unit Districts - Administration

Table 4.20

Elementary districts

The data collected from elementary districts related to administrative computing are in Table 4.21. These data were analyzed in two ways. First, correlation coefficients were computed among all the variables and are listed in the correlation matrix in Table 4.22. Second, the data were analyzed using a stepwise multiple regression procedure which has been summarized in Table 4.23. Three of the predictor variables (teacher-to-administrator ratio, proportion of the administrative computing budget paid from federal funding, and proportion of the administrative computing budget paid from local funding) combined to account for about 60% of the variance associated with the dependent variable. The multiple correlation coefficient of .8028 was statistically significant at the .05 level.

In general, as (a) the teacher-to-administrator ratio increased; (b) the percent of funding from federal sources increased; and (c) the percent of funding from local sources increased, the extent and quality of administrative microcomputer use increased. Therefore, funding commitment and the number of teachers per administrator combined to be very good predictors of administrative microcomputer use. Districts with fewer supervisory personnel were more likely to automate their offices through the use of microcomputers.

It should be noted that the teacher-to-administrator ratio and the percent of local funding were moderately

related to district size. Also, the teacher-to-administrator ratio and local funding were somewhat related to each other. This interaction among these variables indicated that they were measuring the same things to some extent.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
1	0	0	11	62	153882	2727	9.5384	8.125	3.2091	0	0
2	100	0	3	1172	28933	1717	15.626	18.75	61.450	0	0
3	0	5000	9	2477	73769	2536	16.850	13.363	0	0	0
4	0	0	1	172	77274	2464	12.285	14	0	0	0
5	0	0	4	113	79165	2295	12.555	9	5.7844	0	0
6	100	0	12	2224	77596	2023	19.339	11.5	14.445	0	0
7	100	100	17	206	36493	2030	15.846	13	12.686	0	0
8	100	0	3	1029	64699	2194	18.052	19	16.193	0	0
9	0	0	7	151	27379	2041	15.1	10	0	0	0
10	0	0	0	34	157101	3132	11.333	3	0	0	0
11	100	5000	17	4159	73404	3157	18.484	13.235	21.480	0	0
12	90	0	6	340	131804	3064	11.333	15	35.695	10	0
13	100	0	11	2051	76543	2262	12.818	20	64.607	0	0
14	0	0	0	125	30542	2523	12.5	10	0	0	0
15	100	0	27	1043	31941	2146	13.906	18.75	19.288	0	0
16	0	0	21	700	43474	1944	17.5	13.333	0	0	0
17	0	0	1	102	31829	1821	18.545	5.5	0	0	0
18	0	6000	4	630	261524	4593	9	17.5	0	0	0
19	10	2500	16	1110	55585	2552	13.875	11.428	71.988	90	0
20	100	0	11	312	265396	4163	9.75	16	2.8328	0	0
21	0	0	2	118	114815	1868	11.8	10	3.2091	0	0
22	0	0	0	115	44105	1954	9.5833	12	0	0	0
23	0	0	18	142	109517	2084	14.2	5	0	0	0
24	0	0	12	1966	94169	2498	17.872	15.714	67.476	10	0
25	0	0	3	140	31535	1755	12.727	11	0	0	0
26	0	0	1	147	52042	2207	14.7	5	5.4286	10	0
27	100	0	1	361	72861	2267	15.695	11.5	36.810	0	0
28	0	0	9	157	77077	2355	19.625	8	0	0	0
29	100	2500	10	4751	65596	2244	13.574	17.5	37.890	0	0
30	0	0	23	2129	30597	2078	17.032	13.888	0	0	0
31	0	0	0	50	103691	3038	10	5	0	0	0

	Variable	Mean	S.D.
X1	LOCFUN	35.484	48.017
X2	OTHCOM	680.645	1674.979
X3	SUPT	8.387	7.619
X4	ADA	912.516	1210.771
X5	EAVPER	83043.161	59920.143
X6	EXPPER	2442.968	651.454
X7	STU/TCHR	14.227	3.157
X8	TCHR/ADM	12.100	4.622
X9	DEPVAR	15.499	22.993
X10	FEDFUN	9.677	29.038
X11	OTHFUN	00.000	00.000

Elementary Districts - Administrative Data
Table 4.21

	LOCFUN	OTHCOM	SUPT	ADA	EAVPER	EXPPER
LOCFUN	1.000					
OTHCOM	.0150	1.000				
SUPT	.2437	.1142	1.000			
ADA	.4408*	.5323*	.4025*	1.000		
EAVPER	.0048	.2855	-.1219	-.1404	1.000	
EXPPER	.0366	.5093*	-.0738	.0089	.8641*	1.000
STU/TCHR	.1798	.0043	.3389	.3851*	-.5411*	-.4732*
TCHR/ADM	.6125*	.2425	.3087	.4856*	.0256	.1010
DEPVAR	.4726*	.0488	.1678	.4165*	-.1396	-.0902
FEDFUN	-.2115	.0143	.0428	.0387	-.0761	-.0036
OTHFUN						

	STU/TCHR	TCHR/ADM	DEPVAR	FEDFUN	OTHFUN
STU/TCHR	1.000				
TCHR/ADM	.0563	1.000			
DEPVAR	.1563	.5028*	1.000		
FEDFUN	.1277	-.0944	.4731*	1.000	
OTHFUN					

Correlation Matrix
Elementary Districts - Administration

Table 4.22

* $|r| > .355$ significant at $p < .05$ (Glass & Stanley, 1970, p. 536)

Source	DF	SS	MS
Regr.	3	10221.7451	3407.2484
Resid.	27	5638.3574	208.8281
Total	30	15860.1025	

$F(3,27) = 16.316$ $P = <.001$

Multiple Correlation $R = .8028$

R-Squared $R^2 = .6445$ (.6050 adjusted for sample size)

Standard Error S.E. = 14.7262

Variable	Coefficient	T	S.E.	P
TCHR/ADM	1.533589	2.082	.7366	.0446
FEDFUN	.465992	4.914	.0948	<.001
LOCFUN	.195452	2.706	.0722	.0113
CONSTANT	14.501623			

Step	Action	F	P	Overall F	R
1	Add TCHR/ADM	9.81	.004	9.81	.503
2	Add FEDFUN	16.16	<.001	15.55	.752
3	Add LOCFUN	7.23	.0117	15.08	.791

F(Enter) = 2.5
F(Remove) = 2.5

Stepwise Multiple Regression Analysis
Elementary Districts - Administration

Table 4.23

High school districts

The data collected from high school districts related to administrative computing are in Table 4.24. These data were analyzed in two ways. First, correlation coefficients were computed among all of the variables and are presented in Table 4.25. Second, the data were analyzed using a stepwise multiple regression procedure. The results of this procedure are in Table 4.26. One predictor variable, the proportion of the administrative computing budget paid from local funds, was found to have a statistically significant relationship (at the .05 level) with the dependent variable. Forty-eight percent of the change in the dependent variable was associated with change in the predictor variable. The multiple correlation coefficient of .7211 was statistically significant at the .05 level.

In general, as the percent of the administrative computing budget paid from local funds increased, the quality and extent of administrative microcomputer use increased. It would be logical if this relationship were a reflection of commitment as represented by the high percent of local funding. Administrative microcomputer use among high school districts was not found to be related to the personnel measures used in this study and was not found to be related to school district size or wealth.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
1	100	0	13	479	79571	2837	14.515	16.5	34.334	0	0
2	100	0	20	2865	252039	3893	15.078	17.272	35.925	0	0
3	95	0	15	836	112690	3511	12.861	32.5	22.460	5	0
4	90	0	8	349	46731	4394	8.725	13.333	27.854	10	0
5	100	150	9	152	172406	4306	7.2380	21	48.153	0	0
6	100	0	1	80	154979	4357	6.6666	6	13.399	0	0
7	0	130676	1	2177	90720	3055	17.277	9	4.7543	0	0
8	0	0	20	856	71542	3065	14.266	15	0	0	0
9	100	60000	2	1294	189235	4222	12.323	17.5	3.9553	0	0
10	0	15000	2	1763	157093	4059	12.592	10.769	0	0	0
11	100	0	23	1158	58356	2746	17.283	13.4	39.992	0	0
12	90	0	12	2556	86101	2720	15.975	26.666	5.0673	0	10
13	100	0	6	175	128911	3323	14.583	12	18.898	0	0
14	100	50000	15	2395	76287	4031	13.305	13.846	20.804	0	0
15	100	0	4	748	115159	4210	14.96	10	42.503	0	0
16	100	9000	13	1430	105824	2821	15.052	15.833	33.176	0	0
17	100	0	21	536	108793	2950	13.4	20	23.668	0	0

	Variable	Mean	S.D.
X1	LOCFUN	80.882	38.739
X2	OTHCOM	15578.000	34782.161
X3	SUPT	10.882	7.482
X4	ADA	1167.588	897.898
X5	EAVPER	118025.706	53067.445
X6	EXPPER	3558.824	646.988
X7	STU/TCHR	13.300	3.115
X8	TCHR/ADM	15.919	6.514
X9	DEPVAR	22.055	15.610
X10	FEDFUN	.882	2.643
X11	OTHFUN	.588	2.425

High School Districts - Administrative Data
Table 4.24

	LOCFUN	OTHCOM	SUPT	ADA	EAVPER	EXPPER
LOCFUN	1.000					
OTHCOM	-.4409	1.000				
SUPT	.2074	-.4162	1.000			
ADA	-.2396	.4243	.1566	1.000		
EAVPER	.1378	-.0304	-.2141	.1783	1.000	
EXPPER	.1247	-.0041	-.5181	-.1753	.4599	1.000
STU/TCHR	-.2084	.2686	.3484	.5524*	-.2427	-.7271*
TCHR/ADM	.2809	-.2731	.4403	.1149	.0251	-.2658
DEPVAR	.6461*	-.4186	.3254	-.2753	.0527	.0848
FEDFUN	.0987	-.1589	-.0260	-.2593	-.3296	.2965
OTHFUN	.0607	-.1154	.0385	.3985	-.1550	-.3341

	STU/TCHR	TCHR/ADM	DEPVAR	FEDFUN	OTHFUN
STU/TCHR	1.000				
TCHR/ADM	.0630	1.000			
DEPVAR	-.0889	.0816	1.000		
FEDFUN	-.3640	.2071	.0909	1.000	
OTHFUN	.2213	.4252	-.2804	-.0860	1.000

Correlation Matrix
High School Districts - Administration

Table 4.25

* $|r| > .482$ significant at $p < .05$ (Glass & Stanley, 1970, p. 536)

Source	DF	SS	MS
Regr.	1	2027.1504	2027.1504
Resid.	15	1871.8328	124.7889
Total	16	3898.9832	

F(1,15) = 16.245 P = .001

Multiple Correlation R = .7211

R-Squared R^2 = .5199 (.4879 adjusted for sample size)

Standard Error S.E. = 11.5630

Variable	Coefficient	T	S.E.	P
LOCFUN	.260334	3.489	.0746	.003
CONSTANT	.999024			

Step	Action	F	P	Overall F	R
1	Add LOCFUN	10.75	.005	10.75	.646

F(Enter) = 3.2
F(Remove) = 3.2

Stepwise Multiple Regression Analysis
High School Districts - Administration

Table 4.26

Research Question Number Three

Is there a relationship between the extent and quality of a school district's microcomputer use for administration and the extent and quality of a school district's microcomputer use for instruction?

The analysis of the data related to this question has been organized by the three types of school districts that were sampled: unit districts (grades K-12), elementary districts (grades K-8), and high school districts (grades 9-12)

Unit districts

The data collected from unit districts related to the extent and quality of their administrative and instructional microcomputer uses are in Tables 4.18 and 4.8 respectively. Since only two variables were involved, the analysis of these data consisted of a simple linear regression procedure which is summarized in Table 4.27. The correlation coefficient of .573 was statistically significant at the .05 level and about 32% of the variance of the variables was related.

In general, unit districts that were more involved with instructional computing were also more involved with administrative computing. At least among this type of school district, instructional and administrative microcomputer use were found to be moderately related.

Variable	N	Mean	S.D.
Instruction (X)	35	27.275	11.778
Administration (Y)	35	22.066	18.890

Regression equation:

$Y = .918 (X) - 2.984$

Correlation Coefficient $R = .573$

R-Squared $R^2 = .328$

Standard Error $S.E. = 15.719$

Test for significance:

$T(33) = 4.013 \quad P < .001$

Linear Regression Analysis
Unit Districts - Instruction vs. Administration

Table 4.27

Elementary districts

The data collected from elementary districts related to the extent and quality of their administrative and instructional microcomputer uses are in Tables 4.21 and 4.11 respectively. These data were analyzed using a simple linear regression procedure which is included in Table 4.28. No statistically significant relationship was found between the two variables. Therefore, in elementary school districts a commitment to use microcomputers in one way did not indicate that the district would use them in another.

Variable	N	Mean	S.D.
Instruction (X)	31	33.776	16.288
Administration (Y)	31	15.499	22.993

Regression equation:

$Y = .296 (X) + 5.495$

Correlation Coefficient $R = .210$

R-Squared $R^2 = .044$

Standard Error S.E. = 22.865

Test for significance:

$T(29) = 1.156$ $P = .2562$

Linear Regression Analysis
Elementary Districts - Instruction vs. Administration

Table 4.28

High school districts

The data collected from high school districts related to the extent and quality of their administrative and instructional microcomputer uses are in Tables 4.24 and 4.14 respectively. These data were analyzed using a simple linear regression procedure whose results are summarized in Table 4.29. The correlation coefficient of .601 was statistically significant at the .05 level. About 36% of the variance of the two variables was related.

In general, high school districts that had a higher instructional use of microcomputers also had a higher administrative use of microcomputers. Therefore, the decisions to use microcomputers for administration and instruction were moderately related.

Variable	N	Mean	S.D.
Instruction (X)	17	39.965	17.580
Administration (Y)	17	22.055	15.610

Regression equation:

$Y = .534 (X) + .727$

Correlation Coefficient $R = .601$

R-Squared $R^2 = .361$

Standard Error S.E. = 12.886

Test for significance:

$T(15) = 2.912$ $P = .0104$

Linear Regression Analysis
High School Districts - Instruction vs. Administration

Table 4.29

Summary

The multiple factors, variables, and samples used in this study dictated a lengthy, methodical presentation of the data and results. Also, it is not a simple matter to interpret multiple regression analysis results. For convenience, a summary of the results of the statistical analyses is given in Table 4.30. A summary of the results for each of the three research questions follows:

1.0 Is there a relationship between school district characteristics and the extent and quality of microcomputer use for instruction?

This study has established that such relationships do exist. In two out of the three samples, unit districts and elementary districts, relationships significant at the .05 level were found. The third sample contained a relationship that would fulfill a .10 criterion. The most common successful predictor variables were related to staffing patterns and district size. However, the variance of the predictor variables was associated with only a small proportion of the variance in the extent and quality of instructional microcomputer use. This fact points to the existence of other predictor variables that could be as significant as the ones used in this study.

Res. Question	Sample	Variable	Ind. R	Mult. R	P	Degree of Assoc.
# 1	Unit	STU/TCHR	-.2598	.4546	.024	16%
		ADA	.2173			
#1	Elem.	TCHR/ADM	.5777	.6573	<.001	39%
		SUPT	-.0738			
#1	H.S.	OTHCOM	.1191	.7133	.057	34%
		ADA	.1963			
		EAVPER	.1205			
		FEDFUN	-.3252			
#2	Unit	LOCFUN	.5323	.7366	<.001	48%
		FEDFUN	.0987			
		EXPPER	-.2296			
		ADA	.1042			
#2	Elem.	TCHR/ADM	.5028	.8028	<.001	60%
		FEDFUN	.4731			
		LOCFUN	-.2115			
#2	H.S.	LOCFUN	.6461	.7211	.001	48%
#3	Unit		.573		<.001	32%
#3	Elem.		.210		.256	4%
#3	H.S.		.601		.010	36%

Summary of Results

Table 4.30

2.0 Is there a relationship between school district characteristics and the extent and quality of administrative microcomputer use?

Relationships between school district characteristics and the extent and quality of administrative microcomputer use were established by this study. The value of the predictor variables found in the administrative regression equations was considerably higher than the value of the predictor variables associated with the instructional samples. Interestingly, the funding source for administrative computing appears in the regression equation for all three samples. However, in all cases there was a substantial proportion of the change in the dependent variable with which the predictor variables were not associated indicating that other characteristics not included in this study also must be related to administrative microcomputer use.

3.0 Is there a relationship between the extent and quality of instructional microcomputer use and the extent and quality of administrative microcomputer use?

Statistically significant relationships were established for unit and high school districts but not for elementary districts. The use of microcomputers for administration and instruction were more closely interrelated in school districts that have high schools.

In summary, school district characteristics were found to be related to the extent and quality of microcomputer use. Based upon the degree of association between the predictor and dependent variables used in this study, there must be important characteristics not included here which would warrant further study.

CHAPTER V

SUMMARY

This discussion consists of five parts: a summary of the procedures, conclusions, implications of the study, general recommendations, and recommendations for further research.

Summary of Procedures

The procedures for this study involved two separate but interrelated parts: (a) the use of the Delphi Technique to develop two formulas to measure the extent and quality of a school district's microcomputer use and (b) multiple regression analysis to determine whether relationships existed between selected school district characteristics and the extent and quality of microcomputer use.

The Delphi Technique was employed to identify the factors to be used in measuring the extent and quality of a school district's microcomputer use. The Delphi panel also assigned weights to establish the relative importance of each of the factors. The factors and their weights were then used in formulas to measure the extent and quality of a school district's microcomputer use on a scale of 0 to 100 with 100 being the maximum value.

The formulas were used to analyze data gathered from random samples of Illinois school districts, thereby establishing their relative positions on the 0 to 100 scale. Three samples were taken in all, each representative of one of the classifications of Illinois school districts: (a) unit districts (grades K-12); (b) elementary districts (grades K-8); and (c) high school districts (grades 9-12).

After the microcomputer usage factors of each school district had been subjected to analysis using the formulas, these rankings were compared to the following school district characteristics: (a) the size of the school district (as measured by average daily attendance); (b) the relative wealth of the school district (as measured by assessed valuation per pupil); (c) the district's per pupil expenditures; (d) the district's student-to-teacher ratio; (e) the district's administrator-to-teacher ratio; (f) the funding source for microcomputer use (as measured by the percent of the total microcomputer budget paid from local, federal, or other sources); (g) the district's investment in mini or mainframe computers (as measured by current expenditures); and (h) the longevity of the district's superintendent. The comparison was achieved through multiple regression analysis to determine the extent and type of relationships among the variables.

Conclusions

The conclusions that can be drawn from the results of this study have been organized according to the three research questions.

Research Question Number One

Is there a relationship between school district characteristics and the extent and quality of microcomputer use in instruction?

1.0 For unit districts, a statistically significant relationship (.05 level) was found between the dependent variable and two of the school district characteristics: the student-to-teacher ratio and school district size. In general, as school district size increased and the student-to-teacher ratio decreased, the extent and quality of microcomputer use for instruction increased.

2.0 For elementary districts, a statistically significant relationship (.05 level) was found between the dependent variable and two of the school district characteristics: the teacher-to-administrator ratio and superintendent longevity. In general, the quality and extent of microcomputer use increased as the teacher-to-administrator ratio increased and superintendent longevity decreased.

3.0 Among high school districts, no statistically significant relationships were found.

Research Question Number Two

Is there a relationship between school district characteristics and the extent and quality of microcomputer use in administration?

1.0 Among unit districts, statistically significant relationships were identified between the dependent variable and three of the school district characteristics: the funding source for administrative computing, per pupil expenditures, and school district size. In general, the extent and quality of administrative microcomputer use increased as (a) the percent of funding from federal sources increased; (b) the percent of funding from local sources increased; (c) school district size increased; and (d) per pupil expenditures decreased.

2.0 Among elementary districts, two of the school district characteristics were found to have statistically significant relationships with the dependent variable: the teacher-to-administrator ratio and funding source. In general, the extent and quality of administrative microcomputer use increased as (a) the teacher-to-administrator ratio increased; (b) the percent of funding from federal sources increased; and (c) the percent of funding from local sources increased.

3.0 Among high school districts, only funding source was found to be related to the extent and quality of

microcomputer use in administration. In general, as the percent of the administrative computing budget paid from local funds increased, the extent and quality of administrative microcomputer use increased.

Research Question Number Three

Is there a relationship between the extent and quality of a school district's microcomputer use for administration and the extent and quality of a school district's microcomputer use for instruction?

1.0 Among unit districts and high school districts, statistically significant relationships were found between instructional microcomputer use and administrative microcomputer use.

2.0 Among elementary districts, school districts that use microcomputers for administration were not more nor less likely to use microcomputers for instruction.

Implications

The implications of this study are twofold. The first implication involves the relationships established by the study while the second implication involves other relationships that may be inferred to exist because of the results of this study.

This study has established that relationships exist between certain school district characteristics and the extent and quality of microcomputer use in school districts.

Therefore, school districts that exhibit certain characteristics are likely to be developmentally ahead of school districts that do not exhibit those characteristics. To change the performance of a school district with respect to microcomputer use, it will be necessary to alter or circumvent the relationship between the characteristics of the district and the district's microcomputer use.

Alternatively, a large amount of the variance in microcomputer use was unrelated to the characteristics used in this study. Since the study established that relationships exist between school district characteristics and microcomputer use, the implication is that there are important characteristics that were not included in this study. It may be necessary to determine what those characteristics are before any type of intervention can be designed for school districts that are not experiencing success in attempting to implement microcomputer use.

General Recommendations

Based on the results of this study, the following recommendations are made:

1.0 Because of the proven benefits, school districts should continue to implement microcomputer use in instruction and administration.

2.0 In planning for microcomputer use, school districts should plan for the specific uses to which they will be

put and should plan carefully for the training to be provided to the staff members who will use them.

3.0 Research on school district microcomputer use should concentrate on which variables are important to successful microcomputer use in the schools, why those variables are important, and how the variables may be manipulated with positive results.

4.0 Policy makers should review the research and consult experts in the field prior to instituting ways of helping school districts with microcomputer implementation. Unless interventions change variables related to microcomputer use, no improvement will occur.

5.0 Several school districts should be selected competitively to become model sites for microcomputer use. Strict empirical controls should be used in their establishment so that an implementation model(s) can be developed for school districts to follow.

6.0 School districts should use scales similar to the ones found in this study to measure the extent and quality of their microcomputer use. The scales could then be used to identify needed changes in their programs since it would be a simple matter of examining where the district's performance in the formula is weak.

Recommendations for Further Study

The conclusions and implications of this study lead to

several recommendations for further study. They are as follows:

1.0 An ex post facto study using the data gathered by this research is recommended. The factors used in the two formulas should be removed from the formula one at a time and used as predictor variables in a regression analysis.

2.0 This study should be replicated using a national sample of school districts to determine whether the same conclusions can be drawn for all the nation's school districts.

3.0 The study should be repeated using other predictor variables in an attempt to determine which other factors or characteristics are associated with the extent and quality of microcomputer use.

4.0 Based upon the results of numbers 2 and 3 above, experimental research should be conducted where variables closely associated with or closely related to microcomputer use are actually manipulated rather than simply studied.

REFERENCES

Alabama Center for Evaluation. (1982, August). The administrative uses of microcomputers. Alabama University, University College of Education. (ERIC Document Reproduction Service No. ED 221 946)

Anderson, R., Welch, W., & Harris, L. (1984, April). Inequities in opportunities for computer literacy. Computing Teacher, 11(8), pp. 10-12.

Becker, H. J. (1982, January). Microcomputers in the classroom - dreams and realities. (Report No. 319). Baltimore, MD: Johns Hopkins University, Center for Social Organization of Schools.

Bell, F. (1980, April). CAI and computer literacy: a ten year school/university project. Proceedings of the annual convention of the Association for Educational Data Systems (pp. 8-14). Washington, DC. (ERIC Document Reproduction Service No. ED 192 718)

Bork, A. (1980). Interactive learning. In R. P. Taylor (Ed.), The computer in the school: tutor, tool, tutee (pp. 53-66). New York: Teachers College Press.

Bork, A. (1984, November). Computer futures for Education. Creative Computing, pp. 178-180.

Bork, A., & Franklin, S. D. (1979). The role of personal computer systems in education. AEDS Journal, 13(1), 17-30.

Bracey, G. W. (1982, November/December). Computers in Education: what the research shows. Electronic Learning, pp. 51-54.

Center for Social Organization of Schools. (1983, October). School uses of microcomputers: Reports from a national survey. (Issue no. 3). Baltimore, MD: Johns Hopkins University.

Chicago survey polls computer use in school administration. (1982, September). Electronic Learning, p. 14.

Coburn, P., Kelman, P., Roberts, N., Snyder, T. F., Watt, D. H., & Weiner, C. (1982). Practical guide to computers in education. Reading, MA: Addison Wesley.

Cyphert, F. R., & Gant, W. L. (1971, January). The Delphi Technique: a case study. Phi Delta Kappan, LII, 272-273.

Dodge, B. J., & Clark, R. E. (1977, March). Research on the Delphi Technique. Educational Technology, 17(3), 58-59.

Eisele, J. E. (1981, October). Computers in the schools: now that we have them...? Educational Technology, 21(10), 24-27.

Elseroad, H. (1981). Managing technological change in Montgomery County, Maryland. Proceedings of the National Conference on Technology and Education (pp. 145-151), Washington, DC: Institute for Educational Leadership. (ERIC Document Reproduction Service No. ED 220 916)

EL Survey Shows: Computers Used More Widely in Instruction than Administration. (1982, May/June). Electronic Learning, p. 12.

Fisher, G. (1983, November/December). Where CAI is effective: a summary of the research. Electronic Learning, pp. 82-84.

Gallup, G. H. (1984, September). The 16th annual Gallup poll of the public's attitudes toward the public schools. Phi Delta Kappan, 66(1), 23-38.

Gaushell, H. (1982, April). Microcomputers in Education. (ERIC Document Reproduction Service No. ED 225 540)

Glass, G. V., & Stanley, J. C. (1970). Statistical Methods in Education and Psychology. Englewood Cliffs, Jew Jersey: Prentice-Hall, Inc.

Grady, M. T. (1983, May). Long-range planning for computer use. Educational Leadership, 40(8), 16-19.

Grayson, L. P. (1984, August). An overview of computers in U. S. Education. Technological Horizons in Education Journal, 12(1), 78-83.

Grossnickle, D. R., & Laird, B. A. (1983, May). Microcomputers: bitter pills to swallow - Rx for successful implementation efforts. Technological Horizons in Education Journal, 10(7), 106-108.

Guide for selecting a computer-based instructional system. (1982). Austin, TX: Texas Education Agency. (ERIC Document Reproduction Service No. ED 222 176)

Hall, M. E. (1982). The diffusion of educational technology:

a profile of microcomputer use in Ohio. Dissertation Abstracts International, 43(8), 2644A.

Hartman, A. (1981, March). Reaching consensus using the Delphi Technique. Educational Leadership, 38, 495-497.

Haugo, J. E. (1981). Management applications of the microcomputer: promises and pitfalls. AEDS Journal, 14(4), 182-188.

Hayes, J. (1982, January). Microcomputer usage in the classroom, 1981-1982. Paper presented at the annual convention of the National Audio Visual Association, Anaheim, CA. (ERIC Document Reproduction Service No. ED 226 717)

Holmes, G. (1982, September). Computer assisted instruction: a discussion of some of the issues for would-be implementators. Educational Technology, 22(9), 7-13.

Hoover, T., & Gould, S. (1983, May). The many roles of the school district microcomputer coordinator. Educational Technology, 23(5), 29-30.

Illinois State Board of Education, Department of Finance and Reimbursements. Illinois Public Schools Financial Statistics 1981-82 School Year. Springfield, Il.

Illinois State Board of Education, Department of Finance and Reimbursements. Annual State Aid Entitlement Statistics 1983-84. Springfield, Il.

Ingersoll, G. M., & Smith, C. B. (1984, August). Availability and growth of microcomputers in American schools. Technological Horizons in Education Journal, 12, 84-87.

Judd, R. C. (1972, July). Forecasting to consensus gathering, Delphi grows up to college needs. College and University Business, 53, 35-43.

Kearsley, G., Hunter, B., & Seidel, R. J. (1983, February). Two decades of computer based instruction projects: what have we learned? Technological Horizons in Education Journal, 10(4), 88-96.

Kehner, G. A., & Schepis, N. A. (1982). Microcomputers: administrative timesavers. AEDS proceedings: the tomorrow in new technology; frontiers in administrative computing; adventures in instructional computing, Washington, DC. (ERIC Document Reproduction Service No. ED 223 239)

Kelman, P. (1982, January/February). What if they gave a computer revolution and nobody came? Classroom Computer News, pp. 10, 54.

Kemeny, J. (1984, November). Personal computers invade the classroom. Creative Computing, pp. 173-175.

Koetke, W. (1984, November). Computers, children, and learning: one complete iteration. Creative Computing, pp. 163-169.

Leuhrmann, A. (1980). Prepared statement on research, development, and planning. In R. P. Taylor (Ed.), The computer in the school: tutor, tool, tutee (pp. 136-140). New York: Teachers College Press.

Leuhrmann, A. (1984, November/December). How many computers do we really need? Electronic Learning, p. 24.

Lipkin, J. (1984, April). Computer equity and computer educators (you). Computing Teacher, 11(8), 19-21.

Madigan, S., & Lawrence, V. (1983). Regress II: a multiple regression program for the Apple II/IIe/IIc [Computer program manual]. Northridge, CA: Human System Dynamics.

Marshall, D. G. (1982). Purchasing a microprocessor system for administrative use in schools. AEDS Journal, 15(4), 183-197.

Martin, C. D., & Heller, R. S. (1982, October). Computer literacy for teachers. Educational Leadership, 40, 46-47.

Melmed, A. S. (1984, March). Educational productivity, the teacher and technology. Technological Horizons in Education Journal, 11(6), 78-82.

Minium, E. W. (1978). Statistical Reasoning in Psychology and Education. New York: John Wiley & Sons.

Morgan, C. E. (1981). Effectiveness of technology in the schools - public and taxpayers response. Proceedings of the National Conference on Technology and Education (pp. 90-96), Washington, DC: Institute for Educational Leadership. (ERIC Document Reproduction Service No. ED 220 916)

Moursund, D. (1981). Microcomputers will not solve the computers-in-education problem. In J. L. Thomas (Ed.), Microcomputers in the Schools (pp. 112-116). Phoenix: Oryx Press.

O'Brien, T. C. (1983, November). Wasting new technology on the same old curriculum. Classroom Computer Learning, pp. 25-30.

Ohanian, S. (1983, October). Beware the rosy view! Classroom Computer Learning, pp. 21-27.

Papert, S. (1980). Teaching critical thinking. In R. P. Taylor (Ed.), The computer in the school: tutor, tool, tutee (pp. 161-176). New York: Teachers College Press.

Parker, C. S. (1984). Understanding computers and data processing: today and tomorrow. New York: Holt, Rinehart and Winston.

Pitts, M. R. (1982). The educator's unauthorized microcomputer survival manual. Washington, DC: Council for Educational Development and Research. (ERIC Document Reproduction Service No. ED 229 001)

Podemski, R. S. (1982, August). What's so different about microcomputers? Paper presented at the annual meeting of the National Conference of Professors of Educational Administration, San Marcos, TX. (ERIC Document Reproduction Service No. ED 224 111)

Preble, J. F. (1983, March). Public sector use of the Delphi Technique. Technological Forecasting and Social Change, 23(1), 75-78.

Protheroe, N., Carroll, D., & Zoetis, T. (1982). School district uses of computer technology. Arlington, VA: Educational Research Service, Inc.

Riggs, W. E. (1983, March). The Delphi Technique: an experimental evaluation. Technological Forecasting and Social Change, 23(1), 89-94.

Roblyer, M. D. (1980, April). More hands for teachers: report of an instructional computing study for the state of Florida. Proceedings of the annual convention of the Association for Educational Data Systems (pp. 165-171), Washington, DC. (ERIC Document Reproduction Service No. ED 192 718)

Sheingold, K. (1981, February). Issues related to the implementation of computer technology in schools: a cross-sectional study. (Memo No. 1). New York, NY: Bank Street College of Education, Children's Electronic Laboratory. (ERIC Document Reproduction Service No. ED 205 165)

Stevens, D. J. (1980). How educators perceive computers in

the classroom. AEDS Journal, 13(3), 221-232.

Stevens, D. J. (1981, November). Computers, curriculum, and careful planning. Educational Technology, 21(11), 21-24.

Stevens, D. J. (1982). Educators' perceptions of computers in education: 1979 and 1981. AEDS Journal, 16(1), 1-15.

Sturdivant, P. (1980). Microcomputers - promoting their use in elementary and secondary schools. Proceedings of the annual convention of the Association for Educational Data Systems (pp. 216-222), Washington, DC. (ERIC Document Reproduction Service No. ED 192 718)

Sturdivant, P. (1982, March/April). Microcomputers in the schools: the gap between the promise and the reality. Electronic Education, pp. 16, 17, 41.

Tinker, R., & Naisan, A. (1980). Microcomputers in education: applications for microprocessors in the schools. Cambridge, MA: Technical Research Centers, Inc. (ERIC Document Reproduction Service No. ED 196 455)

Uhlig, G. E. (1982). Electronic education: dimensions and directions. Education, 103(2), 106-111.

U. S. approaching more than one million computers in schools. (1984, November). Computing Teacher, 12(3), p. 9.

Vinsonhaler, J. F., & Bass, R. K. (1972, July). A summary of ten major studies on CAI drill and practice. Educational Technology, 12(7), 29-32.

Walker, D. F. (1983, October). Reflections on the educational potential and limitations of microcomputers. Phi Delta Kappan, 65, 103-107.

Watts, N. (1981, April). A dozen uses for the computer in education. Educational Technology, 21(4), 18-22.

Weaver, W. T. (1971, January). The Delphi forecasting method. Phi Delta Kappan, LII, 267-271.

White, M. A. (1983, May). Synthesis of research on electronic learning. Educational Leadership, 40(8), 13-15.

Willis, C. (1982). Successful implementation of computing technology in schools through teacher education, professional development and support. AEDS proceedings: the tomorrow in new technology; frontiers in administrative computing; adventures in instructional computing (pp. 93-97), Washington, DC. (ERIC Document

Reproduction Service No. ED 223 239)

Winner, A. A. (1983). Computer literacy in the elementary school: an argument for change from within. AEDS Journal, 16(3), 153-165.

55,000 schools use computers. (1984, January). Electronic Education, p. 49.

APPENDIX A

609 N. LaGrange Rd.
LaGrange Park, Il. 60525

date

full.name
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city.state.zip

Dear name:

I am writing my dissertation at Loyola University of Chicago and am researching in the area of microcomputers in education. Specifically, I am trying to find ways to answer the following two questions:

1) How well developed is a school district's computer education program?

2) How advanced is a school district's administrative use of microcomputers?

In the end I hope to develop a formula that may be used to differentiate among a group of school districts and place them along a continuum according to the extent and quality of their microcomputer usage. To develop this formula my study requires that I utilize a panel of experts in the area of microcomputer use in education.

I have selected you to participate on the panel because of your leadership role in developing and implementing microcomputer-based programs. Participation in my study will require very little of your time (perhaps a total of two hours over a period of weeks). Participation will involve you in a three-step process:

1) Panel members will be provided with two lists, one for administration and one for instruction. Panel members will be asked to indicate which of the items are important and should be considered when one measures the extent and quality of a school

district's microcomputer usage. An opportunity will be provided to add items to the lists.

2) A summary of the items identified as important in the first survey will be distributed to panel members. They will be asked to assign weights to each to these items indicating how important each one is in demonstrating the extent and quality of a school district's microcomputer use.

3) Panel members will be contacted one final time. They will be given the mean and median weights for each of the items based upon the panel's responses along with the weights they have assigned. Panel members may change the weights they have assigned after reviewing their colleagues' responses.

Please be assured that your identity will not be disclosed and that your name will never be used in the text of my dissertation or in any subsequent publication that may relate to this study.

Thank you for your willingness to assist me in my research by becoming a member of my panel of experts. Please complete the two surveys enclosed and return them in the self-addressed, stamped envelope by Monday, September 17th.

Sincerely,

Theodore L. Sanders

Instructional Microcomputer Usage Survey

Below is a list of items that may be indicative of the quality and extent of a school district's microcomputer use for instruction. Please check each item which you think is important and should be taken into consideration when the quality and extent of a school district's microcomputer use for instruction is measured. There may be others that you think are important. Please list them under "others."

Microcomputer uses for instruction:

____ Drill and Practice

____ Tutorial

____ Computer Managed Instruction

____ Simulations

____ Teaching computer-related information skills (editing text, retrieving information)

____ Computer Programming

____ Computer Science

____ Computer Awareness and Literacy

____ Computer Assisted Instruction

Miscellaneous factors:

____ Written curriculum

____ Inservice program

____ Number of students receiving various types of instruction

Others:

Administrative Microcomputer Usage
Survey

Below is a list of items that may be indicative of the quality and extent of a school district's microcomputer use for **administration.** Please check each item which you think is important and should be taken into consideration when the quality and extent of a school district's microcomputer use for administration is measured. There may be others that you think are important. Please list them under "others."

Microcomputer uses for administration:

____ Student attendance

____ Enrollment Projections

____ Health Records

____ Grades

____ Scheduling

____ School Calendar

____ Student Records

____ Testing Program (Construction, Analysis, Evaluation)

____ Payroll

____ Personnel Records

____ Salary Simulation (projections for negotiations)

____ Energy Management

____ Facilities/Equipment Inventory

____ Maintenance Records and Scheduling

____ Accounting

____ Financial Forecasting

____ Vendor Reports/Purchase Orders

____ Bus Routing

____ Mailing Lists/Labels

____ Project Planning and Budgeting

___ Research/Statistical Analysis

___ Word Processing

___ Curriculum Planning and Production

___ Professional Development

___ Database Access

___ Public Relations/Information

Miscellaneous factors:

___ Inservice program for administrators

___ Number of administrative microcomputers

Others:

Would you like a copy of the panel's final results?

___ yes ___ no

609 N. LaGrange Rd.
LaGrange Park, Il. 60525

date

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Dear name:

Thank you for responding to my first survey. Your willingness to participate in my study is very much appreciated.

The enclosed surveys represent the second of the three rounds that I outlined in my first letter. In this round, I am asking that you assign weights to the items identified during the first round. Your task is to indicate the relative importance of each item in measuring the quality and extent of microcomputer usage in a school district.

Please return this survey by October 6th.

Sincerely,

Theodore L. Sanders

Instructional Microcomputer Usage
Survey

Below is a list of the items that the panel identified as being indicative of the quality and extent of a school district's microcomputer use for **instruction.** Please circle a weight for each item using a scale of 0 to 10 with 0 meaning that you think the item is not important and 10 meaning that you think the item is critically important.

not important					moderately important				critically important	
0	1	2	3	4	5	6	7	8	9	10

Microcomputer uses for instruction:

0	1	2	3	4	5	6	7	8	9	10	Drill and practice
0	1	2	3	4	5	6	7	8	9	10	Tutorial
0	1	2	3	4	5	6	7	8	9	10	Computer managed instruction
0	1	2	3	4	5	6	7	8	9	10	Simulations
0	1	2	3	4	5	6	7	8	9	10	Teaching computer-related information skills (editing text, retrieving information)
0	1	2	3	4	5	6	7	8	9	10	Computer programming
0	1	2	3	4	5	6	7	8	9	10	Computer science
0	1	2	3	4	5	6	7	8	9	10	Computer awareness and literacy
0	1	2	3	4	5	6	7	8	9	10	Computer assisted instruction
0	1	2	3	4	5	6	7	8	9	10	Keyboarding
0	1	2	3	4	5	6	7	8	9	10	Problem solving
0	1	2	3	4	5	6	7	8	9	10	Business Education department usage of computers in typing, accounting, and filing instruction

Miscellaneous factors:

0	1	2	3	4	5	6	7	8	9	10	Written curriculum
0	1	2	3	4	5	6	7	8	9	10	Inservice program

0	1	2	3	4	5	6	7	8	9	10	Number of students receiving various types of instruction
0	1	2	3	4	5	6	7	8	9	10	Type and variety of students using computers
0	1	2	3	4	5	6	7	8	9	10	Number of computers per student
0	1	2	3	4	5	6	7	8	9	10	Extent of use of existing computers (percent of available time used)
0	1	2	3	4	5	6	7	8	9	10	Number and types of teachers using computers
0	1	2	3	4	5	6	7	8	9	10	Subjects in which computers are used
0	1	2	3	4	5	6	7	8	9	10	Computer applications - word processing, databases, electronic spreadsheets
0	1	2	3	4	5	6	7	8	9	10	Number of days spent on each instructional topic per grade
0	1	2	3	4	5	6	7	8	9	10	Arrangement of computers (class, lab, learning center)
0	1	2	3	4	5	6	7	8	9	10	Computer coordinator on staff
0	1	2	3	4	5	6	7	8	9	10	Budget amounts for hardware, software, materials, and maintenance over the last three years
0	1	2	3	4	5	6	7	8	9	10	Average amount of time students are on the computer per year or week per grade
0	1	2	3	4	5	6	7	8	9	10	Number of software packages used in each grade
0	1	2	3	4	5	6	7	8	9	10	Percent of staff involved with instructional use of computers
0	1	2	3	4	5	6	7	8	9	10	Existence of computer curriculum task force
0	1	2	3	4	5	6	7	8	9	10	Local evaluation process of computer curriculum
0	1	2	3	4	5	6	7	8	9	10	Balance of literacy, programming, applications, and CAI in K-12 curriculum

0	1	2	3	4	5	6	7	8	9	10	Percent of staff using teacher utility programs, word processing, database management programs, gradebook programs, and software creation aids to support the instructional process
0	1	2	3	4	5	6	7	8	9	10	Computer clubs and after hours student use of computers
0	1	2	3	4	5	6	7	8	9	10	Examples of assignments from various classes where software or other computer usage is necessary

Administrative Microcomputer Usage
Survey

Below is a list of the items that the panel identified as being indicative of the quality and extent of a school district's microcomputer use for **administration.** Please circle a weight for each item using a scale of 0 to 10 with 0 meaning that you think the item is not important and 10 meaning that you think the item is critically important.

not important				moderately important						critically important
0	1	2	3	4	5	6	7	8	9	10

Microcomputer uses for administration:

0	1	2	3	4	5	6	7	8	9	10	Student attendance
0	1	2	3	4	5	6	7	8	9	10	Enrollment projections
0	1	2	3	4	5	6	7	8	9	10	Health records
0	1	2	3	4	5	6	7	8	9	10	Grades
0	1	2	3	4	5	6	7	8	9	10	Scheduling
0	1	2	3	4	5	6	7	8	9	10	School calendar
0	1	2	3	4	5	6	7	8	9	10	Student records
0	1	2	3	4	5	6	7	8	9	10	Testing program (construction, analysis, evaluation)
0	1	2	3	4	5	6	7	8	9	10	Payroll
0	1	2	3	4	5	6	7	8	9	10	Personnel records
0	1	2	3	4	5	6	7	8	9	10	Salary simulation (projections for negotiations)
0	1	2	3	4	5	6	7	8	9	10	Energy management
0	1	2	3	4	5	6	7	8	9	10	Facilities/equipment inventory
0	1	2	3	4	5	6	7	8	9	10	Maintenance records and scheduling
0	1	2	3	4	5	6	7	8	9	10	Accounting
0	1	2	3	4	5	6	7	8	9	10	Financial forecasting
0	1	2	3	4	5	6	7	8	9	10	Vendor reports/purchase orders

0	1	2	3	4	5	6	7	8	9	10	Bus routing
0	1	2	3	4	5	6	7	8	9	10	Mailing lists/labels
0	1	2	3	4	5	6	7	8	9	10	Project planning and budgeting
0	1	2	3	4	5	6	7	8	9	10	Research/statistical analysis
0	1	2	3	4	5	6	7	8	9	10	Word processing
0	1	2	3	4	5	6	7	8	9	10	Curriculum planning and production
0	1	2	3	4	5	6	7	8	9	10	Professional development
0	1	2	3	4	5	6	7	8	9	10	Database access
0	1	2	3	4	5	6	7	8	9	10	Public relations/information
0	1	2	3	4	5	6	7	8	9	10	Maintenance of school cafeteria expenditures/costs/receipts
0	1	2	3	4	5	6	7	8	9	10	Use of microcomputers in library management

Miscellaneous factors:

0	1	2	3	4	5	6	7	8	9	10	Inservice program for administrators (topics and number enrolled)
0	1	2	3	4	5	6	7	8	9	10	Number of administrative microcomputers (in each building and in central office)
0	1	2	3	4	5	6	7	8	9	10	Extent of centralization of computer use vs. decentralization
0	1	2	3	4	5	6	7	8	9	10	Use of off-campus computer services to do any of the above (purchased services)
0	1	2	3	4	5	6	7	8	9	10	Introduction to computers for administrators
0	1	2	3	4	5	6	7	8	9	10	Number of staff assigned to manage computer usage by administration
0	1	2	3	4	5	6	7	8	9	10	Percent of secretaries using microcomputers for word processing, etc.

0	1	2	3	4	5	6	7	8	9	10	Number of years each application has been used
0	1	2	3	4	5	6	7	8	9	10	Training for secretaries (number of workshops, number of staff attended, number offered during the day, number offered after hours)

609 N. LaGrange Rd.
LaGrange Park, Il. 60525

date

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Dear name:

Thank you for responding to my second survey. Your continued participation has been essential to the success of my study.

The enclosed surveys represent the third and last round that I outlined in my first letter. The surveys contain the means and medians of the weights assigned to each item by the panel members. Your task is to compare the overall panel results to your own responses and then decide whether or not to modify any or all of your responses.

Please return these surveys by October 19th.

Those of you who requested the panel's final results will receive them shortly after October 19th.

Sincerely,

Theodore L. Sanders

Instructional Microcomputer Usage
Survey

Below you will find the mean and median for each of the items assigned weights by the panel during the last survey. Please examine the results and compare them to your own assigned weights (also given below). List any changes that you wish to make based upon the group response. The scale that was used is as follows:

not important					moderately important				critically important	
0	1	2	3	4	5	6	7	8	9	10

Microcomputer uses for instruction:

mean	median	your rating	any change?	
5.1	5	----	----	Drill and practice
7.1	7.5	----	----	Tutorial
6.1	7	----	----	Computer managed instruction
7.6	8	----	----	Simulations
8.4	8.5	----	----	Teaching computer-related information skills (editing text, retrieving information)
4.5	4	----	----	Computer programming
4.9	4.5	----	----	Computer science
8.0	10	----	----	Computer awareness and literacy
7.0	8	----	----	Computer assisted instruction
6.9	7.5	----	----	Keyboarding
7.1	8	----	----	Problem solving
8.8	9	----	----	Business Education department usage of computers in typing, accounting, and filing instruction

Miscellaneous factors:

mean	median	your rating	any change?	
6.5	8.5	----	----	Written curriculum
8.0	9.5	----	----	Inservice program
6.6	7	----	----	Number of students receiving various types of instruction
5.8	7.5	----	----	Type and variety of students using computers
8.5	9	----	----	Number of computers per student
8.9	9	----	----	Extent of use of existing computers (percent of available time used)
6.9	8	----	----	Number and types of teachers using computers
6.4	7	----	----	Subjects in which computers are used
8.6	9	----	----	Computer applications - word processing, databases, electronic spreadsheets
5.4	6	----	----	Number of days spent on each instructional topic per grade
8.4	8.5	----	----	Arrangement of computers (class, lab, learning center)
7.0	6	----	----	Computer coordinator on staff
6.8	7.5	----	----	Budget amounts for hardware, software, materials, and maintenance over the last three years
7.4	8	----	----	Average amount of time students are on the computer per year or week per grade
5.8	5.5	----	----	Number of software packages used in each grade
7.0	7.5	----	----	Percent of staff involved with instructional use of computers
6.4	7	----	----	Existence of computer curriculum task force

mean	median	your rating	any change?	
7.8	7.5	----	----	Local evaluation process of computer curriculum
6.0	7	----	----	Balance of literacy, programming, applications, and CAI in K-12 curriculum
7.9	8	----	----	Percent of staff using teacher utility programs, word processing, database management programs, gradebook programs, and software creation aids to support the instructional process
6.4	7	----	----	Computer clubs and after hours student use of computers
5.7	7	----	----	Examples of assignments from various classes where software or other computer usage is necessary

Administrative Microcomputer Usage
Survey

Below you will find the mean and median for each of the items assigned weights by the panel during the last survey. Please examine the results and compare them to your own assigned weights (also given below). List any changes that you wish to make based upon the group response. The scale that was used is as follows:

not important				moderately important					critically important	
0	1	2	3	4	5	6	7	8	9	10

Microcomputer uses for administration:

mean	median	your rating	any change?	
7.3	8	----	----	Student attendance
7.5	8	----	----	Enrollment projections
7.0	7	----	----	Health records
8.0	8	----	----	Grades
8.0	8	----	----	Scheduling
5.4	5	----	----	School calendar
7.8	8.5	----	----	Student records
8.1	8.5	----	----	Testing program (construction, analysis, evaluation)
7.4	7.5	----	----	Payroll
7.6	8.5	----	----	Personnel records
8.5	9	----	----	Salary simulation (projections for negotiations)
7.8	8	----	----	Energy management
7.9	8	----	----	Facilities/equipment inventory
7.6	8	----	----	Maintenance records and scheduling
8.1	8.5	----	----	Accounting
8.9	9.5	----	----	Financial forecasting

mean	median	your rating	any change?	
7.5	7.5	----	----	Vendor reports/purchase orders
5.6	5.5	----	----	Bus routing
7.5	8	----	----	Mailing lists/labels
8.3	8	----	----	Project planning and budgeting
6.9	7.5	----	----	Research/statistical analysis
9.0	10	----	----	Word processing
7.1	7.5	----	----	Curriculum planning and production
5.9	7	----	----	Professional development
7.5	8	----	----	Database access
4.3	5.5	----	----	Public relations/information
7.9	8	----	----	Maintenance of school cafeteria expenditures/costs/receipts
8.1	8	----	----	Use of microcomputers in library management

Miscellaneous factors:

7.0	8	----	----	Inservice program for administrators (topics and number enrolled)
6.5	6.5	----	----	Number of administrative microcomputers (in each building and in central office)
6.4	8	----	----	Extent of centralization of computer use vs. decentralization
5.4	5	----	----	Use of off-campus computer services to do any of the above (purchased services)
8.0	8	----	----	Introduction to computers for administrators
6.8	7	----	----	Number of staff assigned to manage computer usage by administration

mean	median	your rating	any change?	
8.1	8	----	----	Percent of secretaries using microcomputers for word processing, etc.
5.1	5.5	----	----	Number of years each application has been used
7.8	8	----	----	Training for secretaries (number of workshops, number of staff attended, number offered during the day, number offered after hours)

Instructional Microcomputer Usage
Survey

Below you will find the mean and median for each of the items assigned weights by the panel during the last survey. Please examine the results and compare them to your own assigned weights (also given below). List any changes that you wish to make based upon the group response. The scale that was used is as follows:

not important					moderately important				critically important
0	1	2	3	4	5	6	7	8	9	10

Microcomputer uses for instruction:

mean	
5.1	Drill and practice
7.1	Tutorial
6.2	Computer managed instruction
7.6	Simulations
8.4	Teaching computer-related information skills (editing text, retrieving information)
4.5	Computer programming
5.2	Computer science
8.8	Computer awareness and literacy
7.0	Computer assisted instruction
7.5	Keyboarding
7.1	Problem solving
8.8	Business Education department usage of computers in typing, accounting, and filing instruction

Miscellaneous factors:

mean	
6.8	Written curriculum
8.8	Inservice program
6.6	Number of students receiving various types of instruction
5.8	Type and variety of students using computers
8.5	Number of computers per student
8.9	Extent of use of existing computers (percent of available time used)
6.9	Number and types of teachers using computers
6.4	Subjects in which computers are used
8.6	Computer applications - word processing, databases, electronic spreadsheets
5.7	Number of days spent on each instructional topic per grade
8.4	Arrangement of computers (class, lab, learning center)
7.0	Computer coordinator on staff
6.8	Budget amounts for hardware, software, materials, and maintenance over the last three years
7.9	Average amount of time students are on the computer per year or week per grade
5.8	Number of software packages used in each grade
7.3	Percent of staff involved with instructional use of computers
6.4	Existence of computer curriculum task force

mean	
7.8	Local evaluation process of computer curriculum
6.0	Balance of literacy, programming, applications, and CAI in K-12 curriculum
7.9	Percent of staff using teacher utility programs, word processing, database management programs, gradebook programs, and software creation aids to support the instructional process
6.4	Computer clubs and after hours student use of computers
6.1	Examples of assignments from various classes where software or other computer usage is necessary

Administrative Microcomputer Usage
Survey

Below you will find the mean and median for each of the items assigned weights by the panel during the last survey. Please examine the results and compare them to your own assigned weights (also given below). List any changes that you wish to make based upon the group response. The scale that was used is as follows:

not important				moderately important					critically important	
0	1	2	3	4	5	6	7	8	9	10

Microcomputer uses for administration:

mean	
7.6	Student attendance
7.5	Enrollment projections
7.0	Health records
8.0	Grades
8.0	Scheduling
5.0	School calendar
7.8	Student records
8.1	Testing program (construction, analysis, evaluation)
7.4	Payroll
7.6	Personnel records
8.5	Salary simulation (projections for negotiations)
7.8	Energy management
7.9	Facilities/equipment inventory
7.6	Maintenance records and scheduling
8.1	Accounting
8.9	Financial forecasting

mean	
7.5	Vendor reports/purchase orders
5.6	Bus routing
7.8	Mailing lists/labels
8.3	Project planning and budgeting
7.4	Research/statistical analysis
9.4	Word processing
7.1	Curriculum planning and production
6.2	Professional development
7.5	Database access
4.2	Public relations/information
7.9	Maintenance of school cafeteria expenditures/costs/receipts
8.1	Use of microcomputers in library management

Miscellaneous factors:

7.0	Inservice program for administrators (topics and number enrolled)
6.5	Number of administrative microcomputers (in each building and in central office)
6.4	Extent of centralization of computer use vs. decentralization
5.4	Use of off-campus computer services to do any of the above (purchased services)
8.1	Introduction to computers for administrators
7.2	Number of staff assigned to manage computer usage by administration

mean

8.1 Percent of secretaries using microcomputers for word processing, etc.

5.1 Number of years each application has been used

7.8 Training for secretaries (number of workshops, number of staff attended, number offered during the day, number offered after hours)

609 N. LaGrange Rd.
LaGrange Park, Il. 60525

February 3, 1985

Superintendent of Schools
organization
street.address
city.state.zip

Dear sir/madam:

I am writing my dissertation at Loyola University of Chicago and am researching in the area of microcomputers in education. I am comparing administrative and instructional microcomputer use to school district characteristics. Your district has been selected as part of a state-wide sample to assist me in completing my research.

Please be assured that your identity and the identity of your school district will be entirely confidential. Neither your name nor the name of your school district will be used in the text of my dissertation or in any subsequent publication relating to this study.

Thank you for your willingness to assist me in my research by completing the two surveys enclosed. Please ask the appropriate person(s) to complete the surveys and return them in the self-addressed, stamped envelope by February 15.

Sincerely,

Theodore L. Sanders

Instructional Microcomputer Usage
K-8 Survey

Please answer the following questions as accurately as possible. The information that you provide will be used to create a profile of your school district's instructional computing program.

1) What is the name and position of the person completing this form?

name _____

position _____

2) Circle the ways in which you use microcomputers in the following subject areas:

math	drill	tutorial	CMI	CAI	simulations
social studies	drill	tutorial	CMI	CAI	simulations
reading	drill	tutorial	CMI	CAI	simulations
writing	drill	tutorial	CMI	CAI	simulations
language arts	drill	tutorial	CMI	CAI	simulations
spelling	drill	tutorial	CMI	CAI	simulations
science	drill	tutorial	CMI	CAI	simulations
others (please list):					
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations

3) What percent of your students regularly use microcomputers for the following functions:

____% drill
____% tutorial
____% CMI
____% CAI
____% simulations

4) What percent of your students receive formal instruction in each of the following areas?

____% computer awareness and literacy
____% keyboarding
____% problem solving with microcomputers

5) Please circle the grade levels for which you have a formal, written computer education curriculum:

K 1 2 3 4 5 6 7 8

6) What percent of your staff have participated in each of the following types of computer education inservice activities during the last year:

____% graduate courses
____% institute day workshops
____% after school workshops
____% released time workshops
others (please list):
_____ ____%
_____ ____%
_____ ____%

7) How many instructional microcomputers does your district presently have? _____

8) On the average how many hours per day are your microcomputers used? _____hrs.

9) What percent of your staff use microcomputers in their classrooms on a regular basis? ____%

10) Please indicate where your instructional microcomputers are normally housed:

_____ classroom
_____ lab
_____ learning center (library)
_____ other (please specify _____)

11) If your district has a computer coordinator(s), please indicate the full-time equivalency for that position (one full-time person = 1, one half-time person = .5, etc.): _____

12) Please indicate the amount of money that your district spent on your computer education program last year:

$_____ hardware
$_____ software
$_____ other

13) Does your school district have a group of teachers and/or administrators who have been assigned the task of developing computer education curricula? yes no

14) Does your school district have a formal process for evaluating the computer education program? yes no

15) What percent of your staff use microcomputers for the following purposes in support of the instructional program:

____% teacher utility programs (i.e., readability programs, graphics creation aids, word search creators, test creators, etc.)
____% word processing
____% database management
____% grade book programs
____% authoring languages (PILOT, BLOCKS, etc.)

16) How many teachers does your district employ (total full-time equivalency)? _____

17) What percent of your computer education expenditures come from the following sources?

____% local funds
____% federal funds (Chapter 1, Chapter 2, etc.)
____% other (specify _____)
100% Total

18) If your district has mini or mainframe computers that are used for instruction, how much did the district spend in support of those units last year? $_____

Instructional Microcomputer Usage
K-12 Survey

Please answer the following questions as accurately as possible. The information that you provide will be used to create a profile of your school district's instructional computing program.

1) What is the name and position of the person completing this form?

name _____

position _____

2) Circle the ways in which you use microcomputers in the following subject areas:

math	drill	tutorial	CMI	CAI	simulations
social studies	drill	tutorial	CMI	CAI	simulations
reading	drill	tutorial	CMI	CAI	simulations
writing	drill	tutorial	CMI	CAI	simulations
language arts	drill	tutorial	CMI	CAI	simulations
spelling	drill	tutorial	CMI	CAI	simulations
science	drill	tutorial	CMI	CAI	simulations
others (please list):					
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations

3) What percent of your students regularly use microcomputers for the following:

____% drill
____% tutorial
____% CMI
____% CAI
____% simulations

4) What percent of your students receive formal instruction in each of the following areas?

____% computer awareness and literacy
____% keyboarding
____% problem solving with microcomputers

5) What percent of your high school students are enrolled in computer science/programming classes? ____%

6) For which of the following does your high school Business Education department offer instruction using microcomputers?

_____ word processing
_____ accounting (payroll, general ledger)
_____ database management
_____ spreadsheets

7) Please circle the grade levels for which you have a formal, written computer education curriculum:

K 1 2 3 4 5 6 7 8 9 10 11 12

8) What percent of your staff have participated in each of the following types of computer education inservice activities during the last year:

____% graduate courses
____% institute day workshops
____% after school workshops
____% released time workshops
others (please list):
_____ ____%
_____ ____%
_____ ____%

9) How many instructional microcomputers does your school district presently have? _____

10) On the average how many hours per day are your microcomputers used? _____hrs.

11) What percent of your staff use microcomputers in their classrooms on a regular basis? ____%

12) Please indicate where your instructional microcomputers are normally housed:

_____ classroom
_____ lab
_____ learning center (library)
_____ other (please specify _____)

13) If your school district has a computer coordinator(s), please indicate the full-time equivalency for that position (one full-time person = 1, one half-time person = .5, etc.): _____

14) Please indicate the amount of money that your district spent on your microcomputer-based instructional program last year:

$_____ hardware
$_____ software
$_____ other

15) Does your school district have a group of teachers and/or administrators who have been assigned the task of developing computer education curricula? yes no

16) Does your school district have a formal process for evaluating the computer education program? yes no

17) What percent of your staff use microcomputers for the following purposes in support of the instructional program:

____% teacher utilities programs (ie., readability programs, graphics creation aids, word search creators, test creators, etc.)
____% word processing
____% database management
____% grade book programs
____% authoring languages (BLOCKS, PILOT, etc.)

18) How many teachers does your district employ (total full-time equivalency)? _____

19) What percent of your computer education expenditures come from the following sources?

____% local funds
____% federal funds (Chapter 1, Chapter 2, etc.)
____% other (specify _____)
100% Total

20) If your district has mini or mainframe computers that are used for instruction, how much did the district spend in support of those units last year? $_____

Instructional Microcomputer Usage
9-12 Survey

Please answer the following questions as accurately as possible. The information that you provide will be used to create a profile of your school district's instructional computing program.

1) What is the name and position of the person completing this form?

name _____

position _____

2) Please list the subject areas in which you use microcomputers and circle the ways in which you use them:

_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations
_____	drill	tutorial	CMI	CAI	simulations

3) What percent of your students regularly use microcomputers for the following:

____% drill
____% tutorial
____% CMI
____% CAI
____% simulations

4) What percent of your students receive formal instruction in each of the following areas?

____% computer awareness and literacy
____% keyboarding
____% problem solving with microcomputers

5) What percent of your students are enrolled in computer science/programming classes? ____%

6) For which of the following does your Business Education department offer instruction using microcomputers?

_____ word processing
_____ accounting (payroll, general ledger)
_____ database management
_____ spreadsheets

7) Please circle the grade levels for which you have a formal, written computer education curriculum:

9 10 11 12

8) What percent of your staff have participated in each of the following types of computer education inservice activities during the last year:

____% graduate courses
____% institute day workshops
____% after school workshops
____% released time workshops
others (please list):
_____ ____%
_____ ____%
_____ ____%

9) How many instructional microcomputers does your school district presently have? _____

10) On the average how many hours per day are your microcomputers used? _____hrs.

11) What percent of your staff use microcomputers in their classrooms on a regular basis? ____%

12) Please indicate where your instructional microcomputers are normally housed:

_____ classroom
_____ lab
_____ learning center (library)
_____ other (please specify _____)

13) If your school district has a computer coordinator(s), please indicate the full-time equivalency for that position (one full-time person = 1, one half-time person = .5, etc.): _____

14) Please indicate the amount of money that your district spent on your microcomputer-based instructional program last year:

$_____ hardware
$_____ software
$_____ other

15) Does your school district have a group of teachers and/or administrators who have been assigned the task of developing computer education curricula? yes no

16) Does your school district have a formal process for evaluating the computer education program? yes no

17) What percent of your staff use microcomputers for the following purposes in support of the instructional program:

____% teacher utilities programs (ie., readability programs, graphics creation aids, word search creators, test creators, etc.)
____% word processing
____% database management
____% grade book programs
____% authoring languages (BLOCKS, PILOT, etc.)

18) How many teachers does your district employ (total full-time equivalency)? _____

19) What percent of your computer education expenditures come from the following sources?

____% local funds
____% federal funds (Chapter 1, Chapter 2, etc.)
____% other (specify _____)
100% Total

20) If your district has mini or mainframe computers that are used for instruction, how much did the district spend in support of those units last year? $_____

Administrative Microcomputer Usage
Survey

Please answer the following questions as accurately as possible. The information that you provide will be used to construct a profile of your school district's administrative microcomputer use.

1) What is the name and position of the person completing this form?

name _____

position _____

2) Please check the functions which you perform with microcomputers:

_____ Student attendance
_____ Enrollment projections
_____ Health records
_____ Grades
_____ Scheduling
_____ School calendar
_____ Student records
_____ Testing program (construction, analysis, evaluation)
_____ Payroll
_____ Personnel records
_____ Salary simulation (projections for negotiations)
_____ Energy management
_____ Facilities/equipment inventory
_____ Maintenance records and scheduling
_____ Accounting
_____ Financial forecasting
_____ Vendor reports/purchase orders
_____ Bus routing
_____ Mailing lists/labels
_____ Project planning and budgeting
_____ Research/statistical analysis
_____ Word processing
_____ Curriculum planning and production
_____ Professional development
_____ Database access
_____ Public relations/information
_____ Maintenance of school cafeteria expenditures/costs/receipts
_____ Use of microcomputers in library management

3) Over the past year, how many inservice programs on administrative uses of microcomputers have been held for your administrators?

_____

What percent of your administrators participated? ____%

4) How many microcomputers does your school district have that are used for administrative purposes? _____

5) What percent of your administrative staff has participated in some type of "introduction to computers" activity? ____%

6) What percent of your secretaries use microcomputers? ____%

7) How many years have you been using microcomputers for administrative applications? _____yrs.

8) Please indicate the percent of your secretaries who have attended each of the following types of training?

____% courses
____% workshops offered during business hours
____% workshops offered after business hours
____% other (please specify _____)

9) How many administrators does your school district employ (total full-time equivalency)? _____

10) What percent of your administrative microcomputer program is supported by the following funding sources?

____% local funds
____% federal funds (Chapter 1, Chapter 2, etc.)
____% other (specify _____)
100% Total

11) If your school district has mini or mainframe computers that are used for administration, how much money was spent in support of those computers last year? $_____

12) How many years has your superintendent been employed as superintendent of your school district? _____yrs.

APPENDIX B

CASE	*	Q2	Q2	Q2	Q2	Q2	Q3	Q3	Q3
1	1	30	40	0	0	0	12	12	8
2	1	30	60	0	30	0	10	25	10
3	2	0	0	0	0	0	100	100	0
4	2	100	0	0	0	0	50	50	0
5	1	80	15	6	24	8	9	0	0
6	2	0	0	0	0	0	10	10	5
7	1	20	5	0	5	5	10	5	10
8	2	180	0	0	0	0	30	0	15
9	1	5	5	0	0	0	10	15	0
10	2	0	0	0	0	0	100	100	100
11	1	90	90	0	40	0	80	10	20
12	1	0	70	0	0	0	0	0	0
13	1	50	0	10	20	0	15	0	15
14	2	50	50	0	250	0	100	100	10
15	2	30	0	0	0	0	0	0	0
16	2	160	40	0	0	0	10	10	10
17	2	2	0	0	0	0	0	0	0
18	1	15	15	0	0	0	20	20	20
19	2	100	0	0	0	0	5	0	0
20	1	15	0	0	150	0	0	60	10
21	1	8	6	0	0	0	8	0	0
22	2	40	10	0	40	0	0	0	0
23	2	0	80	0	80	0	80	80	80
24	2	420	120	80	180	100	50	30	10
25	1	360	20	0	0	5	100	0	20
26	2	30	0	0	0	0	100	100	0
27	1	10	10	0	0	45	75	5	15
28	2	0	0	0	50	0	100	0	0
29	2	0	50	0	50	0	12	12	12
30	1	0	0	0	0	0	20	10	10
31	1	30	5	0	125	5	25	15	5
32	1	200	120	40	300	60	60	25	30
33	1	20	60	0	0	0	66	66	20
34	1	0	0	0	0	0	50	50	50
35	1	25	15	0	0	2	10	10	0

* - 1 indicates survey received by mail
2 indicates phone survey

Unit Districts - Raw Data
Instruction

CASE	Q5	Q6	Q6	Q6	Q6	Q7	Q8	Q9
1	20	1	1	1	1	4	20	18
2	10	1	0	0	0	1	230	6
3	25	0	0	0	0	0	101	30
4	5	1	0	1	1	2	137	23
5	10	1	1	0	1	4	90	52
6	20	1	1	0	0	3	105	25
7	15	0	0	0	0	2	250	16
8	30	1	1	0	0	0	0	30
9	7	1	0	0	0	0	2	10
10	20	0	0	0	0	2	50	28
11	10	1	1	0	1	2	3	14
12	0	0	0	0	0	0	20	10
13	15	1	0	0	0	1	57	28
14	10	1	1	1	1	2	140	17
15	0	1	0	0	0	0	0	2
16	8	0	0	0	0	0	0	10
17	10	1	0	0	0	0	115	20
18	30	0	0	0	0	4	35	17
19	25	1	0	1	1	4	40	80
20	7	1	0	0	0	1	26	15
21	19	0	0	0	0	1	106	10
22	25	1	1	0	1	0	120	22
23	80	1	0	1	0	3	70	8
24	16	1	0	0	1	13	105	45
25	0	1	0	0	0	11	140	34
26	8	1	1	0	0	4	100	27
27	10	1	0	0	1	0	130	53
28	10	1	0	0	0	6	165	18
29	12	0	0	0	0	1	101	15
30	30	1	0	0	1	4	105	6
31	10	1	1	0	1	4	19	142
32	23	1	1	0	0	13	173	72
33	19	1	1	0	1	5	120	10
34	0	1	0	0	0	4	0	23
35	10	1	0	0	0	0	135	14

Unit Districts - Raw Data
Instruction (cont.)

CASE	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17
1	6	10	4	0	7232	0	0	0
2	8	20	6	0	1000	1	1	20
3	3	7	6	0	14000	1	0	0
4	3	25	6	0	8500	1	0	2
5	5	35	4	0	16500	1	1	0
6	4	20	6	0	5500	0	0	10
7	3	10	2	0	7000	0	0	10
8	3	8	3	0	0	0	0	0
9	2	1	1	0	4032	0	0	0
10	3	10	3	.5	6900	1	1	20
11	5	10	1	0	1800	1	0	5
12	6	10	1	0	6000	0	0	0
13	8	35	6	0	6200	0	0	10
14	5	5	4	0	9500	1	0	15
15	6	25	3	0	1900	0	0	25
16	6	10	3	0	5500	0	0	5
17	1	10	3	0	13000	0	0	10
18	6	5	5	0	4000	0	0	2
19	6	90	4	.5	32500	0	0	2
20	5	15	2	0	1500	0	0	2
21	3	2	5	0	6493	0	0	0
22	4	10	3	0	6500	0	0	0
23	6	0	1	1	0	0	0	0
24	5	20	6	.6	33000	1	0	20
25	5	15	3	.2	0	0	0	10
26	5	10	3	0	12000	1	0	2
27	4	10	6	0	13500	1	0	45
28	5	8	3	0	5500	0	0	8
29	4	30	3	0	9300	0	0	40
30	3	5	3	0	2500	1	0	0
31	3	1	4	.1	42500	1	0	1
32	5	60	4	.16	55000	1	0	30
33	7	2	3	0	4500	0	0	1
34	4	10	4	0	2900	1	0	0
35	4	10	1	0	6000	1	0	3

Unit Districts - Raw Data
Instruction (cont.)

CASE	Q17	Q17	Q17	Q17
1	0	0	0	0
2	10	10	20	0
3	75	0	75	0
4	0	0	0	0
5	2	0	0	0
6	10	0	0	0
7	20	5	40	0
8	0	0	0	0
9	0	0	0	0
10	10	0	5	0
11	5	3	3	0
12	0	0	0	0
13	4	0	4	0
14	15	0	0	0
15	0	0	0	0
16	5	0	5	0
17	10	2	0	0
18	2	2	2	0
19	2	0	0	0
20	10	0	2	0
21	2	2	4	0
22	2	0	0	0
23	0	0	0	0
24	30	20	40	0
25	20	5	10	0
26	8	0	5	0
27	15	0	40	3
28	4	0	0	0
29	40	0	40	0
30	10	0	0	0
31	2	0	0	0
32	50	10	5	15
33	4	0	0	0
34	10	0	0	0
35	5	0	2	0

Unit Districts - Raw Data
Instruction (cont.)

CASE	*	Q2	Q2	Q2	Q2	Q2	Q4	Q4	Q4
1	1	450	0	0	0	0	0	0	0
2	2	60	80	40	0	60	95	0	15
3	2	570	570	0	0	5	25	25	25
4	2	500	500	0	0	500	50	50	75
5	1	300	400	0	500	500	100	100	100
6	2	150	0	0	0	100	100	0	15
7	1	40	40	0	50	0	50	50	50
8	1	125	100	0	325	250	65	40	35
9	1	180	0	0	75	0	25	0	0
10	1	0	0	0	0	0	0	0	0
11	1	40	40	0	80	120	90	10	10
12	1	100	90	0	120	300	100	0	100
13	2	100	600	0	0	0	100	100	80
14	1	570	665	0	0	0	100	50	50
15	2	250	0	0	0	0	60	60	40
16	2	50	300	0	0	20	35	0	15
17	1	45	100	0	125	20	30	30	15
18	1	240	100	0	160	50	100	40	25
19	2	0	0	0	0	0	75	75	0
20	1	0	0	0	0	0	100	100	0
21	1	0	100	0	0	0	100	50	50
22	1	4	2	0	0	0	0	0	0
23	2	0	0	0	0	0	0	0	0
24	2	400	0	0	0	0	100	100	25
25	1	480	300	200	240	120	80	20	60
26	1	100	100	0	0	0	100	0	0
27	1	0	0	0	420	0	60	10	60
28	2	125	0	0	0	0	0	0	0
29	1	0	0	0	0	0	10	10	0
30	2	60	60	0	60	60	22	15	10
31	1	150	150	0	0	0	70	0	0

* - 1 indicates survey was received by mail
2 indicates phone survey

Elementary Districts - Raw Data
Instruction

CASE	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
1	0	100	1	0	100	1	0	1000
2	0	165	13	6	60	1	0	8000
3	0	95	45	6	50	3	0	16000
4	9	240	3	5	100	2	.4	2700
5	2	100	2	4	25	1	0	1700
6	9	40	48	4	0	5	0	6000
7	4	120	4	2	10	3	0	3800
8	0	300	40	3.5	10	2	0	23000
9	0	110	9	2	75	1	0	750
10	0	0	0	0	0	0	0	0
11	0	30	50	5	5	5	0	5500
12	8	180	12	4	25	4	0	900
13	0	135	45	8	40	6	0	8000
14	0	30	3	4	60	3	0	1400
15	2	160	60	4	30	4	0	13000
16	0	202	17	7	20	2	0	7000
17	4	0	3	2	60	1	0	300
18	4	40	11	7	5	3	.5	5300
19	4	125	20	4	10	3	0	10500
20	0	112	30	5	0	5	1	93000
21	4	120	6	1	20	4	0	0
22	0	140	1	1	30	2	0	0
23	0	0	0	0	0	0	0	0
24	9	150	60	6	20	4	.1	14000
25	0	200	2	5	100	1	0	1500
26	8	120	3	4	20	1	0	1100
27	0	175	8	4	20	6	.5	0
28	0	140	2	3	50	2	0	1200
29	1	30	25	4	7	4	.25	30000
30	2	190	85	4	15	5	0	85000
31	0	200	2	4	75	1	0	2000

Elementary Districts - Raw Data
Instruction (cont.)

CASE	Q13	Q14	Q15	Q15	Q15	Q15	Q15
1	1	0	0	0	0	0	0
2	0	0	20	10	5	30	2
3	1	0	4	7	4	3	0
4	1	0	20	0	0	0	0
5	1	0	0	0	0	0	0
6	1	1	15	30	0	15	0
7	0	1	0	10	0	0	0
8	1	1	15	20	25	20	0
9	0	0	10	10	0	0	0
10	0	0	0	0	0	0	0
11	0	0	10	25	5	0	5
12	1	0	25	10	0	0	0
13	1	0	0	0	0	0	0
14	0	0	0	0	0	0	0
15	1	0	20	0	10	25	0
16	1	0	1	3	0	0	0
17	0	0	0	0	0	0	0
18	1	0	5	5	0	0	0
19	0	0	30	15	15	0	0
20	0	0	0	0	0	0	0
21	0	0	20	0	0	0	0
22	1	0	20	20	0	0	0
23	0	0	0	0	0	0	0
24	1	0	20	40	5	0	0
25	0	0	50	10	0	30	0
26	0	0	10	10	0	0	10
27	1	0	40	0	0	20	0
28	0	0	0	0	0	0	0
29	1	1	0	0	0	0	0
30	1	1	5	15	5	5	0
31	0	0	0	0	0	0	0

Elementary Districts - Raw Data
Instruction (cont.)

CASE	*	Q2	Q2	Q2	Q2	Q2	Q4	Q4	Q4
1	1	20	20	0	30	40	100	100	20
2	1	30	20	60	40	80	25	25	35
3	1	10	0	10	20	0	10	0	10
4	1	15	15	0	50	10	20	0	10
5	1	134	180	60	525	100	100	45	25
6	1	40	225	0	300	0	20	0	0
7	1	50	0	4	40	60	50	70	8
8	2	0	0	0	0	0	17	0	0
9	2	40	40	0	0	40	100	0	20
10	2	20	0	0	0	0	0	0	0
11	1	60	105	2	210	40	100	0	0
12	1	200	245	50	60	25	100	0	0
13	1	20	10	0	40	30	80	10	0
14	2	50	0	0	100	12	100	100	100
15	2	150	150	0	0	150	90	90	90
16	2	0	0	0	0	0	0	0	0
17	2	60	60	0	0	0	0	0	0

High School Districts - Raw Data
Instruction

CASE	Q5	Q6	Q6	Q6	Q6	Q7	Q8	Q9
1	15	1	1	1	1	3	190	30
2	25	1	1	0	0	3	35	150
3	10	1	0	0	0	2	75	20
4	10	0	0	0	0	4	25	15
5	15	1	1	1	1	4	199	15
6	10	1	1	1	1	3	35	5
7	7	1	1	1	0	0	14	73
8	22	1	1	0	0	4	20	26
9	15	1	1	0	1	0	0	30
10	0	0	0	0	0	3	0	8
11	26	1	0	0	0	3	25	74
12	14	0	0	0	0	2	25	31
13	15	1	0	0	0	3	134	8
14	20	1	1	1	1	4	140	75
15	50	1	1	0	1	4	245	50
16	10	1	1	1	1	0	133	70
17	15	1	1	1	1	2	130	32

High School Districts - Raw Data
Instruction (cont.)

CASE	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17
1	6	15	4	1	52500	1	0	5
2	6	10	5	.25	35000	1	0	10
3	5	7	4	.4	40165	1	0	10
4	3	2	1	0	16500	1	0	0
5	5	50	6	0	28500	1	0	25
6	4	20	6	.5	2300	0	0	20
7	6	0	5	.33	75000	1	1	5
8	4	7	3	0	200	0	0	7
9	6	10	3	0	36000	1	0	1
10	2	0	2	0	25000	0	1	0
11	4	7	4	.1	44806	1	0	5
12	5	10	3	.71	28000	1	0	10
13	4	33	3	.25	3000	1	0	33
14	4	5	3	.6	67000	0	1	10
15	6	25	3	.2	50000	1	0	33
16	7	15	4	0	48000	0	0	10
17	6	15	3	0	15500	1	0	20

High School Districts - Raw Data
Instruction (cont.)

CASE	Q17	Q17	Q17	Q17
1	7	10	15	0
2	25	5	5	0
3	15	1	10	0
4	2	2	0	0
5	15	10	50	10
6	0	0	0	0
7	2	9	1	16
8	15	5	0	0
9	3	1	2	0
10	0	0	0	0
11	5	0	10	0
12	8	2	10	1
13	33	17	8	0
14	40	5	5	0
15	33	0	10	0
16	25	10	40	0
17	10	30	30	0

High School Districts - Raw Data
Instruction (cont.)

CASE	*	Q2	Q3	Q3	Q4	Q5	Q6	Q7	Q8
1	1	0	0	0	0	0	0	0	0
2	1	524	0	0	1	100	0	3	0
3	2	740	0	0	3	0	60	3	20
4	2	0	0	0	0	0	0	0	0
5	1	811	2	100	6	100	16	5	16
6	2	469	0	0	1	0	0	1	0
7	1	723	0	0	2	100	33	4	66
8	2	0	0	0	0	0	0	0	0
9	1	0	2	30	1	60	30	0	60
10	2	1087	0	0	4	0	30	1	15
11	1	0	0	0	0	50	0	0	0
12	1	257	0	0	1	50	20	1	50
13	1	154	0	0	1	0	75	1	75
14	2	990	0	0	2	0	100	1	66
15	2	0	0	0	0	0	0	0	0
16	2	338	0	0	1	66	20	2	0
17	2	0	0	0	0	0	0	0	0
18	1	382	2	50	0	40	0	0	75
19	2	1001	0	0	10	0	60	2	0
20	1	539	0	0	5	100	100	4	100
21	1	497	0	0	1	33	4	2	4
22	2	156	1	100	3	100	66	2	0
23	2	653	0	0	0	0	33	4	33
24	2	1080	6	20	3	100	40	2	80
25	1	955	0	0	0	0	20	3	0
26	2	0	0	0	0	100	0	0	0
27	1	576	0	0	3	100	25	4	200
28	2	0	0	0	0	0	0	0	0
29	2	0	0	0	0	0	0	0	0
30	1	230	1	100	2	100	1	2	20
31	1	94	1	30	0	75	0	0	0
32	1	1510	4	100	7	100	60	3	145
33	1	727	2	33	2	100	100	2	125
34	1	408	0	0	0	75	25	2	0
35	1	398	0	0	3	30	0	0	0

* - 1 indicates survey recieved by mail
2 indicates phone survey

Unit Districts - Raw Data
Administration

CASE	*	Q2	Q3	Q3	Q4	Q5	Q6	Q7	Q8
1	1	0	0	0	0	100	0	0	0
2	2	1266	0	0	6	100	33	4	100
3	2	0	0	0	0	0	0	0	0
4	2	0	0	0	0	0	0	0	0
5	1	0	0	0	1	100	0	0	0
6	2	327	0	0	2	0	12	1	12
7	1	94	2	100	1	100	0	1	0
8	1	0	3	100	2	100	100	2	200
9	1	0	0	0	0	0	0	0	0
10	1	0	0	0	0	0	0	0	0
11	1	398	2	25	3	100	20	1	20
12	1	567	0	0	2	100	75	1	300
13	2	1443	2	100	7	0	50	2	0
14	1	0	0	0	0	0	0	0	0
15	2	328	0	0	3	0	50	3	100
16	2	0	0	0	0	0	0	0	0
17	1	0	0	0	0	0	0	0	0
18	1	0	0	0	0	0	0	0	0
19	2	1462	0	0	8	100	100	4	200
20	1	0	0	0	1	0	0	0	100
21	1	0	0	0	0	100	0	0	0
22	1	0	0	0	0	0	0	0	0
23	2	0	0	0	0	0	0	0	0
24	2	1279	2	100	11	100	100	5	100
25	1	0	0	0	0	0	0	0	0
26	1	80	1	100	0	2	0	2	0
27	1	552	1	100	1	100	100	3	300
28	2	0	0	0	0	0	0	0	0
29	1	401	15	80	5	80	25	2	35
30	2	0	0	0	0	0	0	0	0
31	1	0	0	0	0	0	0	0	0

* - 1 indicates survey recieved by mail
2 indicates phone survey

Elementary Districts - Raw Data
Administration

CASE	*	Q2	Q3	Q3	Q4	Q5	Q6	Q7	Q8
1	1	570	0	0	2	100	100	3	100
2	1	703	0	0	6	100	70	3	0
3	1	250	3	50	4	50	60	1	90
4	1	482	0	0	3	66	60	3	60
5	1	885	0	0	2	100	50	2	150
6	1	255	0	0	1	50	0	1	0
7	1	81	0	0	0	0	0	0	100
8	2	0	0	0	0	0	0	0	0
9	2	89	0	0	1	0	0	0	0
10	2	0	0	0	0	0	0	0	0
11	1	805	2	40	3	60	40	4	40
12	1	76	0	0	1	10	1	3	4
13	1	241	0	0	1	100	0	5	100
14	2	261	1	100	10	100	40	3	90
15	2	1000	0	0	2	0	20	3	0
16	2	653	0	0	10	0	20	3	75
17	2	577	0	0	0	0	0	2	0

* - 1 indicates survey received by mail
2 indicates phone survey

High School Districts - Raw Data
Administration

APPENDIX C

Sample	N	Mean	SD
Mail	10	40.801	17.844
Phone	7	38.770	18.538

Hypothesized Difference: 0

Obtained Difference: 2.030

T(15) = .227 p = .6779

Standard Error = 8.932

High School Districts - Instruction
Test for Statistical Difference
Mail vs. Phone Survey
Using Formula Results

Sample	N	Mean	SD
Mail	10	25.084	14.760
Phone	7	17.729	16.909

Hypothesized Difference: 0

Obtained Difference: 7.354

T(15) = .953 p = .3580

Standard Error = 7.715

High School Districts - Administration
Test for Statistical Difference
Mail vs. Phone Survey
Using Formula Results

Sample	N	Mean	SD
Mail	19	32.564	15.625
Phone	12	35.695	17.818

Hypothesized Difference: 0

Obtained Difference: -3.132

T(29) = -.515 p = .6083

Standard Error = 6.081

Elementary School Districts - Instruction
Test for Statistical Difference
Mail vs. Phone Survey
Using Formula Results

Sample	N	Mean	SD
Mail	19	9.538	13.566
Phone	12	24.938	31.339

Hypothesized Difference: 0

Obtained Difference: -15.400

T(29) = -1.893 p = .0654

Standard Error = 8.135

Elementary School Districts - Administration
Test for Statistical Difference
Mail vs. Phone Survey
Using Formula Results

Sample	N	Mean	SD
Mail	19	25.751	11.428
Phone	16	29.083	12.299

Hypothesized Difference: 0

Obtained Difference: -3.332

T(33) = -.830 p = .4174

Standard Error = 4.015

Unit School Districts - Instruction
Test for Statistical Difference
Mail vs. Phone Survey
Using Formula Results

Sample	N	Mean	SD
Mail	19	24.403	18.261
Phone	16	19.291	19.838

Hypothesized Difference: 0

Obtained Difference: 5.112

T(33) = .793 p = .4389

Standard Error = 6.445

Unit School Districts - Administration
Test for Statistical Difference
Mail vs. Phone Survey
Using Formula Results

APPROVAL SHEET

The dissertation submitted by Theodore L. Sanders has been read and approved by the following committee:

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Education.

Date

Director's Signature