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The effectiveness of teacher inservice computer training programs and support services: A case study of the roles of selected educational agencies in two Michigan intermediate school districts

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THE EFFECTIVENESS OF TEACHER INSERVICE COMPUTER TRAINING PROGRAMS AND SUPPORT SERVICES: A CASE STUDY OF THE ROLES OF SELECTED EDUCATIONAL AGENCIES IN TWO MICHIGAN INTERMEDIATE SCHOOL DISTRICTS

By

Paul Kofi Ebraju Egbo

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ABSTRACT

THE EFFECTIVENESS OF TEACHER INSERVICE COMPUTER TRAINING PROGRAMS AND SUPPORT SERVICES: A CASE STUDY OF THE ROLES OF SELECTED EDUCATIONAL AGENCIES IN TWO MICHIGAN INTERMEDIATE SCHOOL DISTRICTS

By

Paul Kofi Ebraju Egbo

The 1980s has witnessed the increasing use of computers for instructional purposes in elementary schools in the United States. Often, hardware acquisition has been an end in itself to the detriment of training and support services for teachers in their classroom uses of computers.

This was a case study of the philosophies, policies and objectives in instructional computing and the training programs and support services provided by selected public education agencies in two Michigan Intermediate School Districts. A complementary objective was to determine classroom teachers' assessment of the effectiveness and value of the training and support they receive from the agencies. The methods used for data gathering were document search and interviews with officials of the agencies and questionnaires administered to classroom teachers and principals.

Some of the findings of the study were: 1) The absence of a state-wide policy on instructional computing in Michigan and the tenuous coordination between the programs of the agencies studied, 2) the importance of the position and qualifications of a local district instructional computer coordinator, 3) the lack of adequate relationship between training and the classroom needs of teachers, 4) the low level of involvement of teachers in the programs of the agencies, and 5) the need for the agencies to provide a variety of support materials and services for the instructional uses of teachers.

The findings are discussed and suggestions made as to how teacher inservice computer training and support services may be improved.

DEDICATION

To the Almighty God
and His son, Jesus Christ
for their mercies

to the memories of
David Erakpobruke Egbo, my father
and
Amos Kwamena Egbo, my brother
who yearned to see this dawn
but did not live to share the joy

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To those who know of my experiences at Michigan State University, this little work is a miracle which I can only attribute to God who brought a number of people to my assistance at times when I thought everything was lost.

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I consider myself very fortunate to have had the benefit of the backgrounds and experiences of some of the best professors at Michigan State University on my committee. I am greatly indebted to Dr. Lawrence Alexander, Dr. Thomas Baldwin, Dr. Rex Ray and Dr. Stephen Yelon for their support, challenge and encouragement even when I had to drastically change the focus of my research. Special thanks to Dr. Erling Jorgensen, my chairman and major professor for his academic guidance, support, concern, interest and efforts to resolve my myriad problems. Thanks also to Dr. Ken Ebert and Elda Keaton and the Office of Foreign Students and Scholars for their tremendous help.

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CHAPTER I

THE PROBLEM

Introduction

The 1980s will be remembered by educational historians for the extensive introduction and use of computers for instructional purposes in schools, both in the United States and in other countries. In a survey of nine "most computer-advanced" countries, Dan Levin (1984) found that the United States leads the rest of the world in computer application in education. The growth in the number of computers in schools in the United States in the last five years is simply phenomenal and trends indicate that the years ahead will witness even more introduction and use of computers in U.S. schools. For example, Fiske (1983) quoting a Market Data Retrieval Company survey stated that of the 77,000 elementary and secondary schools in the U. S., 23,000 had acquired microcomputers for instruction and this was made up of 50 percent of all high schools, 40 percent of junior high schools and 20 percent of elementary schools. Commenting on the rate of introduction of computers in United States schools, Edward Fiske noted:

> More striking than the overall totals, though, is the rate at which these numbers are growing. From 1981 to 1982 the number of schools with such technology rose by 33 percent among high schools and 49 percent among junior high schools. The number of elementary schools with computers nearly doubled -- up by 85 percent (p. 89).

Evan Birkhead (1986) projects that by 1988 the number of computers in U.S. schools will approach six million.

Two major reasons may be advanced for the increasing use of computers for instruction in elementary and secondary schools: (1) Computers have been demonstrated as effective in providing individualized instruction, drill and practice, simulation of skills that may be too dangerous or too expensive to teach in real life situations, and especially for special education (Spring and Perry, 1981-1982; Lally, 1980; Culclasure, 1982; Hasselbring and Crossland, 1981; Watkins and Webb, 1981). (2) The anticipation that computers will become more and more pervasive in our daily lives and that schools have a responsiblity for preparing students for the real world of computers. Says Edward Fiske:

> Parents, teachers, administrators, school board members, and others seem to have awakened suddenly to the fact that computers are becoming intrinsic not only to the job market but to every other part of American society as well. Because schools are supposed to train kids to move into the real world, it follows that they have a mandate to make sure that students are comfortable in using the new technology (p. 86).

Such views are shared by others such as Guenther (1984), Hunter (1984), Komoski (1984), and Megarry (1983).

Statement of the Problem

The speed with which computers are being introduced into schools has not been matched by teacher competency in the creative use of this relatively new technology for

instruction. In the rush to "keep abreast of the times," many districts and schools acquired computer hardware as an end in itself without careful planning or the involvement of teachers who are charged with the responsibility for using them for classroom instruction. The magnitude of the problem is only beginning to be realized. Writing on the teacher training efforts of one college to provide its students with the skills for computer instruction, Marshall and Pfeifer (1984) stated:

> For the students, computers are fun; for the teachers, they are threatening, intimidating, and downright embarassing -- anything but fun.
>
> Teachers deserve training before they are held accountable for teaching about hardware and software (p. 219).

There is evidence that to date, educators nationwide are groping to find ways of solving the problems brought about by the often planless introduction of computers into schools. For example, Popular Computing magazine devoted its entire August, 1983 edition to the problem of computers in education which it labels "the next crisis in education." Says the magazine:

> Changes are taking place so rapidly that it's not at all clear who's in charge. Are the computer manufacturers and software publishers pushing computers into the schools? Or do school administrators, school boards, or individual teachers have the ultimate responsibility for making decisions about purchasing and curriculum? The frightening answer may well be that no one's in charge! There's no master plan, no one at the helm -- just innovation for its own sake (p. 83).

The major issues of concern with instructional computing range from the general such as planning, software evaluation and selection, and support services, to the specific like hardware, software, and teacher training (Lewis, 1984; Rosenthal, 1983; Bork, 1984; Komoski, 1984; Caissy, 1984; Blaschke, 1986; Wagschal, 1984; Wilson, 1984; Chamberlin, 1983; Publisher's Weekly, 1984; to name but a few critics). In an interview with Elisabeth Rosenthal, Professor Joseph Weizenbaum, a pioneer of computer technology and a co-designer of the first computerized accounting system for banks in the 1950s, decried the hurried, unplanned and indiscriminate introduction of computers at all levels of the United States educational system. He expressed concern over the attitudinal, social and aesthetic implications of the rush to introduce computers in schools without careful planning. He also expressed grave concern over exploitation of the computer revolution by commercial companies. Weizenbaum feels that the United States is engaged in "a Faustian bargain" with computers, science, and technology in general which is "likely to blow up in our faces." He feels that before teachers can teach students about or with computers, they themselves must understand the functions and limitations of computers:

> But how to proliferate computers in schools, where fully half of all math and science teachers are operating on emergency certificates, and where

> everyone generally admits that teachers know less than the kids about computers, at least after the first week? (sic) (p. 95).

History records that in the United States and other developed countries, education has always had short-lived romances with technology. Every new technology has always been regarded by some educators as the magic panacea to solve educational problems of the particular period; thus there was great interest in audiovisual materials in the 1940s and boisterous enthusiasm about the limitless powers of radio, and especially television, to revolutionalize education between the early twenties and the sixties. Often such sentiments have been unfounded and the educational uses of such technologies, merely fads. In an incisive and visonary article, Wagschal (1984) draws convincing similarities between the present euphoria over the promise of computers in education and those held for television two and three decades ago. He advances three reasons for television's failure in education:

1. Schools rushed into the purchase of television sets without setting aside funds for equipment upkeep
2. There was no effective training for teachers to integrate television into school programs
3. A majority of teachers were snobbish about the quality of commercial television and so failed to see the usefulness of the medium in the classroom

He traces a direct analogy to instructional computing:

> As was the case with television, most schools have stretched their budgets to the limit to purchase computer hardware and software. Therefore, they have little money set aside to repair and maintain the machines they have purchased. Moreover, as was true in the case of television, few schools have been able to afford the large-scale retraining efforts that will enable teachers to make computers an integral part of classroom instruction.

On the third point, Wagschal says he often hears "teachers complain about the poor quality of instructional software, about the dehumanizing impact of computers on their users, and about the centralized control that the computer revolution threatens to establish in this nation" (pp. 352-353).

Both federal and state governments in the United States are also recognizing the problem of computers in education and are either making plans or taking action to stabilize the situation. In 1984, for instance, two bills were introduced in the United States Congress aimed at addressing problems confronting instructional computing. Rep. Timothy E. Wirth (D., Colo.) introduced the Computer Literacy Act while Rep. Albert Gore, Jr. (D., Tenn.) sponsored the National Educational Software Act. Both bills called for federal funding to schools for computer hardware purchase, teacher training and software evaluation. In addition, Rep. Gore's bill called for comprehensive planning by schools that receive federal money and the setting up of a national

educational software corporation (Publishers Weekly. Vol. 225, No. 26, June 29, 1984, p. 75).

During the committee hearings on the Computer Literacy Act, F. James Rutherford, who was once head of educational programs of the National Science Foundation and also directed research efforts at the Department of Education under President Carter, testified. Among his suggestions were that:

1. Federal efforts in computers or other technology must be planned. Past failures in educational technology had less to do "with overestimating the power of new technologies than with underestimating the effort necessary to exploit that power effectively in the schools"

2. Teachers and school administrators must be involved in determining the placing and uses of computers in schools

3. The federal government should provide funding to "creative groups" for innovative software production -- "something that the educational marketplace has proved unable to do"

4. The federal government should establish an independent corporation "to design, build, and maintain a modern educational telecommunication system that effectively links all schools and colleges to sources of creative audiovisual materials" (Lewis, 1984, pp. 3-4)

Similar concerns have been raised and suggestions made by government bodies such as the U.S. 96th Congress House of Representatives Subcommittee on Science, Research and Technology (1979) and the National Task Force on Educational Technology (1986). The National Task Force identified lack of planning, inequitable distribution of educational

technologies, inadequate software, increased cost and the problem of cost effectiveness for poorer districts, obsolescence and lack of compatibility among technologies, as some of the problems facing educational technology. The Task Force concentrated almost entirely on the use of computers for instruction. On teacher computer competence, the Task Force wrote:

> Many individual teachers were supplied with microcomputers without first being convinced about their usefulness or receiving even rudimentary training in their proper application. As a result, the technology was not used as it was originally designed to (pp. 3-4).

The national problems discussed above appear to be even more chronic in the State of Michigan. There is evidence that if there was planning for instructional uses of computers in Michigan, it was poor and the issue of effective teacher training did not receive the priority attention it deserved and is only beginning now to receive some serious attention at the state level. In the absence of state leadership, various school districts and Intermediate School Districts which were fortunate to have the leadership and personnel with the necessary skills have "jumped the gun" and are well ahead of others. At the conference of the Michigan Association for Computer Users in Learning in Grand Rapids, Michigan (MACUL '86) attended by the investigator, for instance, presenters from Climax-Scotts Schools, Oakland Schools, Livonia Public Schools, Ann Arbor Public Schools,

Portage Public Schools, Shiawassee Intermediate School District, Lansing School District, Hanover-Horton Schools, Birmingham Public Schools, Pontiac School District, Detroit Public Schools and others, gave accounts of their different approaches to the problems associated with instructional computing. Common themes included lack of sufficient teacher training, integration of computers into the curriculum, support materials and services, and software evaluation.

The vastly different approaches employed by the various districts is symptomatic of the lack of direction at the state level. As one presenter put it, the motto of instructional computer planners has been "Ready, fire, aim." She stressed the need for careful planning which should include training for teachers. She also suggested software previews and evaluation at district level to help teachers identify appropriate software (Carol Klenow, Director, IICD, Oakland Schools).

Tied to the issue of teacher training is the crucial issue of support services. One vital area in terms of support concerns the evaluation and selection of software. Computers work on software most of which the teacher is not expected to produce himself or herself. Software has to be purchased but even if the money is readily available, the problem of identifying the most appropriate software for a particular application remains. Whereas in places like Britain and France software production is under the close

supervision or control of a government education agency, in the United States computer companies and publishing houses dominate the field. This has resulted in a flood of software on the U.S. market. Much of the quality of a lot of the software available in the U.S. and other countries and their suitability for instructional use have been openly questioned. Notes Megarry (1983):

> ...there is already a wide range of 'educational' software -- and much of it is of dismal quality, poorly documented, gimmicky and unimaginative, some of it actually dangerous in the sense that prolonged inexperienced use could lead to the perpetuation of maladaptive strategies, and the learning of errors (p. 18).

Despite such pessimism about the quality of computer software, some educational computing experts believe that such claims constitute a smokescreen for inactivity by some administrators and teachers. For example, LeRoy Finkel of the San Mateo, California Office of Education (1986) confidently maintains that good quality software does exist in every area of the curriculum and that what is required is the ability to match software to classroom needs. Realizing that this is a specialized task which is too much to leave for the individual teacher, the California schools system has developed a ready reference matrix which matches software for both computers and television with classroom instructional needs of teachers. However, experts like Komoski (1984) disagree with such optimistic assessment of computer software:

> ...All such statements are either the result of impressionistic assessments, based on a familiarity with some very small percentage of today's educational software, or else the result of a misguided hope that the present small percentage of excellent software will somehow discourage the continued proliferation of poor programs (p. 247)

Komoski should know what he is talking about; he is the executive director of the Educational Products Information Exchange Institute (EPIE) which has been assessing the quality of educational software since 1982.

As one talks with educators in Michigan, there seems to be no uniform approach to software evaluation; in some school districts, software evaluation is the task of specialized committees while in some, teachers are provided with standardized forms for software evaluation. However, in others it is not clear whose responsibility it is. Other support services that teachers require in computer education include expert advice on equipment purchase, physical arrangement of equipment, scheduling, equipment maintenance and repairs, assistance when there is a problem (e.g. in the use of a particular piece of software), and others.

In the use of this new technology for instruction, therefore, it appears the teacher is being given great responsibility for which he or she is ill-prepared.

Purpose of the Study

In an effort to deal with the problems of teachers in the instructional uses of computers, numerous associations

with acronyms reminiscent of the "alphabet soup" which characterized the heydays of educational radio and television have mushroomed across Michigan (and the nation). Some of these are governmental agencies while others are of individuals with common interests. In Michigan there are associations such as the Michigan Association for Computer Users in Learning (MACUL), Project ACCESS, WE CAN, and the Technology in Michigan Education (TIME) project established by the State Department of Education in 1984 with five regional centers: TIME-NORTH for the northern part of the Lower Peninsula, UP Microcomputer Consortium for the Upper Peninsula, West Michigan TIME, Central TIME, and the SouthEastern Michigan Technology in Education Consortium (SEMTEC). A sixth center called TMT (for Training Modules for Trainers) is at the University of Michigan, Ann Arbor, and is responsible for developing modules for training selected teachers from the other TIME regions as trainers who would have the responsibility of training other trainers and teachers.

The intermediate and local school districts as well as the regional media centers also provide inservice training for teachers and provide them with support services.

The purpose of this study is to determine the types of training and support services offered teachers by a variety of selected agencies and to determine teachers' assessment of the effectiveness and adequacy of the various programs in

their classroom use of computers for instruction. Since all training must start with some philosophy, it is also intended to look into the policies and goals of the selected agencies.

It is hoped that the study will determine if there is any hiatus between theory and practice and that it will identify some of the problems confronting the elementary classroom teacher in computer utilization in education and elicit data which will yield suggestions as to how such problems may be ameliorated.

Significance of the Study

Studies and reports are appearing daily which suggest the important and increasing role computers will play in the social and economic lives of people in the "Information Age." For example, the National Association of Secondary School Principals (NASSP) projects major changes in the future world of work. The association predicts that, by the year 2000, manufacturing will provide 11 percent of the jobs as against 28 percent in 1980, that agriculture will drop from 4 percent to 3 percent and that:

> The turn of the century will find the remaining 86 percent of the workforce in the service sector, up from 68 percent in 1980. Of the service sector jobs, half will relate to information collection, management and dissemination (p. 13).

Table 1 summarizes the predictions of the NASSP. The association predicts that while some jobs will disappear,

TABLE 1: The Shifting Job Market

SOME JOBS THAT WILL BE DISAPPEARING" BY 1990:

OCCUPATION	% DECLINE IN EMPLOYMENT
Linotype operator	-40.0
Elevator operator	30.0
Shoemaking machine operators	19.2
Farm laborers	19.0
Railroad car repairers	17.9
Farm managers	17.1
Graduate assistants	16.7
Housekeepers, private household	14.9
Childcare workers, private household	14.8
Maids and servants, private household	14.7
Farm supervisors	14.3
Farm owners and tenants	13.7
Timber cutting and logging workers	13.6
Secondary school teachers	13.1

SOME JOBS THAT WILL BE GROWING" UNTIL 1990:

OCCUPATION	% DECLINE IN EMPLOYMENT
Data Processing machine mechanics	+157.1
Paralegal personnel	143.0
Computer systems analysts	112.4
Midwives	110.0
Computer operators	91.7
Office machine service technicians	86.7
Tax preparers	77.9
Computer programmers	77.2
Aero-astronautic engineers	74.8
Employment interviewers	72.0
Fast food restaurant workers	69.4
Childcare attendants	66.5
Veterinarians	66.1
Chefs	55.0

SOURCE: National Association of Secondary School Principals, High Tech Schools: The Principal's Perspective (Reston, VA:NASSP), 1984.

"The word is used by the authors but it seems to this investigator that "declining" would be more appropriate.

technical jobs in energy, housing rehabilitation, hazardous waste management, industrial laser processes, industrial robotics, genetic engineering, bionic medicine, computer axial tomography (CAT), computer-assisted design (CAD), computer-assisted graphics (CAG), computerized vocational training (CVT) and other service-related jobs will increase dramatically.

While some critics contend that the importance of the role of the computer has been overestimated, there is evidence that computers are becoming more and more an integral part of American life. For these reasons also, it is strongly argued that the school has a responsibility to prepare students for the world in which they will live (NASSP, 1984; Guenther, 1984). From a psychological point of view other authorities feel that education should help people to reduce the stress caused by technology to avoid the onset of technophobia (Chamberlin, 1983; Hellman, 1976). Chamberlin suggests that the sheer pervasiveness of technology in modern society frightens some people. In today's society, the contact of many people with technology is the computer. "Unfortunately, many people do not understand or feel comfortable using a computer and therefore fear it" (p. 50). He cites the example of the film projector which he claims many teachers and administrators cannot use personally even today but must depend on an

"assistant," usually a student, to actually operate it. Says Chamberlin:

> Many futurists believe we are poised on the brink of a new production revolution that may far exceed the first industrial revolution in its impact on mankind. It will take the cooperative effort of schools, industry, and government to insure that human beings are prepared for the process (p. 51).

It is, therefore, critical that teachers who are the purveyors of knowledge in society should be comfortable with computers if they are to effectively use them for instructing students.

Initial impetus and source of introduction of computers in schools is as varied as the number of schools which use them for instruction; computer manufacturers fired by profit considerations, school boards wishing not to be left behind in the "Information Age," zealous teachers simply fascinated by the new technology, parents eager for their children to become acquainted with the machine that is prophesied to control our lives in the not-too-far future, have all been known to have influenced the introduction of computers in elementary schools (Komoski, 1984).

The haste with which computers have been wheeled into elementary (and secondary) schools in the United States in the last three years appears to have provided little time for adequate planning. Even if schools and school districts wanted to, they are disadvantaged in the face of outside pressure in convincing proponents of the use of computers in

instruction of the need for thorough planning before the purchase of equipment. It appears as if a successful computer instruction program was measured only in terms of the number of machines acquired, not the use to which they were put (Bliss et al, 1986).

If indeed computers will play an increasing role in people's lives and if students are to be properly prepared for the future, it is only logical that those who teach the students should be properly trained and made to feel comfortable with the new technology. There is a real danger that teachers who develop a fear for computers will, through poor attitudes, pass such fear on to their students. It is also feared that unplanned introduction of any instructional technology will likely lead to resistance on the part of those who are supposed to use them. Educational planners are, no doubt, aware of these possibilities which explains the frantic, albeit late, efforts to address the issue of teacher training in instructional computing.

In 1979, for instance, the U.S. 96th Congress House of Representatives Subcommittee on Science, Research and Technology held hearings on "Information Technologies Appropriate in Education..." at which specialists in information technology from industry and education testified on the various applications of communication technologies such as satellites, television and computers in education. One of the major issues raised at the hearings was the

necessity to make "structural changes in the system of teacher preparation..." to make them "comfortable" with new educational technologies and to prepare them for their new roles (p. 249).

In Michigan, the training of teachers to use computers is carried on by various organizations including colleges, intermediate and local school districts, regional media centers, governmental agencies such as the TIME project, individual buildings, and private associations such as MACUL. At the local level various school districts have introduced inservice programs such as crash workshops and seminars, peer coaching projects, hands-on sessions, programming classes, software evaluation seminars, sharing sessions, etc., as a means of training their teachers in effective utilization of computers in the classroom. These programs usually involve the services of both in- and out-of-district consultants and attain varying levels of success. Many authorities state that during the planning stages in many places, there was little or no involvement of teachers who are the users of computers for classroom instruction. It is apparent from even casual observation that while some districts have well articulated and written philosophies and objectives for computer use in the classroom, others have vague guidelines that are open to varied interpretations.

The resulting patchwork pattern of the training of teachers brings to question issues of coordination, relevance and effectiveness of the training programs and support services provided by the various groups. For example, it is known that many college-level courses often called "computers in education" do not relate to what teachers are expected to use computers for in the classroom. Bork (1984) warns that "Teacher training programs will continue to ignore this new technology and the interactive capabilities of the computer will never be adequately realized" (p. 242) and that "...university faculty are often more backward than the schools in the use of the computer within the educational process" (Bork, 1982, p. 92). Furthermore, the absence of any well-defined policy on instructional computing at the state level has not made the job of the various agencies easier concerning what competencies teachers should have in instructional computing. There is a proposal for certification for high school computer science teachers but, as one official at the State Department of Education said, this is not yet a policy.

The fear on the part of educational observers that resistance to instructional computers by teachers is beginning to set in is strengthened by the possibility that most innovators and early adopters among teachers may have already hopped on the bandwagon. This is the time,

therefore, for well-planned strategies to attract those referred to by Rogers (1962) as the early majority and especially the skeptical late majority and the traditionalist laggards. The instructional television experience is a salutory warning for educational planners and those who have the responsibility for preparing and aiding teachers in their instructional uses of computers. Wagschal (1984) gives an ominous but timely warning:

> The coincidence is too fortunate for us to ignore -- and too unusual for us to expect a reoccurrence. The coming decade may well be our last chance -- our window in time -- for determining whether computer technology will play a major role in our educational institutions or merely dominate our daily lives (as television does) while we ignore it in the schools (p. 254).

This study was aimed at identifying some of the problems existing in the present organization of computer training and the provision of support services for classroom teachers, and providing suggestions which may assist educational planners, administrators, and teachers.

Delimitations of the Study

This investigation was a case study of some of the agencies involved in teacher inservice computer training and support services in two Michigan Intermediate School Districts. The agencies selected for the study are: 1) the State Department of Education, 2) Regional Educational Media Centers, 3) Intermediate School Districts, 4) Local Education Agencies (school districts), 5) Computer Software

Evaluation Centers and, 6) the University of Michigan's Training Modules for Trainers (TMT) Project.

The study was limited to inservice training only and the agencies were limited to those involved with public education. The study precluded computer clubs, private agencies, and training offered by some computer manufacturers and dealers.

The investigation was limited to instructional uses of computers in elementary schools to the exclusion of purely administrative uses; instructional uses in secondary schools are discussed only as part of the general background of the study. The study was also limited to microcomputers as against mainframe projects.

There was also a limitation to instructional uses of computers in general education, their uses for special education being mentioned only as part of the general background and literature review for the study.

Generalizability of the findings of the study is limited by the small number of districts studied.

Assumptions

In consideration of the role computers are playing in society today, the developments that have occurred in the last five years and projections of even greater developments in the technology and its applications, the investigation was premised on the following assumptions:

1) That computers will play an increasing role in social and economic lives of people in the foreseeable future

2) That if creatively used, computers can be a versatile tool for instruction

3) That the problems confronting instructional computing are state-wide in Michigan

4) That administrators and teachers are concerned enough about the problems facing instructional computing to cooperate in the study and will be interested in its findings

5) That a triple approach of interviews, questionnaires and document search techniques for data collection would yield a more indepth understanding of the problems facing teachers in using computers for instruction.

Generalizability and Adaptability of the Findings

The findings of the investigation are generalizable to the two Intermediate School Districts studied and elementary schools in those districts. However, the results can be adapted to other Michigan Intermediate School Districts for the following reasons:

1) Preliminary work for this study indicates that the problems of inservice training and support services for elementary school teachers are either identical or very similar throughout Michigan.

2) The same, or similar, agencies selected for this study are present in all Michigan Intermediate School Districts and perform similar functions.

3) The Michigan Department of Education is concerned about the state-wide nature of problems relating to inservice training and support services to the extent that it has formed larger regional units of Intermediate

School Districts like SEMTEC, TIME-NORTH, UP Microcomputer Consortium, West Michigan TIME and Central TIME to address their common problems.

Research Questions

The two primary interests of the study were: 1) to determine, through interviews and document search, the policies, programs and organization of the selected agencies in matters of teacher inservice computer training and support services, 2) teachers' perceptions about the inservice computer training programs and support services provided by the selected agencies, and factors related to their perceptions. Factors considered included policies, inservice training, support services and demographics. Responses and findings were used to answer the following research questions:

1. Are there any state level policies or guidelines regarding inservice training and support services for elementary school teachers in the use of computers for instruction?

2. What are the philosophies of the various agencies being studied on training and support services for elementary school teachers?

3. What are the objectives of each agency's inservice training program?

4. What is the level of competency expected of elementary school teachers by each of the agencies.

5. To what extent are teachers involved in planning the introduction of computers in their buildings?

6. To what extent are teachers presently involved in computer-related activities such as software selection and planning of inservice training?

7. How well are teachers informed about local district policies relating to instructional computing?

8. What factors prevent teachers from spending more time in using computers for instruction?

9. What are the most common ways by which teachers were introduced to using computers for instruction?

10. What types of inservice training are provided by these agencies and how do they match their stated objectives?

11. What are the perceptions of elementary classroom teachers about the effectiveness of the inservice training programs and support services provided by the agencies?

12. What are the perceptions of teachers about the adequacy of the amount of training received from each of the agencies?

13. What are the types of training school teachers feel they should have for effective use of computers for instruction?

14. What are the major instructional uses of computers by teachers presently?

15. How does the amount of inservice training in instructional computing relate to the perception of teachers about the value of the computer as an instructional tool?

16. How does the amount of inservice training in instructional computing relate to the amount of time teachers spend in the use of computers for instruction?

17. How does the amount of inservice training in instructional computing relate to teachers' desire to spend more time using the computer for instruction?

18. What support services are provided by these agencies to elementary classroom teachers?

19. Besides traditional inservice training what are some types of activities teachers think will help them to gain more competence in instructional computing?

20. What are the perceptions of elementary classroom teachers about the computer as an instructional tool?

21. How closely do the perceptions relating to instructional computing of teachers and principals compare?

22. Does the number of years of teaching experience relate to teachers' perceptions of the value of the computer as an instructional tool?

23. How does grade level taught relate to teachers' perception of the value of the computer as an instructional tool?

24. How does grade level taught relate to the amount of time teachers spend in the use of computers for instruction?

25. Is there any relationship between a school's identification as a high or low use school and the percentage of questionnaires returned?

Definitions

1. AGENCY refers to the State Department of Education, an Intermediate School District, a local school district, a Regional Educational Media Center (REMC) or a Computer Software Evaluation/Training Center.

2. INSTRUCTIONAL COMPUTING means the use of computers by classroom teachers for teaching students.

3. COMPUTER refers to a microcomputer as opposed to a mainframe computer.

4. HIGH COMPUTER USE/LOW COMPUTER USE is as defined by a school district.

5. INSERVICE COMPUTER TRAINING PROGRAM refers to training sessions designed for classroom teachers to enhance their use of computers in instruction and includes workshops, seminars, inservice courses for college credits, and computer conferences.

6. SUPPORT SERVICES refers to software evaluation, advice on computer and software purchase, suggestions for physical set-up and classroom management, model lessons, training guides, peer coaching, or any other service apart from training which assists the teacher in using computers in instruction.

7. COMPUTER LAB refers to a space specifically allocated to a computer network within a building.

8. TIME SPENT USING COMPUTERS FOR INSTRUCTION refers to the amount of time each student actually has an opportunity to work on a computer each week.

Theoretical Framework

The conceptual framework for this study hinges on theories of change and diffusion of innovations and particularly aspects of these theories dealing with resistance.

Different change theorists have provided models of the change process from their various perspectives but all deal with assumptions about what makes people or organizations change. Lindquist (1978) has categorized the various theories into four: Rational Planning, Social Interaction, Human Problem-Solving, and Political Approach according to their peculiar characteristics and strategies for effecting individual and organizational change. The Rational Planning model is based on the assumption that people are rational and that they will change if provided with the necessary knowledge or information. The Rational Planning model (exemplified in industry by Research and Development) emphasizes heavy investment in research, the production, testing and packaging of innovation in very attractive forms. The R and D model is characterized by careful planning with coordination between the activities of the various subunits which are research, development, packaging and dissemination (Havelock, 1971, Chapter 11, p. 5).

Rogers and Shoemaker are often associated with what Lindquist calls the Social Interaction model, the premise of which is that change is the end result of interaction between people; in our daily lives we form formal and informal relationships with people and create communication channels for information exchange which shape our views, beliefs, attitudes and actions. For this reason, the Social Interaction model is heavily dependent on communication:

> ...At its most elemental level of conceptualization, the diffusion process consists of 1) a new idea, 2) individual A who knows about the innovation, and 3) individual B who does not yet know about the innovation. The social relationships of A and B have a great deal to say about the conditions under which A will tell B about the innovation and the results of this telling (Rogers, 1962, pp. 13-14).

Rogers (1962), and Rogers and Shoemaker (1971) categorize adopters of an innovation into four ideal types on a continuum of innovativeness: Innovators who constitute 2.5 percent of the adopters of an innovation. These are the "buffs" who are obsessed with innovation. They are willing to take risks at trying any new idea. The next 13.5 percent are the early adopters who normally have good social networks within their societies. People look up to them as they are usually opinion leaders and role models within their communities. The early majority make up the next 34 percent of the adopter categories. They are normally more discrete in their use of new ideas than innovators and early adopters. They would usually adopt an innovation before the average member of their communities, but they are deliberate in adopting an innovation. The late majority consitute the next 34 percent while the laggards are the last 16 percent to adopt an innovation. The late majority are usually skeptical and are cautious and would not adopt an innovation until most of the community has. The laggards are suspicious of innovation and would do anything to avoid adoption. They have traditional values rooted in the past.

To return to Lindquist's change models, Human Problem-Solving model theorists see change as involving conflict between the interest of those who want to control others and the change targets who are afraid that the proposed change will affect their wellbeing, status or security. Human Problem-Solving theorists, recognizing the sensitive nature of change, advocate skilled intervention which takes such conflict of interests into consideration. The fourth change model is the Political Approach which assumes that if support of politically influential people in the community is secured, authoritative decision will make the change target accept the new idea.

In practice it is usual to apply change strategies borrowing ideas from the various models. Based on Rogers and Shoemaker's categories of adopters, Zaltman and Duncan (1977) have developed a model for simultaneous and sequential use of different strategies -- re-educative, educative, persuasive and facilitative (see Figure 1). For example at the introductory point of an innovation, facilitative strategy could be enough to attract the innovators and some early adopters. This may then be followed by a more persuasive strategy for the late majority and laggards. According to Zaltman and Duncan:

> ...It may be desirable to be pursuing a facilitative strategy, making the innovation more readily available, easier to use, and so forth for every group. What might be most facilitative for

one group may not be most facilitative for another group (p. 167).

	Innovators	Early Adopters	Early Majority	Late Majority	Laggards
%	2.5	13.5	34	34	16

Reeducative Strategy	Increasing Education	Increasing Persuasion	Persuasive Strategy
	<----------	---------->	

<----------Facilitative Strategy---------->

SOURCES: Zaltman and Duncan, 1977, p. 167, Rogers and Shoemaker, 1971, p. 182

FIGURE 1: Simultaneous and Sequential Use of Different Strategies

In every organization, there are forces which serve to promote change while there are counter forces which resist a proposed change. These forces may be personal, cultural, psychological or may be due to the organizatinal structure or processes and may also be a complex mixture of individual and organizatinal factors. Lewin (1947) developed the technique called Force Field Analysis for manipulating these opposing forces toward a desired goal. Havelock (1973), and Hersey and Blanchard (1982) also advocate the technique for successful social change. The first task is to identify these two sets of forces and to note the relative strength

of those identified under each set. A desired change could then be effected by either strengthening the facilitative forces or weakening the restraining forces.

Numerous writers including Havelock (1973), Zaltman and Duncan (1977), Pilon and Berquist (1979), Morton and Morton (1974), Watson (1972), Lindquist (1978), Moore and Hunt (1980), Rogers (1962), and Rogers and Shoemaker (1971) have identified factors which may result in resistance against an innovation. A few situations directly relevant to educational change are those in which there is lack of communication with teachers by administrators because they believe teachers' ideas don't matter; situations in which principals are not interested in new ideas or are ignorant of them; situations where there is lack of continuing education programs for teachers; situations when teachers are fearful of evaluation, rejection or failure and so are unwilling to experiment. Other situations include where the proposed innovation does not meet students' needs, requires new skills or extra effort without compensatory arrangements such as substitute teachers to give teachers the necessary time (Zaltman and Duncan, 1977, pp. 64-65).

The issue of the involvement of teachers in planning and executing innovations is raised by many writers on educational technology and innovation. For example, Armsey and Dahl (1973) found that classroom teachers tend to resist

educational technology for several reasons, primary of which are:

1. The conservatism of the educational establishment
2. The fear on the part of teachers of the effect technology would have on their roles
3. The ineptitude and low level of sensitivity of hardware manufacturers
4. "The minimal or non-existent involvement of teachers at every stage of the process" (p. 11).

Morton and Morton (1974) caution educational planners that:

> Meaningful, lasting changes in the schools come about when the innovation meets a need and when teachers have had a part in the planning and the implementation. Changes that result from administrative dictates are neither effective nor lasting (p. 14).

It is against these theoretical backgrounds that this study was conceptualized.

Organization of the Dissertation

In Chapter I, the general statement and purpose of the study have been stated, and the rationale discussed. Several sources were cited to substantiate concerns at national, state and local levels about problems confronting classroom teachers in their effective use of computers for instruction. The chapter concludes with the theoretical framework for the study.

Chapter II deals with a review of the literature under the following subheadings: a) The Microelectronics

Revolution, b) Computer Applications, c) Computers in Education, d) Research on Instructional Uses of Computers, and e) Computer Literacy and Teacher Training.

In Chapter III, the design of the study and methods for data collection and analysis are presented. Chapter IV covers the analysis of data collected and the findings. Chapter V is a discussion of the findings and a number of recommendations for effective teacher inservice training in instructional computing. Some problems encountered during the study are presented and suggestions for further research made.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

This chapter of the dissertation deals with a review of the literature under the following subheadings: a) The Microelectronics Revolution, b) Computer Applications, c) Computers in Education, d) Research on Instructional Uses of Computers, and e) Computer Literacy and Teacher Training.

In the course of the literature search for this study, it became apparent that there is a dearth of research reports on studies of instructional uses of microcomputers. An overwhelming proportion of journal articles and other primary sources reviewed were project descriptions, projections, personal opinions, and position papers concerning instructional uses of computers. For example, out of a total of 219 relevant articles obtained by computer search, 173 or 79 percent fell into the category of project description; 27 or 12.3 percent were position papers; 29 or 13.2 percent were conference papers. Only 9 or 4 percent were research reports of which only 3 (1.4 percent) dealt directly or indirectly with teacher training.

Many studies encountered were done in the 1960s and 1970s and dealt with mainframe computers (e.g. Mathis et al., 1970; Fletcher and Atkinson, 1972; Koch, 1973; Wilson and Fitzgibbon, 1972; Cropley and Gross, 1970). It must be

remembered that microcomputers which now dominate education had not been perfected at the time and did not start to proliferate schools until the 1980s. Furthermore, the faster speed, greater reliability, more flexibility of use, and low cost of microcomputers today have made their educational applications quite different from the use of minicomputers for instruction. Minicomputers cost about $10,000 each which many elementary or secondary schools could not afford on their own. Consequently, schools which used them did so by leasing computer time from school district central offices, universities, local governments or businesses. Some commercial companies also offered services to schools. Some schools also tried batch processing in which students put data on key punch cards which were then sent to a centrally located computer for processing. The output from the computer was then sent back to the school. Some educators felt that the delay in receiving output from batch processing reduced the interest of students but others felt the relative low cost offset the delay (Koch, 1973, p. 30).

Most earlier studies also focused on the effectiveness of computer-assisted instruction on the achievement of students especially in mathematics and language arts, and the subjects of the studies were either college students or military personnel (Grady et al., 1983; Grabe, 1985). However, in recent years subjects taught with computers have broadened to include art and design, music, problem solving,

simulation, as well as word processing, record keeping, database uses and so on. A lot of the studies done in the late seventies and in the eighties at the elementary and secondary level were concentrated on the use of computers for instructing mentally retarded or otherwise handicapped students.

For the reasons mentioned above Harlow (1985) contends that "the differences...prevent the serious generalization of much of our existing research to answer questions concerning utilizing microcomputers in elementary and secondary classrooms" (p. 38).

The Microelectronics Revolution

The invention of the transistor in 1947 which replaced the vacuum tube in electronic appliances was the precursor of what is often referred to as the Microelectronics Revolution, the Information Age, the Computer Age, and a host of other descriptors. According to Encyclopaedia Britannica (1983) the demand for miniature electronic systems during World War II resulted in the development of many of the underlying techniques of microelectronics (p. 658). Space exploration also prompted research into microelectronics. The invention of the transistor encouraged inventors that it was possible to develop similar substitutes for other electronic components. Among names associated with the development of microelectronics are

Harwick Johnson of the Radio Corporation of America who invented the phase shift oscillator in 1953, G.W.A. Dummer of the Royal Radar Establishment in England, Jack S. Kilby of Texas Instruments, Jay W. Lathrop of the Diamond Ordnance Fuze Laboratories, Jean Hoerni of Fairchild Semiconductor and Kurt Lehovec of the Sprague Electric Company who patented the integrated circuit in 1959. The integrated circuit made it possible to interconnect transistors and other circuit elements by a photoengraved film of evaporated metal which leaves a pattern of the connections. Writing on this development, Noyce (1977) noted that "An individual integrated circuit on a chip perhaps a quarter of an inch square now can embrace more electronic elements than the most complex piece of equipment that could be built in 1950" (p. 65). In 1961 the integrated circuit was introduced and has since been the fastest growing segment of electronic component technology. "They (integrated circuits) are responsible in large measure for the broadening of electronics applications to perform better and more efficiently many functions that had previously been accomplished by completely different techniques" (Encyclopaedia Britannica, 1983, p. 658).

Microelectronic devices made miniaturization possible by replacing earlier electronic components which required wire connectors and solder joints. This, according to experts, has made electronic equipment to be more reliable,

time and labor-saving, to consume less power and, above all, to cost less.

One principal and pervasive application of microelectronics has been in computers which in turn has found application in a wide range of appliances both in the home, at the office, in schools, on streets, at playgrounds, in the car, in cameras, etc. Intel produced the first computer on a single silicon chip in 1971 and made the microcomputer feasible when the company produced the 8080 microcomputer chip in 1974. The first personal computers were introduced in the United States in 1977 by Apple, Radio Shack and Commodore and since then, the memories and capabilities of microcomputers have been growing. As early as 1977 when personal computers first became generally available on the United States market, Robert Noyce wrote:

> Today's microcomputer, at a cost of perhaps $300, has more computing capacity than the first large electronic computer, ENIAC. It is 20 times faster, has a larger memory, is thousands of times more reliable, consumes the power of a light bulb rather than that of a locomotive, occupies 1/30,000 the volume and costs 1/10,000 as much (Noyce, 1977, p. 65).

Despite phenomenal developments since Noyce's estimate, experts predict that the microelectronics revolution is far from having run its course. In 1964, Gordon Moore, once director of research at Fairchild, propounded what has become known in the electronics industry as Moore's law, namely, that the complexity of the integrated circuit would

continue to double every year, and experts claim that that prediction has held true (Noyce, p. 65). In the last few years, for instance, the memory of microcomputers has grown from 4K to 8K to 16K to 32K to 64K. At the moment 128 and 256 kilobyte microcomputers appear to be the norms.

Computer Applications

James Dunnaway, a Washington D.C. educational consultant has described the computer as the greatest invention of man with the greatest potential for mankind since the steam engine. He sees the computer as:

> ...The 20th century's most monumental technological advance, revolutionizing our lives in ways ranging from how the world now manufactures its goods, conducts business, restores artifacts, and explores scientific boundaries, to how it compiles and stores information, performs surgery, communicates, collects taxes, processes food, runs its airlines, and much, much more (Streamlined Seminar, November 1985, p. 1).

His words sum up the pervasiveness of the applications of computers in modern society. Miniaturization, greater reliability, less power consumption, larger memories, and increased uses of computers have been accompanied by declining costs. This has made the microcomputer within the reach of individuals and small businesses. Pogrow (1983), for example, noted that one model cost only $100 (p. 25). Homes are acquiring microcomputers for games, for chores such as keeping family accounts, and also for educational purposes. Businesses, big and small, use them for records,

business accounts, salaries and word processing. Similarly, low cost and the influence of pressure groups such as parents, educational administrators and hardware manufacturers have combined to make computers part of the basic equipment in schools and colleges which use them for both instructional and administrative purposes. Table 2 shows projections of computer sales in the United States from 1975 to 1990 provided by Nilles et al. (1980). The "High" forecast is based on an optimistic view of possible growth; the "low" a less optimistic view, and the third category is by a Delphi Panel. The numbers are for only programmable computers and do not include electronic game machines or microprocessors in appliances.

Apart from direct uses of microcomputers, computer microprocessors are replacing mechanical components in equipment such as food processors, microwave ovens, sewing machines, telephones, audio and video equipment, airplanes, cars, cameras, watches and clocks, light switches, copying machines and in a host of other devices.

Pogrow (1983) has catalogued a number of areas in which computers are playing and will play an increasing role in the future. Telecommunications is a fast-growing area in which computers have found great application. Telephone switching systems, satellite relays, radio and television

TABLE 2: Projections of Microcomputer Sales by Markets

	Annual Units Sold (thousands)			Cumulative Units Sold (thousands)	
	1978	1985	1990	1985	1990
HIGH					
Consumer	170	3050	8803	7610	39,083
Education	15	250	538	650	2875
Office	40	788	3450	1865	1848
TOTAL	255" (225)	4088	12,800" (12,791)	10,225	55,800" (43,806)
DELPHI PANEL	255	1600	5200	5800	23,000
LOW					
Consumer	125	822	2424	3070	11,092
Education	15	74	150	304	886
Office	85	350	604	1587	4041
TOTAL	225	1306" (1246)	3178	4961	15,999" (16,019)

SOURCE: Pogrow (1983), p. 27

"These figures appear to this author to be incorrect totals but have been reproduced from the original source without alteration. The correct figures in this author's opinion are enclosed in parentheses.

broadcasting, videotext, electronic mail and facsimile transmissions over vast distances are being effected through the use of computers. Pogrow says that these technologies now make it possible to transmit information "at rates in excess of 56,000 bits/second (56,000 characters per second) as compared with the commonly-used speeds of 300-1,200 bits/second over conventional telephone lines" (p. 32).

Office automation through the application of computer technology makes it possible to acquire, generate, analyze, manage, store and retrieve the ever-growing wealth of knowledge in business and industry. In manufacturing, robots are replacing blue-collar workers on assembly lines. Quoting Business Week, Pogrow says that while only 1,850 robots were sold in 1980, there will be between 23,000 and 200,000 in U.S. industry by 1990 (p. 30). Teleconferencing is also being used by business and the public sectors to bring together people in widely separated places through the use of computer and telecommunication technologies.

So pervasive are computers and their applications in our lives that Pogrow has noted that:

> As a result of all these existing and developing capabilities, computers are not only affecting computing; they are also changing the way we work and play, and even the economy itself. Computers and the devices they control are, therefore, going to have an increasing role in determining how we live (p. 26).

Computers in Education

Although computer application in education has been on-going, it was the arrival of the microcomputer in 1977 that brought the computer into virtually every school and college in the United States. At the elementary and secondary levels, computers are used for two primary purposes, namely, for administrative chores such as word processing, record keeping, accounting, and communication with parents at home, and for instruction.

In a recent survey of all 50 states of the U.S. Electronic Learning (1986) found that apart from Nebraska, Pennsylvania, and Colorado, all other states are showing increasing commitment to educational uses of computers and are providing funds and support for the purpose. The survey found that 16 states now treat instructional computing as a line item in the budget while others have more than one source of financial support. Forty-three of the states have a state-level computer coordinator as compared with 36 in 1985 and 26 in 1983; 22 states are either funding, or planning to fund, demonstration schools to experiment on intensive uses of computers; 28 states are involved in state-wide or regional software evaluation; and 29 states distribute support materials such as computer books, software, or video materials to schools. On the uses of computers for instruction, the survey found that 11 states and the District of Columbia require schools to integrate

computers into the curriculum; 12 states reported that all students in elementary and secondary schools are required to take some form of computer course, up from 7 in 1985. Six states and the District of Columbia require students to pass some competency test or demonstrate some competency in the use of computers (pp. 27-28). The report also states that all states except Oregon indicate a growing public interest in instructional computing. Table 3 shows the number of school districts in each state and the percentage of the districts with a part-time or full-time computer coordinator. Overall, 38 percent of the nation's schools have a part-time or full-time computer coordinator. Table 4 shows the distribution of microcomputers by brand and it indicates that the most common computers in schools are Apple followed by Commodore. (Except for Arizona, the number of computers includes those for administrative and instructional uses).

The Electronic Learning survey also shows that most states are taking the issue of teacher education in the instructional uses of computers seriously; some states have requirements for teacher certification while others encourage computer courses for teachers. This data is presented in Table 5.

Table 3: Districts with Computer Coordinators

STATE	DISTRICTS	PERCENTAGE DISTRICTS W/COMPUTER COORDINATOR
ALABAMA	130	77 %
ALASKA	5	63
ARIZONA	224	100
ARKANSAS	331	31
CALIFORNIA	1034	N/A
COLORADO	178	30
CONNECTICUT	178	30
DELAWARE	19	47
DC	1	100
FLORIDA	67	100
GEORGIA	186	100
HAWAII	1	100
IDAHO	116	13
ILLINOIS	999	N/A
INDIANA	305	N/A
IOWA	438	26
KANSAS	314	32
KENTUCKY	180	100
LOUISIANA	66	3
MAINE	283	10
MARYLAND	24	100
MASSACHUSETTS	286	40
MICHIGAN	525	N/A
MINNESOTA	434	69
MISSISSIPPI	154	65
MISSOURI	546	N/A
MONTANA	551	23
NEBRASKA	966	7
NEVADA	17	47
NEW HAMPSHIRE	167	30
NEW JERSEY	597	55
NEW MEXICO	88	11
NEW YORK	735	54
NORTH CAROLINA	141	100
NORTH DAKOTA	311	3
OHIO	762	N/A
OKLAHOMA	613	N/A
OREGON	304	33
PENNSYLVANIA	500	9
RHODE ISLAND	40	50
SOUTH CAROLINA	93	N/A
SOUTH DAKOTA	194	100
TENNESSEE	141	N/A
TEXAS	1093	13
UTAH	40	100
VERMONT	280	36
VIRGINIA	143	100
WASHINGTON	298	50
WEST VIRGINIA	55	N/A
WISCONSIN	432	N/A
WYOMING	49	12

SOURCE: Electronic Learning, October 1986

Table 4: Microcomputers in Schools by Brand

STATE	TOTAL	APPLE	COMMODORE 64	IBM PC PC JR	RADIO SHACK	OTHERS
ALA	19,000	75%		9%	13%	3%
ALAS	7,000	90%				10%
ARIZ	21,215	49%	25%	5%	13%	8%
ARK	14,000	25%	40%	2%	30%	3%
CALIF	115,000	70%	10%	8%	8%	4%
COLO	N/A	96%				
CONN	30,000	60%	5%	20%	5%	
DEL	2,903	93%	1.5%	5%	.5%	
D.C.	2,100		25%	40%		35%
FLA	48,873	43.6%	6.5%	7.7%	33.1%	9.1%
GA	8,000	65%		10%	15%	10%
HI	2,500	80%	4%	8%	8%	
IDA	4-5,000	44%	28%	5%	16%	7%
ILL	N/A	N/A	N/A	N/A	N/A	N/A
IND	23,124	49%	10%	8%	17%	16%
IA	18,770	79%	9.3%	6.8%	3.5%	1.4%
KANS	12,000	70%	5%	5%	10%	10%
KEN	17,000	49%	9%	10%	14%	18%
LA	12,717	33%	8%	8%	23%	28%
ME	6,000	38%	10%	2%	32%	18%
MD	7,043	40%	12%	14%	18%	16%
MASS	21,075	N/A	N/A	N/A	N/A	N/A
MICH	N/A	N/A	N/A	N/A	N/A	N/A
MINN	33,000	90%		8%		2%
MISS	6,000	25%	20%	15%	30%	10%
MO	18,000	54%	10%	12%	20%	4%
MONT	7,000	62%	11%	5%	11%	11%
NEB	6,000	30%		21%	22%	27%
NEV	3,513	91.3%				8.7%
NH	N/A	N/A	N/A	N/A	N/A	N/A
N.J.	40,000	52%	25%	10%	7%	5%
N. MEX	N/A	N/A	N/A	N/A	N/A	N/A
N.Y.	90,000	46%	20.9%	8%	15.3%	9.8%
N.C.	28,000	42%	15%	17%	23%	3%
N. DAK	N/A	75%		5%	10%	10%
OH	40,000	60%	13%	3%	15%	9%
OKLA	N/A	N/A	N/A	N/A	N/A	N/A
OREG	15,000	56.8%	22.4%	4.5%	8.3%	7.6%
PENN	50,000	50%	10%	15%	15%	10%
R.I.	3,900	45%	17%	1%	36%	1%
S.C.	14,959	58%	6%	9%	12%	15%
S. DAK	5,000	45%	45%	4%		6%
TENN	N/A	85%				15%
TEX	54,300	N/A	N/A	N/A	N/A	N/A
UT	8,000	60%	30%	10%		
VT	2,000	50%	30%	10%		10%
VA	12,000	35%			25%	40%
WASH	15,130	43%	19%	6%	16%	16%
W. VA	N/A	N/A	N/A	N/A	N/A	N/A
WISC	N/A	80%	7%	5%	7%	1%
WYO	6,300	83%	3%	3%	4%	7%

SOURCE: Electronic Learning, October 1986

Table 5: Pre-Service Requirements

STATES WITH COMPUTER REQUIREMENTS FOR CERTIFICATION	
STATE	**COMMENTS**
California	Beginning in 1988
District of Columbia	Effective 1983
Montana	Effective 1984
Texas	Effective 1986
Utah	Effective 1985
West Virginia	Effective Sept. 1985 for preservice
Wisconsin	Required for recertification
Wyoming	Effective July 1985

STATES THAT ENCOURAGE COMPUTER COURSES FOR TEACHERS	
Arkansas	New Hampshire
Pennsylvania	Connecticut
New Jersey	South Dakota
Georgia	New York
Virginia	Maryland
North Carolina	Washington
Nevada	North Dakota

SOURCE: _Electronic Learning_, October 1986

The unavailability of figures for Michigan in Tables 3 through 5 is worthy of note. However, officials have informed this investigator that an inventory of computer usage in Michigan schools has just been completed and should be available soon.

Of interest too is the fact that the National Governor's Association has set up a Task Force on Educational Technology which shows the level of national involvement in instructional technology, especially computers (p. 27).

Apart from classroom instruction and purely administrative uses, computers have also found application in education in other ways. Libraries across the country, for example, are replacing the familiar subject, author and title index cards with computer databases and terminals at which library users can access a library's holdings and circulation information and also act as security checkpoints. They are also used to access databases for information and materials for patrons ("Libraries Turn to Computers for Reference," Detroit Free Press, 2 September 1986, pp. B1 and B4).

Pogrow (1983) says that the electronic database is as important in the distribution of text as Gutenberg's printing press was, and that:

> Whereas the printing press made possible the distribution of large numbers of physical copies of text, the electronic database makes it possible to distribute text without having to distribute

> multiple physical copies -- a form of electronic paper (p. 37).

Hard copies of appropriate pages from an accessed database can be printed for the user. Pogrow quotes Dunn who speculated that libraries will eventually cease to be loaning centers and will become distribution centers for hard copies of electronic books (p. 38).

Research on Instructional Uses of Computers

As stated in the introduction to this chapter, most research conducted into the instructional uses of computers in the 1970s involved uses of minicomputers as against microcomputers. Most of them were studies of the effectiveness of computer-assisted instruction. A number of studies in the late seventies and in the eighties have dealt with microcomputers but many of these have concentrated more on the use of computers for instructing mentally retarded or otherwise handicapped students. Few studies have looked into the problem of teacher education in the instructional uses of computers. In this section, a number of these studies will be reviewed.

In 1971, the National Association of Secondary School Principals sponsored a national research project into the instructional uses of computers in schools which used them. The study found that most schools which used computers had courses in computer skills with topics which ranged from how a computer functions to programming in a simple programming

language. Commercial software programs for drill and practice were available in arithmetic and language arts and while these programs were targeted to elementary school students, they were found to be useful for remedial purposes at secondary schools. The study found that although there was less use of computers in modeling and simulation in subjects such as biology, physics, chemistry, and economics, the situation was improving. Computer-managed instruction (CMI) was found to be often integrated with computer-assisted instruction; computers tested and recorded students' progress and advised on whether a student was ready for the next level of a course. The study also found that vocational and technical schools were offering courses in key punching, wiring, machine operation, as well as coding and writing original computer programs. The study noted that using computers for CAI and CMI "frees the teacher from the paperwork routines of individualized instruction" (p. 29).

On obtaining equipment, the study found that computer services were provided to schools by school district offices, universities, local governments, industry and business on whose computers schools could lease time. Another alternative was through batch processing in which students marked or punched cards which were then taken to a computer at any of the above-mentioned centers from where the output was sent back to the school. On teacher training,

the study suggested the training of a minimum of one staff member in each school but that this should be increased to two as soon as possible. The study suggested that "A one semester course in computer programming can qualify a teacher for conducting a course in Computer Programming, Computer Mathematics, or a related course involving use of a computer terminal" (Koch, 1973, pp. 30-31).

Cropley and Gross (1970) conducted a study on the effectiveness of computer-assisted instruction with a sample of 76 students at the University of Saskatchewan Regina Campus. Sixty-one of the subjects were men and 15 were women. The subjects were pre-tested using subtests of the Primary Mental Abilities Test (PMA) and were matched in three groups on the basis of the pretest to control for pre-existing intellectual differences. The report claims that the matching eliminated observed difference in cognitive skills by sex. One group was taught the computer language FORTRAN by conventional instruction, the second by programmed instruction and the third group by computer-assisted instruction. The posttest consisted of three FORTRAN tests, four FORTRAN problems, and a final examination. The FORTRAN problems and tests were given to the "conventinal" group at intervals during the two-week duration of the course while the other two groups received them on request and attempted them at their own discretion.

All students then wrote a formal examination at the end. The time spent on the course was also recorded for each student.

The mainframe computer used for this study was a 512K IBM 360/67 located 434 miles from the site of the experiment and was accessed through two IBM 2741 typewriter keyboard terminals by telephone connection.

Analysis of variance showed significant differences on the first two FORTRAN problems. Examination of the means showed that this difference was due to superior performance of the programmed instruction group. The investigators explain that this may be due to the fact that the programmed instruction group "spent much longer (time) in formal preparation than did the other two groups." However, this superiority did not extend to the other FORTRAN problems which were different in that they required actual application of formal principles.

A questionnaire was administered to the CAI group to determine students' attitudes toward computer instruction. Only one student is reported to have said that he felt that no one cared whether he learned or not. One student disagreed with the statement that the computer-assisted instruction challenged him to do his best work.

The investigators conclude that computer-assisted instruction was as effective as programmed instruction and conventional lecture method and that the CAI students found the experience acceptable emotionally.

Wilson et al. (1970) studied the achievement of students in computer-assisted instruction in elementary English of the INDICOM project of the Waterford Township Schools in Michigan. Three groups of students in fourth and fifth grades were the subjects. The students were in intact classrooms. The experimental group consisted of sixty-eight students receiving CAI in both English and mathematics. Control Group I was made up of 42 students who received drill and practice by computer in mathematics, but not in English. Control Group II (N=77) received instruction by traditional methods. The investigators state that Control Group I "was selected as an intermediate control in an attempt to examine the possible effect of an experimental school setting on the results" (p. 577). Each student was ranked using the Warner Socioeconomic Scale "dependent on the employment status of the family breadwinner." Mean I.Q.'s for the Experimental Group was 107 (S.D. = 10.68); Control Group I mean was 109 (S.D. = 11.79), and for Control Group II was 107 (S.D. = 10.58). Form X of the Standard Achievement Test battery was administered to all students before the experiment began, and Form W of the test after the experiment which ran from February to June, 1969.

Over the four month period, it is expected that students should gain four months in grade equivalent score. However, the study found that both control groups gained three months, or one month less than expected; the CAI group

gained seven months, or three months more than expected. The differences were found to be significant beyond the .05 level. Teachers' logs during the experiment were analyzed at the end and the investigators state that they fell into three distinct categores: 1) Students maintained enthusiasm for the CAI program and enjoyed the competition involved; students saw the core lesson as school work and the supplement as "fun games;" many students completed the core lessons and supplements in less than the 15 minutes alloted. 2) The program did not save teachers time, per se, but permitted them to use their time more efficiently. The program freed teachers from the chores of paper-checking and the program allowed for a more intensive treatment of important grammatical problems that time did not permit in the regular classroom. 3) There was indication that students' general performance in school was positively improved by their work on language arts CAI. Students were able to get faster feedback by the CAI method than by traditional means. Although slower students had more difficulty in meeting criteria, teachers generally felt that such students benefited from the CAI method (p. 579).

A similar evaluation of the effectiveness of the Stanford CAI program in initial reading was done by Fletcher and Atkinson (1972). Twenty-five pairs of first-grade boys and 25 pairs of first-grade girls were matched using the Metropolitan Readiness Test scores. The experimental member

of each matched pair received 8 to 10 minutes of CAI each school day in addition to the regular classroom work which both groups received. The experiment ran from the first week in January till the second week of June, 1970. Three posttests were administered to all subjects in May and again in June. These consisted of four subtests of the Form X of the Stanford Achievement Test, Primary I; the California Cooperative Primary Reading Test (COOP) Form 12A (Grade 1, Spring); and an individually adminstered test "designed to measure directly the principal goals of the computer curriculum" (p. 597).

During the experiment, equal numbers of pairs were lost from the girls and boys groups and analyses were based on 22 pairs of each sex group. Posttest comparisons found that apart from the COOP for matched pairs of girls, there was a significant difference in reading achievement of the CAI groups. The study also found that boys benefited more from CAI than girls.

In 1977 Burns and Culp carried out a study on stimulating invention in English composition through computer-assisted instruction at the University of Texas at Austin. The major research question was "Could supplementary computer-assisted instruction be designed, developed, and programmed which would effectively stimulate most individuals' inventive process?" The subjects were 72 volunteer students enrolled in four second-semester English

composition classes. The treatments were randomly assigned to the four classes. To control for teacher variability the researchers gave each of the four classes two one-hour lectures on the group's particular strategy in the course. While the control group was given 30 minutes to list any ideas about the topic of their paper, the experimental group was given the same amount of time to interact with a programmed computer and to type their ideas on a keyboard. The only source of encouragement for the CAI group came from the program itself and the control group had no additional encouragement if they stopped writing before the 30 minutes had expired.

The findings were that the three experimental groups which used CAI generated more ideas which were more comprehensive and exhibited greater overall quality of inquiry. The researchers conclude that "This study contributes some evidence that (the) three heuristic strategies via CAI are better than what little individualized invention actually occurs in the composition classroom, at least as far as quantity, comprehensiveness, intellectual processing, and overall quality of ideas are concerned: (Burns and Culp, 1980, pp. 5-10).

Several studies have indicated that an individual's attitude toward an instructional device or method is dependent on the individual's past experience with that device or method (Wodtke, 1965); Rosenberg et al., 1967).

Thus it is to be expected that a person who had had a successful experience in using computers would develop a favorable attitude toward computers and vice versa. To explore this possibility, Mathis et al. (1970) did a study of college students' attitudes toward computer-assisted instruction (CAI). The subjects were 47 female and 17 male students randomly selected from 108 students enrolled in the General Psychology 205 class at Florida State University. None of the subjects had had experience with CAI and a pretest showed they all had a limited knowledge of general psychology.

For a pretest of students' attitudes toward CAI, the investigators used a "futurized" form of the Brown attitude measurement instrument by placing its content in the future tense (Form A). For posttest, the Brown scale was used in its original past tense (Form B). The original Brown scale has been reported to have an internal consistency reliability coefficient of .89. The "futurized" version of the scale used for pretest is reported by the investigators to have a Kuder-Richardson Formula 20 reliability of .82 for 158 Florida State undergraduates (p. 46). The study used a modified Solomon four-group design to assess the effect of the pretest on the posttest. There were two control and two experimental groups. Experimental I and Control I groups were pretested while Experimental II and Control II groups were not. Students in the experimental groups were given an

average of 45 minutes of CAI individually in booths with typewiter-like terminals which accessed a mainframe IBM computer. The control groups had 45 minutes to read selected material from a general psychology text other than the one used in the course in a quiet room. The selections covered the same topics as the CAI program. The subjects were further randomly assigned to A and B conditions. The A subgroups received CAI or reading material which was discussed in class and on which they were to be tested that week. The B subgroups received CAI or reading material which was not covered in class and on which they were not to be tested for several weeks.

The findings of the study were that: 1) Students generally felt that a computer was good, fair, valuable, fast but safe. 2) Students highly felt that the questions asked by the computer were relevant and that the hardware did not impinge on their learning. 3) Students did not feel bored or isolated as a result of the CAI program. 4) Students' attitudes to CAI were influenced more by experiencing it than by reading. 5) Students who took CAI found it to be more relevant, definitive, interesting, and less complicated than they had expected. 6) Students who received familiar, immediately relevant material were more positive about CAI than students who received unfamiliar material. 7) Students who received familiar material saw CAI as less mechanical whether they experienced CAI or not. 8) Students who made

more errors per question were less favorable to CAI ($r = -.49$) which was found to be significant at the $p<.01$ level. The researchers conclude that:

> College students generally have positive attitudes to computers and exposure to CAI in this study increased their positiveness. But the magnitude of the attitude change was dependent upon the kind of experience they had. Those students who had the familiar and relevant CAI program, and made few errors while taking it, showed the greatest increase in positiveness to CAI (p. 50).

Three surveys were done in Nebraska between 1979 and 1982. According to Stevens (1983/84) "Findings of these surveys were used to determine whether new programs, or simple modifications of present preservice and inservice programs were needed" (p. 53). In 1979, 657 Nebraska K-12 teachers, 79 teachers college faculty, and 227 student teachers at the University of Nebraska, Lincoln were surveyed. In 1981, 714 Nebraska teachers, 88 teacher educators and 238 student teachers were surveyed. In 1982 the third survey involved 238 K-12 educators.

In the 1979 and 1981 surveys, a large majority of those surveyed believed that students should be computer literate. However, only a few of them felt they themselves were qualified to teach computer literacy. In the 1979 and 1981 surveys, student teachers were less positive about the importance of computer literacy than were teachers and educators. Stevens laments that "This is distressing when one considers that these will be teachers entering

classrooms during the so-called computer revolution of society!" (p. 54). In 1981, student teachers and teacher educators showed significantly higher scores in their computer knowledge and computer usage than in 1979 at the $p<0.06$ level. Student teachers also showed a significant improvement in their attitude-to-computer scores in 1981 over the 1979 survey ($p<0.06$).

In 1982, educators expected a substantial increase in computer usage over the next 10 to 15 years. However, teachers were not positive about the future role of computers. Teachers did not feel that computers would substantially effect changes in their classroom management. Teachers also felt that computers would cause less than slightly moderate change in their instructional strategies and what they teach students. Over seventy-five percent of teachers surveyed in 1982 felt that their methodology of teaching was either incompatible with microcomputers or were not sure that microcomputers would blend with their instructional techniques. Generally, those surveyed in 1982 agreed that computer-assisted instruction was not for all students, disciplines, or teachers. While 40 percent of those surveyed in 1982 said they were willing to adopt computers for instruction, 43 percent said they were unwilling to change. The rest were uncommitted. On this finding, Stevens says that "In other words, educators in this study perceived that computers would strongly influence

classroom instruction and the curriculum but not in their classrooms" (p. 55).

Schimizzi (1983/84) carried out a study the basic outlines of which were similar to those of the study for this dissertation. Schimizzi did a nationwide survey of 250 colleges and universities with teacher education departments. He then surveyed 400 school systems in the 50 states. The purpose of the study was to determine "the specific decisions already made by those college teacher education departments and school systems planning and implementing microcomputer programs". The results were intended to provide colleges and universities with teacher education programs and school systems information which might be used to plan and implement their computer programs (p. 59).

Some of Schimizzi's findings are as follows: Seventy-five percent of the colleges and universities had adopted the microcomputer center approach in housing their equipment as against 33 percent of school systems. The rank order of curriculum areas microcomputers were used for were similar for colleges and universities and the school systems, i.e., mathematics, reading and language arts, and social studies. He also found that the most common brand of microcomputers used by college education departments and schools was Apple (55 percent and 44 percent respectively). The next most popular brand was Radio Shack TRS-80 (colleges 22 percent

and schools 32 percent). Colleges and schools listed financial problems and lack of prepared faculty as constraints in their microcomputer programs. One-half of the campuses and two-thirds of the schools were using microcomputers as against time-sharing terminals. Ninety-nine percent of the campuses and 99 percent of the schools said they would recommend microcomputers for instruction on campuses and in schools elsewhere. Many of the campuses and schools indicated they had some sort of plan before they acquired microcomputers. He also found that an interested mathematics teacher or administrator was often responsible for the introduction of microcomputers in the schools and colleges. Both the campuses and the schools were involved in inservice training for their faculty in the instructional uses of microcomputers. Forty-one percent of the colleges and universities, and 42 percent of the schools felt that a microcomputer consortium should be the responsibility of a nearby college or university. Schimizzi concluded that "The major weakness in microcomputer programs in both studies seemed to be a lack of comprehensive and long-range planning before and after the acquisition of microcomputers" (p. 61).

In general, the literature suggests that computers are effective in instruction if used creatively. The appropriateness of the use of the computer in a given educational situation is an important factor which must be

considered. For example, Forcheri and Molfino (1986) are of the opinion that if the use of the computer is merely for the presentation of data graphically and if the purpose of the lesson is the introduction of graphic representation, "it is educationally more useful to use a pencil and graph paper than a program which enables students to automatically obtain the graph required" (p. 138).

User-friendliness of the system is also important; the easier it is to use, the more positive will be the attitude of the user. Alderman et al. (1978) evaluated the PLATO (Programmed Logic for Automatic Teaching Operations) computer network which has its base at the University of Illinois, and the TICCIT (Time-shared, Interactive, Computer-Controlled, Information Television) system which is a small local CAI network which serves schools in Arizona and Virginia. Apart from the technical differences in the two CAI systems, the study found the PLATO system to be more effective for instructional uses and that it also had more favorable impact on instructors than the TICCIT system. Alderman et al. conclude that:

> The approach taken to implementing the systems in schools, for example, would seem to account for much of the results. The autonomy afforded teachers in deciding about the use of the PLATO system seems a viable explanation for faculty acceptance of the system. The responsiblity given students in learning on the TICCIT system seems an important reason behind the lower completion rates for courses under the TICCIT program...It would

> appear that computer systems themselves neither guarantee any dimension of educational effectiveness nor explain fully the results of such demonstrations (pp. 44-45).

Computer Literacy and Teacher Training

The computer revolution has come along with its own jargon which is often called computerese. Some old words, concepts, and expressions have acquired new meanings and significance in the computer community. One such computerese which is of particular relevance to education is the concept of "computer literacy." Although the concept has become fashionable and common in computer literature, it has defied a common definition and is generating heated debates among computer technologists, educators and the public. One reason for the uncompromising feud over what is, or what is not, computer literacy is that for some computer experts, the word "literacy" takes on a specialized, almost-sacrosanct significance when married to the word "computer."

The diversity of views on computer literacy is, perhaps, best exemplified by opinions expressed at a conference of experts held at Reston, Virginia in December 1980. The conference which was sponsored by the National Science Foundation was entitled "National Goals for Computer Literacy in 1985" and its primary goal was to seek ways for achieving national computer literacy in the United States. After two and a half days of deliberations by 90 computer

scientists, classroom teachers, creators of educational materials, publishers, vendors and government officials, the conferees agreed that one of the keys to achieving national computer literacy is "The recognition that the concept of computer literacy is multi-faceted." In other words, computer literacy means different things to different people:

> For example, to some a general awareness of computers is sufficient; to others, a technical skill that can only be acquired by hands-on experience is mandatory; to still others, students must learn to write programs that do things--solve differential equations or create poetry (Deringer and Molnar, 1982, pp. 4-5).

The two extreme views concerning computer literacy may be summarized as follows: The first -- the "comprehensive" view -- is that a computer-literate person should know everything about computers from their history, technical components, how computers operate, their uses and social implications, ethics, how to use computers to perform given tasks, to how to program computers to perform those tasks (e.g. Dwyer and Critchfield, 1981; Anderson, 1983; Bork, 1982). The second school of thought maintains that the computer is just another tool to help man perform certain tasks. Consequently, users need not have detailed technical knowledge about computers or about programming and that what is critical is for the individual to use the computer to meet his/her own needs. This group maintains that the production of user packages, software, and programming

should be the responsibility of a few experts. Megarry (1983) argues the logic of the two viewpoints thus:

> ...It would be wholly unjustifiable to restrict driving licences to such would-be drivers as can explain the principles of the four-stroke combustion cycle, and just as irrational to prevent students from discussing the environmental impact of motorized transport unless they could first pass a Heavy Goods Vehicle proficiency test (p. 20).

The argument for the "tool" view of computers is strengthened by the fact that particularly since the arrival of the microcomputer, there has been a growing market for software, and commercial companies and publishing houses have been producing software for business, industrial, administrative, home, and educational applications. Thus, the individual computer user does not need to produce his or her own program for a particular application but can use or adapt an existing piece of software. Zamora (1983), for instance, maintains that unlike in the early days of computers when people were compelled to learn about the computer, today, we increasingly use the <u>applications</u> of computers and that "We don't use the computer; we make use of it through its applications" (p. 8).

In the late seventies, the National Science Foundation awarded a grant to the Minnesota Educational Computing Consortium (MECC) to study the impact of precollege computer literacy programs. In order to identify various approaches to computer literacy, MECC surveyed all 6800 grade 7 through

12 science, mathematics, business education, computer science, and data processing teachers in Minnesota in 1978. Views from the study were so divergent that "...The project elected to develop a conceptual framework that attempted to incorporate as much as possible the views of all" (Johnson et al., 1980, p. 92). The computer literacy program objectives of those studied were listed under two broad headings--Cognitive and Affective. Under the cognitive, the study found that the objectives ranged from knowledge about hardware, programming and algorithms, software and data processing, applications, to social impacts of computers. Affective objectives covered attitudes, values, and motivation. Within each category were specific student outcomes which included requirements for students to "identify the five major components of a computer...; recognize the definition of algorithm; modify a simple algorithm to accomplish a new, but related task; develop an algorithm for solving a specific problem; (student) does not feel fear, anxiety, or intimidation from computer experiences; values economic benefits of computerization of a society; enjoys and desires to work or play with computers, especially computer-assisted learning..." (pp. 93-96. See also Anderson, 1982; Wheeler, 1979). This study shows the broad range of what the teachers surveyed considered to be part of computer literacy.

Implications for Teacher Training

Perhaps, because of the divergent views on what constitutes computer literacy, many policy statements and goals for teacher computer training and student competencies have been unspecific and noncommittal. Samples of such statements and goals should elucidate the point:

1. Position statement by the Board of Directors, National Council of Teachers of Mathematics (NCTM), 1976:

> An essential outcome of contemporary education is computer literacy. Every student should have firsthand experiences with both the capabilities and the limitations of computers through contemporary applications. Although the study of computers is intrinsically valuable, educators should also develop an awareness of the advantages of computers both in interdisciplinary problem solving and as an instructional aid. Educational decision makers, including classroom teachers, should seek to make computers available as an integral part of the educational program (Mathematics Teacher, May 1978, p. 468).

2. Recommendation by the Michigan State Board of Education:

> The State Board of Education recommends to local boards of education that they require all students to complete:...One-half year of "hands-on" computer education. Although almost no computer courses are required for graduation, 28 percent of Michigan students take a course, 86 percent of the Michigan public surveyed favored requiring a course in computer science/literacy (Michigan State Board of Education, 1984, p. 5).

The statements above lack specificity as to what competence is expected of a "computer literate" person and lack direction for the training of teachers for instructional uses of computers. Consequently too, while some districts

have well articulated and written philosophies and objectives for computer use in the classroom, others have vague guidelines that are open to varied interpretations (compare Bacak and Elsholz, Computer Usage Handbook, 1984, and WE CAN, Planning Guide: A District Computer Curriculum, undated). However, Seidel (1982) feels that an individual's role places different demands on his or her use of, and involvement with, computers:

> ...An administrator in a school, or a policymaker, must be able to appreciate how computers can be used to, for example, augment the existing disciplines or how they might aid in managing student schedules. However, it is debatable whether such individuals need to become computer programmers in order to attain this appreciation. My guess is that for now the latter is not the case (pp. 23-24).

Similarly, in a large corporation an executive may need a general appreciation of the benefits and the role of computers in production, inventory, and administration but his or her needs would be different from those of, say, a line supervisor or a secretary. Consequently, Seidel feels that a computer literacy curriculum should be tailored to the needs of the individual and that "The sequence of topics and emphasis would vary contingent on need and interest" (p. 26).

The implication of this is that teacher trainers must first be aware of expected student learning outcomes in order to determine teachers' needs if they are to prepare teachers adequately to teach students.

On the problem of teacher training, Bork (1982) says that if teachers are to attain a reasonable level of the use of computers for instruction, they must be assisted and that as of the present, few teachers have the competency:

> The problem we face is that of training a large number of teachers to make effective instructional use of the equipment they will confront in the classroom, the modern computer equipment of today and the immediate future. It is a national problem and one that should be met as soon as possible if we are to aid our teachers (p. 93).

Bork also feels that conventional teacher inservice training alone is not adequate to meet the training needs of teachers because there are simply too many teachers to be trained. Unfortunately too, universities are not often of much help, he believes, "...because the university faculty are often more backward than the schools in the use of the computer within the educational process" (p. 92).

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Introduction

This study had a dual focus: Firstly, it was intended to study the selected agencies to determine their policies, objectives and guidelines for teacher inservice training for instructional uses of computers. The types of inservice and support services actually provided by the agencies were also of interest. Secondly, the study sought to determine the perceptions of classroom teachers about the relevance and adequacy of the training and support services they receive from the agencies in their instructional uses of computers. To achieve these aims, three techniques were planned for data collection. These were interviews, document search, and survey. It was felt that such a triple approach would yield data leading to a clearer understanding of the problem.

Study Population

The agencies selected for the study were:

1. The Michigan State Department of Education
2. The Ingham Intermediate School District
3. The Oakland Intermediate School District
4. Regional Educational Media Centers Numbers 13 and 17
5. The Oakland and Ingham Computer Software Evaluation/ Training Centers
6. The Local Education Agencies (school districts) of Lansing, Okemos, Mason, Pontiac, Waterford, and South Lyon

Because of the repeated mention of the Training Modules for Trainers (TMT) project at the University of Michigan, Ann Arbor during interviews, and because of its apparent central role, it was decided to include it for study even though it was not in the original proposal.

These agencies all share certain criteria primary of which are that they are all involved with public education and provide one or another form of training to teachers in the instructional uses of computers. Apart from the State Department of Education and the TMT project, the agencies selected are within two Michigan Intermediate School Districts -- Ingham and Oakland -- which the investigator felt contrasted very well in their approaches to instructional computing. For example, while Oakland Intermediate School District made an early entry into instructional computing, has state leadership in several computer training projects, and exhibits a strong commitment to teacher training and support for instructional computing, Ingham Intermediate School District's efforts in these areas are not as visiable. Another criterion is that the same or similar agencies exist in all Michigan Intermediate School Districts and perform identical functions.

Within each Intermediate School District, three local school districts were selected for study and these represent one urban, one suburban and one rural. In each local school district, two buildings were selected for the study on the

basis of "High Use" or "Low Use" of computers for instruction as defined by the individual school district. Finally, all teachers and all principals at the selected buildings were to be surveyed.

Instrumentation

For the purpose of interviews with officials of the various agencies, an interview schedule was designed and field-tested. The field tests suggested the need to design separate interview schedules appropriate to each agency (Appendices A through F). It was planned to ask interviewees for newsletters, publications, training plans, training modules, organizational charts, and other documents relating to their agency's role in instructional computing. Interviewees were also to be asked for suggestions as to other sources of documents and pertinent information.

Questionnaires were designed for all classroom teachers and all principals of the selected schools for the survey. A different form of the questionnaire for teachers was designed for principals and both forms were pilot-tested on two principals and ten teachers. Suggestions from participants of the pilot test indicated that teachers and principals are more comfortable with questionnaire formats which take less time and effort to complete, and which have less to do with their personal lives. Consequently, the questionnaires were revised with the information obtained

from the pilot tests and with the help of an educational consultant. The final questionnaires consisted mostly of grids on which subjects were asked to check their response or write short answers. There were very few open-ended questions (see Appendices G and H). With an average of 10 teachers per school, the survey population was estimated at about 120 teachers and 12 principals.

Data Collection

Because of the broad nature of the study and the diversity of the participants, it was necessary to make contacts and arrange preliminary interviews with officials at the State Department of Education, Intermediate School Districts, Directors of the two Regional Media Centers, Coordinators of the Computer Software Evaluation/Training Centers, District Computer Coordinators, School District Superintendents, Curriculum Directors, Research and Evaluation officials and others well in advance of the study itself. Such initial contacts were made in Fall 1985 while the study itself did not begin until May 1986. These preliminary contacts offered the investigator opportunity to explain the purpose and nature of the study to officials and to seek clearance and support from them. The contacts also enabled the investigator to obtain the names, addresses and telephone numbers of the key people to see with regard to the different aspects of the study. They also provided

information about the procedures to adopt for each part of the study. For instance, while clearance and support for the study was obtained in some districts verbally after the initial interview, one district required a lengthy process of formal written application, the filling out of appropriate district research request forms, the submission of a full copy of the research proposal, personal interviews and phone calls. Finally, a board of administrators, principals, and teachers disapproved participation of the district in the study on the grounds that the district had been over-surveyed during the year.

In keeping with Michigan State University regulations, the investigator applied and received the approval of the University Committee on Research Involving Human Subjects (UCRIHS) before the actual study began (Appendices I and J).

Face-to-face interviews were conducted with officials of the agencies between May and August 1986 while questionnaires were administered to teachers and principals in May and June. The general procedure with the questionnaires was to send them in bulk to the schools and to provide a large envelope in the school's office into which completed questionnaires were dropped. This procedure was to insure anonymity. In most districts, computer coordinators or curriculum directors arranged to get the questionnaires to the schools and to return them in the envelope provided to the investigator. In two schools, the

questionnaires had to be delivered to the principals of the schools in bulk by the investigator from whom he picked them up at a later date.

Because of time constraints expressed by one school district as a result of a busy end-of-school year schedule, a slight departure had to be made to this general procedure: The investigator took the questionnaires in bulk to the District Superintendent's Office with envelopes, stamped and addressed to the investigator. The district then delivered the questionnaires to the schools with a cover letter from the investigator explaining that teachers and principals could fill them out after school was over for the year and mail them directly to the investigator. This compromise worked as well as the original procedure.

Each questionnaire sent out was accompanied by a letter from the investigator briefly explaining the purpose of the study and the guarantees of anonymity. Letters to principals, in addition, had attached introduction letters from the investigator's major professor and from the State Department of Education. These introduction letters also served the purpose of legitimacy for the investigator during the interviews (see Appendices K through N).

Procedure and Coding Frame for Data Analysis

Information obtained by interviews was studied, summarized and relevant data extracted from it for statistical analysis where this was necessary.

Questionnaire items were hand-coded according to the following criteria: Items such as teachers' rating of the value of computers for instruction were given the following weights:

1 = of no value
2 = of little value
3 = of moderate value
4 = of great value

Similarly, items concerning teachers' rating of their involvement in computer related activities were scored from 1 to 4 with 1 = not involved, through 4 = highly involved.

A "yes" response was scored as 2 and a "no" response as 1. This is in keeping with the overall coding frame in which a higher numerical value is associated with a "favorable" response and a lower one with a "less favorable" response.

Total number of respondents (N) differs from item to item and, in some cases, actually seems to exceed the overall survey population for one or more of the following reasons:

1. Not all questions were applicable to all respondents

2. Respondents were given more than one choice
3. Respondents were asked to rate a number of possibilities

In calculating the relationship between the amount of inservice training and the amount of time teachers spend in the use of computers for instruction, only teachers who received inservice training from the agencies listed in the questionnaire were included. Schools that share computers on a rotational basis were excluded because responses were unquantifiable. For example, on the amount of time a class uses computers for instruction in a week, some respondents gave answers such as "once a month" which cannot be correctly quantified for statistical uses.

Item 12 of the teachers' questionnaire (Appendix G) was scored as follows:

1/2 day = 3 hours
full day = 6 hours
1 week = 30 hours
1 semester/term = 40 hours

This is based on actual field practice whereby half-day inservice training sessions normally run from 9 a.m. to 12 noon, and full day sessions from about 9 a.m. till about 4 p.m. with a one-hour break. One week sessions are usually full-day for a five-day week. Forty hours for a semester or term is based on 2 college credit hours a week for 20 weeks or 3 college credit hours a week plus practicum, for at least 10 weeks. Thus if a respondent reported 3 half-days of inservice training, this was computed as 9 hours (3 X 3).

Grade level taught was scored as follows:

Kindergarten	= 1
Grade One	= 2
Grade Two	= 3
Grade Three	= 4
Grade Four	= 5
Grade Five	= 6
Grade Six	= 7

When a teacher teaches at 2 grade levels, the average coding value was used. For example, if a teacher teaches grade levels 3 and 4, this was weighted as (4 + 5)/2 = 4.5.

For the calculation of Pearson's correlation coefficient on teaching experience and perceptions of the value of the computer as an instructional tool, teaching experience was scored as follows:

0 - 5 years	=	1
6 - 10 years	=	2
11 - 15 years	=	3
16 years or more	=	4

There are fewer kindergarten teachers (N = 8) because in most elementary schools these teachers actually teach one session in the morning and one in the afternoon. Therefore, they handle two classes of students in one day. The small number of 6th grade teachers (N = 3) is explained by two factors: (1) Some teachers teach grade levels 5 and 6 and so were coded as 5.5. (2) Three of the districts surveyed have middle schools and therefore, have no 6th grade classes in their elementary schools.

The State Department gave the mean number of years of experience of teachers as 15 with which the study data compares favorably.

Data Analysis

Data obtained from the study were aggregated and subjected to summary statistical analyses using a Laser 128 personal computer. The results were tabulated to provide answers to the research questions listed at pages 23 through 26 of this dissertation.

Pearson's correlational coefficients were calculated to determine the relationships between a number of variables as outlined in Chapter I of this dissertation at the .05 level of significance. The variables of interest were: amount of inservice training and perceptions about the value of the computer as an instructional tool; amount of inservice training and amount of time teachers spend in the use of computers for instruction; amount of inservice training and teachers' desire to spend more time using the computer for instruction; number of years of teaching experience and teachers' perceptions of the value of the computer as an instructional tool; grade level taught and teachers' perceptions of the value of the computer as an instructional tool; grade level taught and the amount of time teachers spend in the use of computers for instruction; and a school's identification as a high or low use school and the

percentage of questionnaires returned. A chi-square was calculated to test a possible relationship between teachers' ownership of a personal computer and their use of computers for instruction.

Summary

There were two populations for this study. The first consisted of agencies involved with public education and responsible for teacher computer inservice training. The second population was classroom teachers and principals who were surveyed.

In order to obtain the fullest possible understanding of the problem of this study, three approaches were used for data collection: interviews, document search, and survey. The instruments for the interviews and survey were pretested and revised. Data collected were aggregated and subjected to descriptive statistical analyses to determine the frequency and distribution on items of the questionnaires. Pearson's coefficients of correlation were calculated and a chi-square test was performed to explore relationships between a number of variables.

The results of the data analyses are presented in Chapter IV while Chapter V is a discussion of the findings and suggestions for teacher inservice training and for further research.

CHAPTER IV

FINDINGS AND RESULTS OF DATA ANALYSIS

Introduction

This chapter of the dissertation deals with the results of the data analysis and is presented under the following headings: (a) Findings from Interviews with the Agencies, (b) Analysis of Questionnaires administered to Classroom Teachers and Principals, and (c) Summary.

In the interviews, separate interview schedules appropriate to each of the agencies were used and questions arising in the course of the interviews but not necessarily on the interview schedule were pursued to obtain a fuller understanding.

Two school districts -- Lansing and Pontiac -- declined to take part in the study. The Lansing School District Office of Evaluation Services stated that teachers had been over-surveyed on computers during the school year (see Appendix O). In Pontiac, the official responsible for coordinating instructional computing granted the investigator an interview and was given questionnaires for the schools. Apparently, the questionnaires never reached the principals and teachers and several attempts to reach the official proved futile. Consequently, for the survey portion of the study, a total of four local school districts instead of six, and eight schools instead of twelve participated. Apart from reducing the number of districts

and the number of teachers originally planned for the study, these refusals did not adversely affect the study.

A summary of the findings of the interviews and document search at the agencies is presented first, followed by the results of data analysis. As much as possible the data is presented in the order of the research questions of the study as listed at pages 23 through 26 except that Research Questions 1 through 4, and 18 are presented together under "Findings from Interviews with the Agencies." Research Question 21 on comparing teachers' and principals' responses is discussed throughout the data presentation where applicable.

Findings from Interviews with the Agencies

Research Questions 1 through 4

> Policies, guidelines, philosophies, objectives and organization of the agencies and their training programs

Findings

Interviews with officials and document searches at the various agencies indicate that there is no definitive state policy on instructional computing or educational technology. The Michigan State Department of Education makes recommendations to local districts and Intermediate School Districts but curriculum decisions are locally made since 70 percent of local district budgets come from local taxes.

There are no stated state requirements for teachers for instructional computing but the state is hoping to require certification for teachers of computer science at the secondary level. Consequently, there are also no state-level objectives for teacher training in the instructional uses of computers.

The regional Computer Software Evaluation/Training (TIME) centers, the Intermediate School Districts (ISDs), the Regional Educational Media Centers (REMCs), and the Local Education Agencies (LEAs) all provide some form of inservice training for teachers in the instructional uses of computers. The TIME centers provide workshops for trainers and teachers. The Training Modules for Trainers (TMT) project at University of Michigan does not directly provide training for classroom teachers but trains people who are interested in becoming trainers. It is intended that these trainers will train other trainers and classroom teachers. TMT was expected to train at least 50 trainers (10 from each TIME region) in its first two years. By the time of this study, the project claimed to have already trained 200 trainers.

Intermediate School Districts (ISDs) are a structural part of public school administration in Michigan. ISDs incorporate a number of local school districts (Local Education Agencies) but as one official put it, ISDs only "exercise authority by permission" over local districts.

In instructional computing, ISDs assist local districts in planning inservice training for teachers, and perform demonstrations of available computer hardware and software. ISDs also carry out inservice training for local teachers. Figure 2 shows the September and October offerings from the Fall 1988 teacher inservice training schedule published by the Oakland Intermediate School District.

Regional Educational Media Centers (REMCs) were established in 1970 under Michigan Public Act 55 to provide instructional media services to local school districts. REMCs are made up of counties, and while in a number of areas REMC boundaries approximate those of ISDs, in most cases they do not. In areas such as Oakland where the REMC boundaries coincide with those of the ISD, the REMC fits into the overall structure of the ISD and it is often difficult to see the REMC as a separate agency.

The REMCs also offer some form of inservice training for teachers but by the nature of their functions, REMC inservice training is product-oriented and includes skills such as computer graphics and design, and computers in television production. To coordinate their district level activities REMCs have an advisory group in each district.

The agencies interviewed agree that in the final analysis, the responsibility for teacher training in instructional computing lies with the local district.

SEPTEMBER

Date(s)	Time	Course Name	Location	Fee
22	8:30am-5:30pm	Physics Workshop	MLAB,OS	$25
23	4-6:30pm	Using THE FACTORY and other software to teach problem solving: Application of Computers in the Curriculum	Rm 215,OS	FREE
25	3:30-5:30pm	Introduction to Desktop Publishing	Rm 325,OS	FREE
30	4-8pm	Integration of Computing into the Secondary Language Arts and Social Studies Classroom - A Mini-Conference	Rm 315,OS	$10

OCTOBER

1	9am-3:30pm	Meet the Macintosh	Apple Comp	$5
2	1:30-4pm	IBM PC-An Intro.	Rm 555,OS	FREE
2	4-8pm	Computing for Middle School Computing Teachers - A Mini-Conference	Kiva, OS	$10
6,7,8,9	9am-noon	Lotus 1-2-3	Rm 555, OS	$5
13,14,16	3:30-6:30pm	AppleWorks	MLAB,OS	$5
16,23,28,30	9am-noon	Lotus 1-2-3 Advanc.	Rm 555,OS	$5
20,24,29,3	1:30-4pm	Word Processing with WordStar	Rm 555,OS	$5
21	3:30-5:30pm	PageMaker-An Intro.	Ap. Comp	FREE
22	1-4pm	Using the Interactive Videodisk	MLAB,OS	$5
23	4-8pm	Integration of Computing into the Mid. School Curriculum - A Mini-Conference	Rm 315,OS	$10
26,30,11/3, 6 and 10	4-6:30pm	Logo Workshop	MLAB,OS	$10

SOURCE: Oakland Schools, ETC, Volume 4, No. 1, Sept/Oct 1986.

Figure 2: Computing and Technology Fall Course Offerings 1986 for the Months of September and October

Even where there is a need for assistance from the Intermediate School District, a Regional Educational Media Center or a Computer Software Evaluation/Training Center, the need has to be articulated by the local district. Responses show that local districts appreciate this fact and that the local district is where the greatest effort is in teacher computer inservice training. The objective of local district computer inservice training is to provide teachers with the essential skills to enable them to use computers for classroom instruction. Three of the four local districts studied have written philosophies, and all have written goals and objectives for computer instruction in the classroom. Three of the districts have written scope and sequences as to what should be taught about computers at different grades of elementary education. Computer instruction at the elementary level is concentrated on grade levels 3 to 6.

Three of the local districts have computer committees which have advisory functions on the uses of computers for instruction. Two of these have separate committees for elementary and secondary education. Committee membership involves administrators, teachers and computer coordinators. One district also has community and student representatives on its computer committee.

One district has a full-time computer coordinator, two have part-time coordinators and one has none, the job being

performed by the Assistant Superintendent for Curriculum and Personnel. One district has two computer coordinators, one for elementary, and one for secondary schools. Three coordinators are classroom teachers with experience, or interest, in computers. The only full-time coordinator has a teaching background, has worked as a data processor at a university and has electronics as a hobby. In one district, the computer coordinator is a district administrator who is a coordinator because of her leadership qualities. The study found that computer coordinators who are also classroom teachers or have teaching backgrounds are more effective in coordinating district instructional computing programs as there was evidence of more inservice training and support activities in such districts. The implications of the qualifications of the computer coordinator will be discussed in the next chapter.

In three of the local districts, classroom teachers are responsible for computer instruction, while in one, parents are used as computer aides. Two types of physical arrangement of computer hardware were reported by the districts -- Network/Computer Lab (3) and Stand-alone Classroom Computers (2). (One district uses a combination of both).

Research Question 18

> The support services provided to classroom teachers by the agencies

Findings

In 1984 the Michigan State Department of Education established the Technology in Michigan Education (TIME) project and divided the state into 5 TIME regions. These regions are groups of Intermediate School Districts (ISDs) which form consortia for the purpose of software evaluation and training of teachers in the classroom uses of computers. Each TIME region is charged with the responsibility for one or more curriculum areas. For example, the SouthEastern Michigan Technology Education Consortium (SEMTEC) is responsible for mathematics, science, special education, and problem solving. Each region evaluates software in its curriculum areas and shares such information with the other regions in the form of an inventory showing what is available. Three pages of such an inventory are shown in Appendix P. A sixth center of TIME, the Training Modules for Trainers (TMT) at the University of Michigan, provides support services in the form of the design and development of training modules for trainers from all TIME regions. The modules developed by TMT are resource materials for trainers and, because of the heterogenous audiences trainers are expected to deal with, the modules are not audience-, computer-, language-, or software-specific but are designed so as to be applicable to building, local district or intermediate district needs. TMT has developed 14 such modules (see Appendix Q). Trainers are free to pick ideas

from different modules to create their own training packages.

Funding for the TIME project was provided by the governor's discretionary funds and grants from the State Department of Education. By the time of the study, the project was in its second year and officials hoped that it would be funded for a 3rd year. A point worth noting about the TIME project is that it has created new political boundaries which will be discussed in the next chapter.

Apart from the TIME project, the State Department of Education provides other incentives for instructional computing. These include the disbursement of State Aid Act funds which provide about $28 extra per student for computer-related activities. The Department also provides money directly to districts for instructional computing under Section 98 funding. It also provides minigrants to teachers, and administers federal funds for math and science computer projects.

There is an advisory committee for the TIME project at the State Department of Education and an advisory committee for each TIME region. At the state level, there is also a Microcomputer Network Committee. Two Department of Education officials act as liaisons between the two committees.

Through the state-sponsored Michigan Statewide Telecommunications Access to Resources Network (M-Star) project, local districts have access to the national Diffusion

Network which disseminates "programs that work" via satellite once a month. Adopting some of the project ideas can be expensive because it may require bringing in trainers for the projects from outside the state. However, the state has arranged to pay up to $5,000 for a district to bring in trainers for such projects.

Intermediate School Districts (ISDs) provide support to local districts in a number of ways. First, they provide subject-area specialist assistance to local districts which do not have such specialists and act as consultants in matters of curriculum planning. Secondly, they assist local districts in planning inservice training for teachers. They also preview and select software for classroom use. ISDs pay teachers for software evaluation and one of the ISDs studied has a demonstration center for hardware and software where teachers can preview materials. They also negotiate purchasing arrangements with hardware and software vendors on behalf of local districts. In one of the ISDs studied, this is done through the Regional Educational Media Center (REMC). Computer coordinators from the various local districts within an ISD meet regularly to discuss inservice training needs. ISDs provide specialized services for local districts. For example, the Oakland ISD has operated the following instructional support programs: OakTech for K-12, and Project ACCESS for Special Education. In addition, the ISD has specialized programs for Business Education and

Vocational Training. Finally ISDs issue newsletters and manuals on specific software packages to help teachers in their classroom work.

The Regional Educational Media Centers are ideal acquisition and dissemination centers for local schools. They maintain collections of software for teachers to work with and to preview. They make copies of materials such as public-domain computer software for local districts and buildings. REMCs provide information to local districts and buildings on available hardware and software and facilitate purchases from vendors. They maintain libraries of books and audiovisual materials for local schools.

Two of the districts in the study reported that their Intermediate School Districts make hardware and software purchase arrangements with vendors on their behalf. However, it appears from other interviews that such arrangements are actually coordinated by the REMC whose role and that of the ISD are often confused by local districts. Of the 4 local districts studied, two have direct computer purchasing arrangements with dealers. Whereas Parent/Teacher Associations (PTAs) supplement hardware purchase in three of the districts studied, one is almost entirely dependent on the PTA for computer purchase because of inadequate district funds available for its computer program.

The local school districts studied introduced microcomputers for instruction between 1978 and 1982. In one, the

introduction came through an interested school principal; in one by a school librarian, and in a third by a pressure group of elementary school teachers. In an unusual case in the fourth district, the introduction of instructional microcomputers was effected by a zealous high school community education director who personally borrowed money from a bank to purchase microcomputers for his program and repaid the bank in two years. The success of his project led to interest at the district level. That district is the only one studied which has a full-time computer coordinator.

One of the local districts studied maintains its own collection of journals and books relating to instructional computing for teachers while two publish local newsletters for distribution to classroom teachers. One local district distributes idea sheets, worksheets, and manuals for software packages to classroom teachers.

These findings have implications on the inservice training and support services provided by the agencies studied. These findings and recommendations based on them are the subject of the next chapter.

Analysis of Questionnaires Administered to Classroom Teachers and Principals

A total of 100 questionnaires were administered to elementary classroom teachers of which 77 were returned giving a return rate of 77 percent. Of those returned, two

were not usable for data analysis. These were one filled jointly by two teachers and one on which the respondent's answers to some questions were considered to be grossly inconsistent internally. Eight questionnaires were sent to principals of which six were returned.

Fifty-four (72%) of classroom teachers surveyed said they use computers for instruction while 21 (28%) do not. Twenty-three or 30.7 percent of the teachers reported they have personal computers at home while 52 of them (69.3%) do not. Principals were asked about school policy on teachers taking school computers home; five of the six principals who responded indicated that teachers are allowed to take computers home and reported a total of 33 teachers who had taken school computers home in the six months preceding the study, an average of about six teachers per school. Considering the fact that 23 teachers have personal computers at home and may, therefore, not take school computers home, the figures indicate that almost 75 percent of the teachers do have opportunity to have hands-on experience in computing on their own. However, one school reported that teachers are not allowed to take computers home and two of the schools which allow teachers to borrow school computers indicated that no teacher had taken a school computer home in the six months preceding the study.

These findings have implications which will be discussed in the next chapter.

Research Question 5

To what extent were teachers involved in planning the introduction of computers in their buildings?

Research Question 6

To what extent are teachers presently involved in computer-related activities?

Findings

Generally, teachers surveyed felt that they were moderately involved in planning the introduction of computers in their buildings (44.8%). However, 32.8 percent of the teachers said they were not involved. Table 6 shows the distribution of teachers in their responses to this question. Table 7.1 is a summary of teachers' responses to Research Question 6 which deals with their present involvement in computer-related activities. The figures indicate that teachers feel left out in matters of hardware purchase (64.2%) and the planning of inservice (63.5%). However, a slightly higher percentage of teachers (54.4%) feel they are either highly or moderately involved in software selection.

TABLE 6: Teachers' Rating of Their Involvement in the Introduction of Instructional Computers

	(N=58) No. of Teachers	%
Highly Involved	8	13.8
Moderately Involved	26	44.8
Slightly Involved	5	8.6
Not Involved	19	32.8

TABLE 7.1: Teachers' Rating of Their Involvement in Computer-Related Activities

	N	Highly Involved	Moderately Involved	Slightly Involved	Not Involved
Software Selection	57	16(28.1)	15(26.3)	11(19.3)	15(26.3)
Hardware Purchase	53	10(18.9)	6(11.3)	3(5.7)	34(64.2)
Scheduling	52	10(19.2)	12(23.1)	10(19.2)	20(38.5)
Planning Inservice	52	5(9.6)	10(19.2)	4(7.7)	33(63.5)

(Percentages are in parentheses and have been rounded to one decimal place.)

On the same questions above, all principals surveyed feel that teachers were moderately or highly involved in the introduction of computers. On hardware purchase and the planning of inservice, principals were evenly divided as to the involvement or non-involvement of teachers.

As a further probe of the level of involvement of teachers in computer-related activities, the types of inservice schedules offered by local school districts was compared with the first choices of inservice schedule made by teachers and principals. All of the four districts reported scheduling computer inservice workshops for after-school and evenings. Three give release time to teachers during school hours while two have summer workshops. When principals were requested to rank their choices of workshop scheduling, three of the six who responded chose summer workshops, two gave release time and one, after school workshops as first choice. Given the same choices, 57 teachers ranked release time, six chose after-school, and summer workshops as first option, while none made evening workshops a first option. The responses of the three groups are summarized in Table 7.2.

TABLE 7.2: Workshop Schedules Offered by Districts, and Principals' and Teachers' First Preferences

Workshop Schedule	No. of Districts Offering Schedule (N=4)	1st Preference	
		Principals (N=6)	Teachers (N=75)
After-School	4	1	6 (8%)
Evening	4	-	-
Release Time	3	2	57 (76%)
Summer	2	3	6 (8%)
Saturday	-	-	1 (1%)

The disparities in Table 7.2 indicate lack of communication between those who plan inservice workshops and those for whom they are planned (teachers). The implications will be discussed in the next chapter.

Research Question 7

> How well are teachers informed about local district policies relating to instructional computing?

Findings

Often, school administrators make policies and acquire resources about which those who are expected to use them are unaware. To measure teachers' awareness of what is available in their districts, they were asked to indicate which of the items in Table 8 they are aware that their districts have with regard to instructional computing. The total number of respondents to this questionnaire item is 75 and includes those who use or do not use computers for instruction as well as those who have or have not received inservice training. The data indicates that 42.7 percent of teachers are aware of district philosophy while 48 percent are aware of district goals and objectives, scope and sequence, and suggested activities and lessons. On the other hand, 20 percent indicated that they are unaware of district activities in this area.

A comparison of questionnaire responses with interviews indicate that teachers from districts which have the

items above indicated very high awareness of them while most of the 20% who responded "don't know" come from districts which either do not have such items or are at the formative stages of developing them. All districts which have the items listed above rely on key contact persons in each building for the dissemination of information.

TABLE 8: Distribution of Teachers on Awareness of District Policies and Resources on Instructional Computing

Policy/Resource	(N=75) No. of Teachers	%
Goals and Objectives	36	48.0
Scope and Sequence	36	48.0
Suggested Activities/Lessons	36	48.0
Philosophy	32	42.7
Don't Know	15	20.0

Research Question 8

What factors prevent teachers from spending more time in using computers for instruction?

Findings

About 59 percent of teachers indicated willingness to use computers for instruction more often if they had the choice but about 48 percent of these indicated that there are too few computers, 40.7 percent that there are too many other things to do in school, while about 31 percent gave reasons of scheduling. The data is summarized in Table 9.

Five of the six principals surveyed would like their staff to use computers more often for instruction. The six principals gave the small number of computers, four gave lack of sufficient training, and two gave lack of support services and too many other things to do in school as factors which prevent their staff from spending more time on instructional computing.

TABLE 9: Factors Which Prevent Teachers From Spending More Time on Instructional Computing

	(N=54) No. of Teachers	%
Too few Computers	26	48.1
Too Many Other Things to Do	22	40.7
Scheduling	17	31.5
Lack of Sufficient Training	13	24.1
Lack of Software	12	22.2
Lack of Support Services	8	14.8
Other	2	3.7

Research Question 9

> What are the most common ways by which teachers were introduced to using computers for instruction?

Findings

A majority of teachers (70.7%) indicated that they were introduced to instructional computing through local district inservice. ISD inservice ranked second (17.2%) while 12.1 percent of teachers were self-taught on personal computers at home. About 10 percent of teachers reported

that they were introduced to instructional computing through other means which include courses offered by computer companies, computer clubs, and peer coaching by other teachers (see Table 10).

TABLE 10: Ways Teachers were Introduced to Instructional Computing

	(N=58) No. of Teachers	%
Local District Inservice	41	70.7
ISD Inservice	10	17.2
Self-taught on Home Computer	7	12.1
REMC Inservice	3	5.2
Formal College Course	3	5.2
State Training Center	0	0.0
Other	6	10.3

Research Question 10

> What types of inservice training is provided by the agencies and how do they match their stated objectives?

Research Question 13

> What are the types of training school teachers feel they should have for effective use of computers for instruction?

(These two research questions are presented together for ease of comparison.)

Findings

Part of Research Question 10 was dealt with under "Findings from Interviews with the Agencies." However, since local school districts are ultimately responsible for

drawing up objectives and planning inservice for teachers, quantified data about their types of training is presented in Table 11. All the districts studied provide training to teachers in introduction to computers which covers an overview of computers, their component parts, and how they function. All districts also provide introductory training to software utilization. Three of the four districts provide training in programming in BASIC and Logo languages for elementary classroom teachers but the districts reported a general shift to Logo. Teachers were asked to choose their first, second and third options in order of importance of the type of training which they feel would assist them in their instructional uses of computers. Almost 27 percent of the teachers chose classroom management as their first option, followed by introduction to computers (24%) and software evaluation (14.7%). Programming as a first option ranked 6th (4%). For a second option, 24 percent of teachers picked introduction to software while 14.7 percent chose classroom management, and 13.3 percent indicated software evaluation.

TABLE 11: Types of Inservice Training Provided to Classroom Teachers by Local School Districts

	(N=4) Number of Local Districts	%
Introduction to Computers	4	100
Introduction to Software	4	100
Programming*	3	75
Word Processing	3	75
Ethics and Social Implications	2	50
Classroom Management	1	25
Record Keeping	-	-
Database Usage	-	-
Other	-	-

*The programming languages commonly used by all districts for training are BASIC and Logo.

TABLE 12: Types of Training Teachers Feel Would Assist them in Instructional Uses of Computers

	(N=75) 1st Choice	2nd Choice	3rd Choice
Classroom Management	20(26.7)	11(14.7)	7(9.3)
Introduction to Computers	18(24.0)	3(4.0)	-
Software Evaluation	11(14.7)	10(13.3)	9(12.0)
Word Processing	9(12.0)	8(10.7)	10(13.3)
Introduction to Software	8(10.7)	18(24.0)	9(12.0)
Programming	3(4.0)	7(9.3)	11(14.7)
Database Usage	2(2.7)	4(5.3)	5(6.7)
Other	1(1.3)	-	3(4.0)

(Percentages are in parentheses and ranking is according to first choices.)

Research Question 11(a)

What are the perceptions of elementary classroom teachers about the effectiveness of the inservice

training programs provided by the various agencies?

Research Question 11(b)

What are the perceptions of elementary classroom teachers about the effectiveness of the support services provided by the various agencies?

Findings

Teachers were asked to rate the training they received and the support they receive from the various agencies as "of great value," "of moderate value," "of little value," or "of no value." Responses have been summarized in Tables 13.1 and 13.2 under two categories -- those who rated training or support services as of great or moderate value and those who rated it as of little or no value.

The striking fact about the two tables is that of the 58 teachers who responded to these questionnaire items, a majority rated the training and support services they receive from local districts (53 or 91.4% for training and 52 or 89.7% for support services.) This confirms the finding that most training and support for instructional computing occur at the local level. It is also important to note that only one teacher reported on TIME center training and six on support services.

TABLE 13.1: Teachers' Assessment of the Effectiveness of Training They Received from Various Agencies

	N	Of Great or Moderate Value	Of Little or No Value
Local District	53	43(81.1)	10(18.9)
ISD	12	10(83.3)	2(16.7)
College	6	4(66.7)	2(33.3)
REMC	5	2(40.0)	3(60.0)
TIME Center	1	-	1(100.0)

(Percentages are in parentheses and are based on the number of teachers who rated each agency.)

TABLE 13.2: Teachers' Assessment of the Effectiveness of Support Services They Receive from Various Agencies

	N	Of Great or Moderate Value	Of Little or No Value
Local District	52	36(69.2)	16(30.8)
ISD	15	6(40.0)	9(60.0)
REMC	9	2(22.2)	7(77.8)
College	8	2(25.0)	6(75.0)
TIME Center	6	-	6(100.0)

(Percentages are in parentheses and are based on the number of teachers who rated each agency.)

In general, teachers rated the training and support services they receive from their local districts most favorably followed by those provided by ISDs while they rated those received from the Computer Software Evaluation/ Training (TIME) Centers least favorably.

On the same scale used for teachers, principals rated local district and ISD inservices and support services as valuable to teachers while they rated training and support services provided by REMCs, Colleges, and TIME Centers as of either little or no value to teachers.

Research Question 12

> What are the perceptions of classroom teachers about the adequacy of the amount of training received from each of the agencies?

Findings

The procedures used for Research Questions 10 and 13 above were also applied to this question. The summary is provided in Table 14.

TABLE 14: Teachers' Assessment of the Adequacy of the Amount of Training They Received from Each Agency

	N	More Than Enough	Enough	Not Enough
Local District	55	-	20(36.4)	35(63.6)
ISD	15	-	4(26.7)	11(73.3)
REMC	9	-	2(22.2)	7(77.8)
College	7	1(14.3)	-	6(85.7)
TIME Center	5	-	1(20.0)	4(80.0)

(Percentages are in parentheses and are based on the number of teachers who rated each agency.)

Table 14 above shows that generally, a larger proportion of teachers rated the amount of training they received from all of the agencies as inadequate.

Principals rated the amount of training provided by all the agencies as not enough.

Research Question 14

What are the major instructional uses of computers by teachers presently?

Findings

Table 15.1 shows that most teachers (79.6%) use computers for drill and practice, followed by problem solving (51.9%) and tutorial (44.4%). Table 15.2 is what local districts reported as the classroom uses of computers while principals' responses to the same question are summarized in Table 15.3.

TABLE 15.1: Instructional Uses of Computers by Classroom Teachers

	(N=54) No. of Teachers	%
Drill and Practice	43	79.6
Problem Solving	28	51.9
Tutorial	24	44.4
Programming*	20	37.0
Word Processing	13	24.1
Simulation	9	16.7
Record Keeping	4	7.4
Accessing Database	2	3.7
Other**	1	1.9

*The language used for classroom instruction is Logo.
**Includes games and graphics.

TABLE 15.2: Local District Assessment of What Computers Are Used for in the Classroom

	(N=4) No. of Teachers	%
Drill and Practice	4	100.0
Tutorial	4	100.0
Programming*	3	75.0
Word Processing	3	75.0
Simulation	3	75.0
Problem Solving	2	50.0
Record Keeping	2	50.0
Accessing Database	2	50.0
Other**	2	50.0

*The language used for classroom instruction is Logo.
**Includes games, graphics, and integration with curriculum.

TABLE 15.3: Principals' Assessment of What Computers Are Used for in the Classroom

	(N=6) No. of Principals	%
Drill and Practice	5	83.3
Problem Solving	5	83.3
Programming*	5	83.3
Word Processing	4	66.7
Simulation	4	66.7
Tutorial	3	50.0
Record Keeping	1	16.7
Accessing Database	-	-
Other	-	-

*The most common languages reported by principals are logo and BASIC.

A comparison of the three tables above shows that while all local districts report tutorial uses of computers, less

than half of the teachers claim to use them for this purpose and that while three of the districts and four of the six principals reported the uses of computers for word processing and simulation, only 24.1 percent and 16.7 percent of teachers respectively use them for those purposes.

While the use of computers for problem solving ranks high with teachers, only 50 percent of districts reported that teachers use them for this purpose. While 83.3 percent of principals reported that computers are used for programming, only 37 percent of teachers reported doing so. This disparity is further discussed in Chapter V.

Research Question 15

> How does the amount of inservice training in instructional computing relate to the perception of teachers about the value of the computer as an instructional tool?

Findings

A positive correlation of .21 was found between the variables in this question which is not significant at the .05 level which shows no relationship between the two variables. The data is presented in Table 16.

TABLE 16: Relationship Between Amount of Inservice Training and Teachers' Perceptions of the Value of the Computer as an Instructional Tool

	(N=74)			
	Mean	S	Cov	r
Amount of Training	23.42	36.39	5.30	.21
Value of the Computer	3.12	.70		

Research Question 16

> How does the amount of inservice training in instructional computing relate to the amount of time teachers spend in the use of computers for instruction?

Findings

For this research question, a positive correlation coefficient of .30 was found which is significant at the alpha = .05 level. Thus, the study found a direct relationship between the amount of inservice training teachers receive and their use of computers for instruction; teachers who receive more inservice training in instructional computing tend to use computers more for instruction (see Table 17).

TABLE 17: Relationship Between Amount of Inservice Training and the Amount of Time Teachers Spend on Instructional Computing

	(N=51)			
	Mean	S	Cov	r
Amount of Training	31.25	40.61	47.61	.30
Time on Instructional Computing	3.79	3.90		

Research Question 17

How does the amount of inservice training in instructional computing relate to teachers' desire to spend more time using the computer for instruction?

Findings

The correlation coefficient of .12 which was found on this research question is not significant at the alpha = .05 level. Therefore, no relationship was found between the amount of inservice training teachers received and their desire to spend more time on instructional computing. The data is presented in Table 18.

TABLE 18: Relationship Between Amount of Inservice Training and Teachers' Desire to Spend More Time on Instructional Computing

	(N=51)			
	Mean	S	Cov	r
Amount of Training	29.24	41.02	23.35	.12
Desire for More Computer Time	1.61	.49		

Research Question 19

Besides traditional inservice training, what are some types of activities teachers think will help them to gain more competence in instructional computing?

Findings

About 88 percent of teachers surveyed feel they need more individual hands-on experience in using the computer. Seventy-two percent would prefer peer coaching by other teachers while nearly 45 percent want opportunities to attend conferences. A total of 55.2 percent of teachers would like newsletters, books, journals, and magazines on computers to be made available to them (see Table 19).

TABLE 19: Classroom Teachers' Suggestions of Ways to Gain More Competence in Instructional Computing

	(N=58) No. of Teachers	%
Individual Time on Computer	51	87.9
Peer Coaching	42	72.4
Attending Conferences	26	44.8
Newsletters	13	22.4
Books about Computing	10	17.2
Journals/Magazines	9	15.5
Computer Club Membership	5	8.6
Computer Committee Membership	3	5.2
Other	-	-

Research Question 20

What are the perceptions of elementary classroom teachers about the computer as an instructional tool?

Findings

Teachers were asked to rate the computer as a tool of instruction on a 1-4 scale ranging from "of no value" through "of great value." Table 20 shows that 86.7 percent of teachers surveyed rated the computer as either of moderate or great value as an instructional tool.

TABLE 20: Teachers' Perception of the Computer as an Instructional Tool

	No. of Teachers	%
Of Great Value	20	26.7
Of Moderate Value	45	60.0
Of Little Value	7	9.3
Of No Value	3	4.0

Research Question 22

Does the number of years of teaching experience relate to teachers' perceptions of the value of the computer as an instructional tool?

Findings

A correlation of -.03 was found between number of years of teaching experience and teachers' perceptions of the value of the computer as an instructional tool which is not significant at the alpha = .05 level (Table 21). Thus, no

relationship was found between teaching experience and teachers' perception of the value of the computer as an instructional tool.

Research Question 23

> How does grade level taught relate to teachers' perception of the value of the computer as an instructional tool?

Findings

A positive correlation coefficient of .08 was found between the two variables in this research question which is not significant at the alpha = .05 level. The relevant data is presented in Table 22. No relationship was found between grade level taught and perception of the value of the computer as an instructional tool.

Research Question 24

> How does grade level taught relate to the amount of time teachers spend in the use of computers for instruction?

Findings

A calculated correlation coefficient of .40 was found for the above research question which is significant at the alpha = .05 level (Table 23). Thus the study found a direct relationship between grade level taught and the time teachers spend on instructional computing.

TABLE 21: Relationship Between Years of Teaching Experience and Teachers' Perceptions of the Value of the Computer as an Instructional Tool

	(N=75)			
	Mean	S	Cov	r
Yrs. of Teaching Experience	3.17	.98	-.02	-.03
Value of the Computer	3.11	.69		

TABLE 22: Relationship Between Grade Level Taught and Teachers' Perceptions of the Value of the Computer as an Instructional Tool

	(N=70)			
	Mean	S	Cov	r
Grade Level Taught	3.77	1.73	.09	.08
Value of the Computer	3.13	.64		

TABLE 23: Relationship Between Grade Level Taught and the Amount of Time Teachers Spend on Instructional Computing

	(N=42)			
	Mean	S	Cov	r
Grade Level Taught	3.98	1.60	2.36	.40
Time on Instructional Computing	4.87	3.70		

Research Question 25

> Is there any relationship between a school's identification as a high or low use school of instructional computers and the percentage of questionnaires returned?

Findings

This question was included in the research design with the expectation that teachers in "high-use" schools would be more involved in the study and would turn in more questionnaires than those in "low-use" schools. However, this notion was flawed because there appears to be more variables than just high or low use in teachers' willingness to fill out and return questionnaires. Other variables include:

(1) The lack of uniform definition of high or low use among districts

(2) The attitude of administrators to the study

(3) The timing of the study

(4) Individual teacher's attitude toward surveys

(5) Individual teacher's schedule at the time of the study

Consequently, return rates did not show any pattern to warrant pursuing this research question further. On the whole, total return rate for high use schools was 74.5 percent and that for low use schools was 79.6 percent. Three principals in each category returned completed questionnaires.

The data gathered suggested an additional question of interest, namely, what is the relationship between teachers' ownership of a personal computer and their use of computers for instruction? To explore this relationship, a chi-square test was performed (see Table 24).

TABLE 24: Chi-Square Test Comparing Teachers' Ownership of a Personal Computer and the Use of Computers for Instruction

	Use	Don't Use	Chi-Sq.	P(Chi-Sq.)
Own	16 (16.6)	7 (6.4)	.11	3.84
Don't Own	38 (37.4)	14 (14.6)		

The .11 chi-square value calculated was not significant at the .05 alpha level, that is, the study found no relationship between teachers' ownership of a personal computer and their use of computers for instruction. A number of reasons would appear to account for this:

1. A teacher may own a personal computer but because of the school schedule or grade level taught, such a teacher may not use computers for instruction
2. A teacher may use computers for instruction but may not consider a computer's utility at home worth the investment
3. If school policy allows teachers to take school computers home, a teacher may consider it unnecessary to buy a personal computer

4. A home computer may have been purchased for a spouse's work and not for its instructional benefits

The implications of these findings for teacher inservice training are discussed in the next chapter of the dissertation.

Summary

This chapter has dealt with the analyses of data that was obtained during the study. There were three sources of the data obtained: interviews with the agencies studied, document search, and questionnaires administered to teachers and principals.

Interview and document search data were synthesized and presented earlier in the chapter, followed by analyses of responses of teachers and principals to questionnaire items. In certain areas data from the three sources were compared. Because of the exploratory nature of the study, summary statistics was the major tool of analysis. Pearson's coefficients of correlation were calculated and a chi-square test done to explore the relationships between a number of variables.

In Chapter V, the findings of the study will be discussed, recommendations made as to how teacher computer inservice training and support services may be better approached, and implications for further study suggested.

CHAPTER V

DISCUSSION OF FINDINGS AND RECOMMENDATIONS

Introduction

The purpose of this study was to determine the types of training and support services provided by selected public education agencies in two Intermediate School Districts of Michigan to elementary classroom teachers in their uses of computers for instruction. A parallel purpose was to determine teachers' perceptions of the effectiveness and adequacy of such training and support services in their instructional uses of computers. It was hoped that the study would lead to the identification of some of the problems which elementary classroom teachers confront in their utilization of computers for instruction, and provide data which could form the basis for recommendations as to how such problems might be addressed.

The study was designed to seek answers to specific questions relating to the philosophies, objectives and programs of the agencies studied in instructional computing. The structural and procedural links between the agencies were also looked into since the agencies form part of public education administration in Michigan. The agencies studied were the State Department of Education, the Regional Educational Media Centers, the Intermediate School Districts, Local Education Agencies and the Technology in

Michigan Education (TIME) centers. Teachers' evaluation of the programs of the various agencies was done by questionnaire and relationships between a number of variables in teachers' responses were also explored.

This chapter of the dissertation is devoted to a discussion of the findings of the study and recommendations as to how training and support services for instructional uses of computers by teachers may be improved. Some problems encountered in the course of the study are presented and suggestions made for further study.

Findings and Recommendations

1. Organization and Coordination

The study found that there is no state-wide policy on exact role of computers in education and so local districts have to grapple with the problems of drawing up policies and objectives for instructional computing on their own.

(a) Discussion

Public education in Michigan is funded largely through local taxes and so it is not surprising that final curriculum decisions are made at the local school district level. This fact is clearly made in Better Education for Michigan Citizens: A Blueprint for Action which is a major document guiding education administration in Michigan today. However, the State Department of Education provides leadership state-wide by carrying out policies and

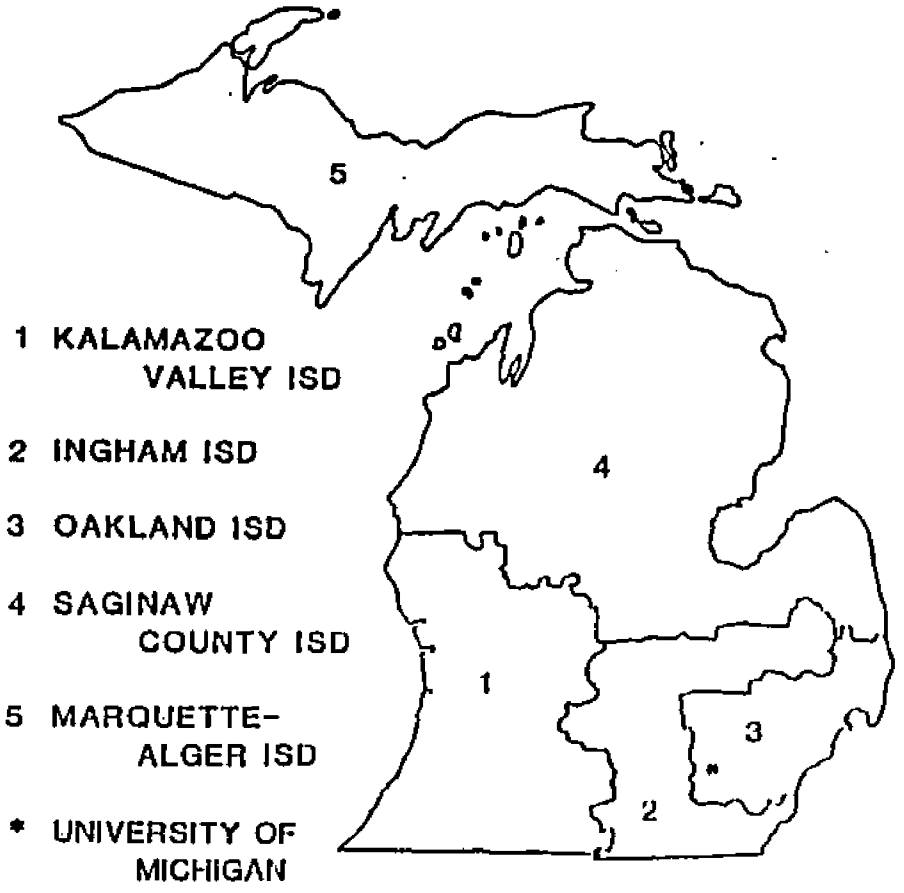
guidelines laid down by the State Board of Education or the legislature. In Blueprint for Action which was approved by the State Board of Education in 1984, the board stated the following intentions about computer technology:

> The State Board of Education, based on the recommendations of the Technology Referent Group, shall:
>
> Acquire existing school district and/or intermediate/Regional Educational Media Centers (REMC) plans in order to develop and provide planning models for school district and intermediate/REMC use.
>
> Develop a statewide human resource bank composed of Department of Education, intermediate/REMC, university and local personnel to serve as resources to local districts, intermediate and REMC districts.
>
> Serve as a resource center for the use of Michigan educators to review and preview instructional software.
>
> Define minimum competencies for those students who choose employment in the field of technology for computer awareness, and for high school completion.
>
> Set standards for the certification of teachers of computer literacy and computer science, as well as standards for certification of all teachers in the use of computers.
>
> Provide access to training for teachers in classroom application of computer technology, as well as access to training for administrators in educational management applications.
>
> Evaluate the levels of computer literacy within the state.
>
> Recommend to the Governor and Legislature a proposal for funding computer software, training, and equipment (p. 13).

The study found that approaches to instructional computing at the local district level vary widely. Obvious reasons for this include the availability of funds and the willingness of local officials to invest limited resources in instructional computing. For example, while one of the districts studied has a full-time coordinator, one district cannot afford one while another is stretching out the duties of the district data processing specialist to include coordination of its instructional computing program. The importance attached to computer technology in the United States and the need for homogeneity of approaches in the state call for state support of local efforts. Officials at state and local levels see the need for state-level action. The statements by the State Board of Education are also indicative of the realization of the need for state-level action. But the statements above call for a definitive state policy on what the role of computers should be in education which does not exist at the moment. The Technology in Michigan Education (TIME) project is a direct reponse to part of the board's intentions. There are five centers of TIME covering the entire state which have the responsibility for training teachers in instructional uses of computers, and software evaluation. The Training Modules for Trainers (TMT) project at the University of Michigan prepares trainer-training modules and trains trainers for all of the five TIME regions. At the time of the study, the TIME

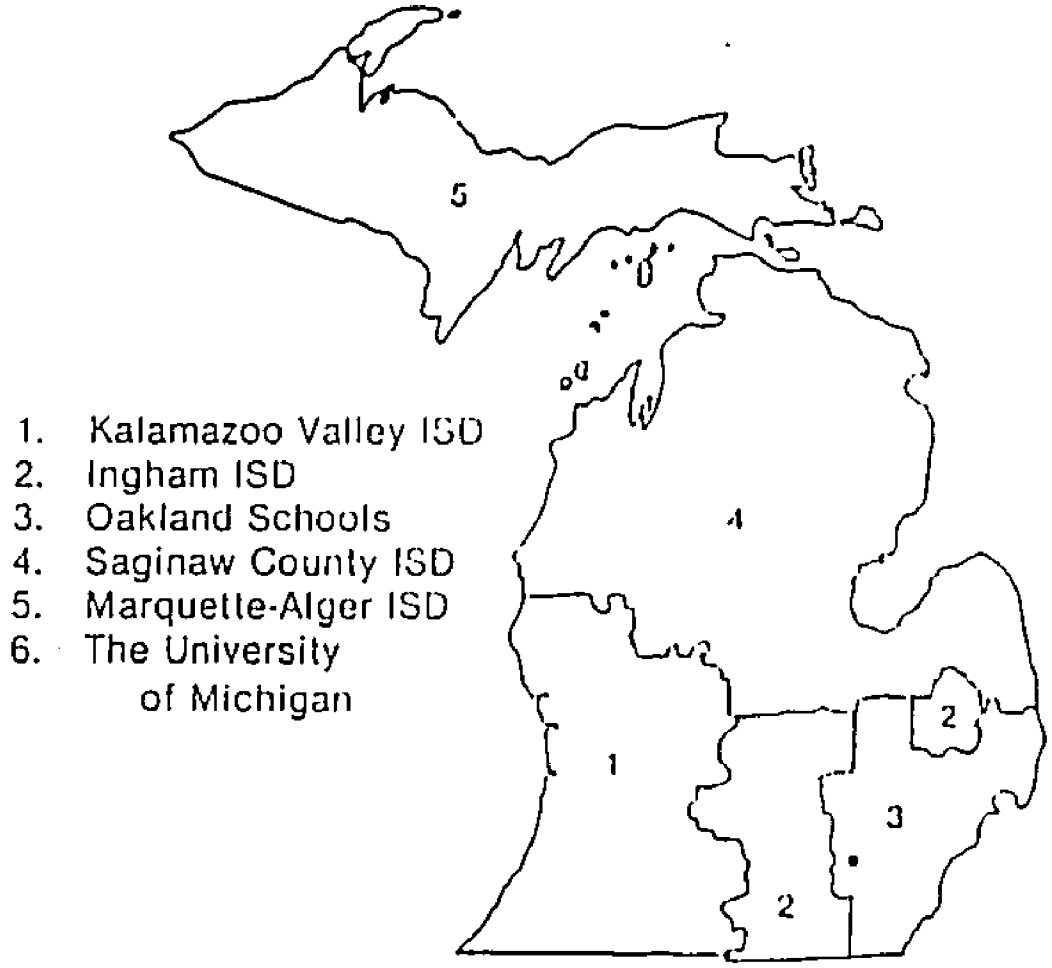
project was in its second year and many of the TIME centers had done considerable work in software evaluation while TMT had developed 14 training modules and claims to have surpassed its target of training 50 trainers by 400 percent. In spite of these seeming gains, the study found that these efforts have not been translated into effective teacher training in instructional computing. The TIME project in the area studied appears to be hampered by the following problems:

1. Each of the TIME regions covers a vast geographic area and officials are not even agreed on the boundaries of some of the regions nor to which region some counties belong (see Figures 3 and 4). With this state of affairs, the effectiveness of the TIME centers is very doubtful. This is evident in the fact that of the 58 teachers who responded to how they were introduced to instructional computing (Research Question 9), none of them reported a TIME center as a source; on the effectiveness of the inservice programs of the various agencies (Research Question 11(a)), only one teacher reported a TIME center as a source, and rated its training program as of little or no value. Again, in teachers' assessment of the effectiveness of the support services they receive from the agencies, only 6 teachers reported TIME centers and they all rated TIME support services as of little or no value. All principals rated TIME center training as of little or no value.



SOURCE: Oakland Intermediate School District

FIGURE 3: Regional Software Evaluation/Training (TIME) Centers



SOURCE: MicroLines, Vol 1, No 2, West Michigan TIME Region

FIGURE 4: Regional Software Evaluation/Training (TIME) Centers

2. Local districts do not appear to benefit from the work of the TIME centers. Although TMT claims to have exceeded its mandate by training a total of 200 instead of 50 trainers, the study found the following reasons for the apparent ineffectiveness of the TIME centers: (a) Most trainers are also full-time classroom teachers and so there is a limit to the amount of time they can devote to teacher computer training; (b) Officials at TMT stated that 60 percent of such trainers have moved to other jobs as computer coordinators or technical directors; (c) Trainers are trained for each of the five TIME regions which means they have vast areas to operate in; (d) Apart from the University of Michigan, no other university in the state is directly involved in the TIME project.

(b) Recommendations

Every good teaching/learning program must begin with a philosophy or clear goals eventually to be achieved by the learner. Brandt and Tyler (1983) maintain that such goals become more and more specific as they move from the system level (e.g. the State Department of Education) to instructional goals or objectives at the classroom level. With rather vague statements such as those by the State Board of Education cited at page 69 of this dissertation, it is difficult for the districts to determine common

competencies and training for teachers in the instructional uses of computers.

There is a real and urgent need for a well-coordinated and concerted effort on teacher training in instructional computing at the state level. A well-articulated state philosophy and policy on computers in education which would form the basis for local district objectives for student outcome and teacher training is overdue. For example, what skills are expected of students at the elementary level? What competencies are expected of teachers to teach such skills? What applications of computers are expected in different subject areas? These are matters that need to be resolved at the state level.

A structural re-organization appears to be necesary. Although educational officials at all levels are aware of the great need to train teachers in the use of computers in instruction, and although efforts are being made by the various agencies studied to meet this need, their activities are, at best, poorly coordinated. The lines of communication and coordination between the State Department of Education, the TIME centers, the Intermediate School Districts, the Regional Educational Media Centers and the local school districts are highly informal and tenuous with regard to instructional computing. This is partly responsible for the replication of efforts in training and providing support for teachers in the classroom uses of computers. Whereas it

could be argued that large consortia such as the TIME regions with specific curriculum areas are cost-effective for software evaluation, the sheer sizes of the regions and the large population some of the TIME regions have to service makes them ineffective agencies for teacher training. Now that the groundwork of software evaluation has been done, it would be more efficient if activities of the TIME regions were transferred to an educational technology unit at the Intermediate School Districts. It is evident that over the years, local school districts, Intermediate School Districts and the Regional Educational Media Centers have forged a dependable communication network which instructional computing can use. A reorganization will reduce replication and encourage specialization by the agencies. For example, the Regional Educational Media Centers are ideal centers for the collection and dissemination of educational materials for local school districts. The REMCs presently perform such functions in providing local schools with video and audio materials. Such functions can be extended to computer software and other support materials.

The 14 training modules now produced by the TMT project at the University of Michigan were designed for trainers who are expected to train other trainers and teachers. Consequently, the modules provide a general overview of some of the major issues in educational computer training (see

Appendix Q). The next logical step would be to develop more specific modules for specific applications like the Minnesota Educational Computing Consortium (MECC) modules.

It has been suggested by numerous authorities that university courses in educational computing are not relevant to teachers' classroom needs (U.S. 96th Congress House of Representatives Subcommittee on Science, Research and Technology, 1979; Bork, 1982). For this reason alone, there is a great need for other universities in the state to be involved with the TIME project, especially in the development of training modules. This would logically have the desired effect of encouraging universities to adapt their own teacher preparation programs to include the actual computer needs of teachers when they eventually go to work in the classroom. The involvement of other universities will also enrich the quality of instructional computer training by pooling the talent and viewpoints of experts in instructional computing. The State of Pennsylvania has tried this approach and it has been found to be quite successful (Interview with TMT officials, August, 1986).

2. Computer Coordinators and Committees

The position and qualifications of district computer coordinators are essential to an effective instructional computing program.

(a) Discussion

The study made the following findings at the local level:

Generally, computer coordinators at the local district level are important to teacher computer inservice training and the quality of support services teachers receive. The study also found that computer coordinators are more effective if (1) they are, or have been, classroom teachers and (2) they are knowledgeable or interested in instructional computing. In the latter condition the word "instructional" is very important; in one of the districts selected for the study, the person who is charged with coordinating instructional computing is a very qualified computer analyst and programmer. However, he is also very skeptical about the value of computers as tools of instruction at the elementary and secondary school levels. This official was very defensive in justifying the fact that little was happening in his district in instructional computing as compared with a less affluent neighboring district. In another small rural district, although the computer coordinator had worked as a computer analyst, he had also been a high school teacher and has set up one of the most enviable instructional computer programs in the districts studied. In yet another district where the coordinator has no "computer science" background but has interest in instructional computing, and is also a classroom

teacher, he was found to be very effective. This seems to suggest that a teaching background may be important to the effectiveness of an instructional computer coordinator.

One district had no computer coordinator but the Assistant Superintendent for Curriculum and Personnel was overseeing instructional computing with the hope of hiring one part-time coordinator during the 1986-87 school year. This is an indication of the realization of the important role of the computer coordinator in instructional computing. Of the teachers surveyed, 72.4 percent made peer coaching a second choice when asked to suggest ways to gain more competence in instructional computing (Table 9). The study also found that communication is greatly enhanced in districts which use key teachers as building contacts.

(b) Recommendations

Ideally, every school district should have one full-time instructional computer coordinator. Smaller or less affluent districts could have one part-time coordinator with assistance from the Intermediate School District. One district studied had two part-time coordinators -- one for elementary and one for secondary grades. This appears to be a good practical approach especially as the two coordinators are also classroom teachers. From the discussion above, what appears to be critical is that an instructional computer coordinator should have a teaching background as this

enables him or her to appreciate the needs of teachers and to understand their problems. Whatever the arrangement, it appears advisable to have one instructional committee for the elementary level and another for the secondary level as the goals of the two levels in instructional computing are likely to be different. It is advisable to have teachers as members of instructional computer committees and as trainers as this promotes a sense of involvement among teachers. It is also suggested that every building should have a "contact-teacher" through whom information can be relayed between the computer committee and teachers in the building.

Local district computer coordinators should be members of the Intermediate School District's advisory board or committee so that they can bring their problems to, and seek assistance from the ISD.

3.Gearing Training Toward Needs

There is evidence that training is not adequately related to teacher needs.

(a) Discussion

The study found a disparity between the types of training provided by local districts and the types of training teachers feel they need for classroom uses of computers (Research Questions 10 and 13). For example, while programming ranked 3rd in the type of inservice training provided by local districts, it ranked 6th as a first choice

among teachers (Tables 11 and 12). Again, while three of the four districts provide training in BASIC and Logo languages (Table 11), no teacher reported using BASIC for instruction. Those who teach any language at the elementary school level teach Logo (Table 15.1). Similarly, while problem solving ranked 2nd among teachers and principals as an activity for which teachers use computers, it ranked 6th among district policy makers on instructional computing; only two of the the four districts reported that teachers use computers for this purpose. While teachers and district officials reported that the most common language used in instruction is Logo, principals reported Logo and BASIC (Tables 15.1, 15.2 and 15.3). Again, while three of the four districts and four of the six principals reported the use of computers for word processing and simulation by classroom teachers, only 24.1 percent and 16.7 percent of teachers respectively claim they use them for these purposes.

The study found that in general instructional computing is limited to grade levels 3 through 6. A positive correlation of .40 ($p < .05$) was also found between grade level taught and the amount of time teachers use computers for instruction (Research Question 24); a correlation of .30 ($p < .05$) was also found between the amount of inservice training received and the amount of time teachers use computers for instruction (Research Question 16). However, the low correlations are of practical significance and may

be explained by other findings: The study found that not all teachers who have received inservice training use computers for instruction. At the same time, 24.1 percent of teachers who indicated willingness to use computers more for instruction gave the reason for not doing so as insufficient training (see Table 9). These findings indicate that teachers who need training are not getting enough of it while some teachers who do not teach with computers are receiving training.

(b) Recommendations

If teachers are to be motivated to use computers for instruction, the training they receive must be relevant to their use of computers in the classroom. Therefore, district policy-makers, principals and classroom teachers need to identify and agree on a prioritization of the needs of teachers in the classroom uses of computers in order to direct training to meet those needs. Another way in which teachers' interest may be sustained in the instructional uses of computers is to build into inservice training programs skills which will be beneficial to the teacher's instructional duties and to him or her personally. For example, word processing is a skill which teachers can use both for direct instruction of students and for instruction-related chores such as preparing lesson plans,

tests, classroom materials and records, or for correspondence.

Whereas it is advisable in the long term to train all teachers in the uses of computers for instruction, in the short term inservice training efforts should be directed at those teachers who actually have to use the technology for instruction. Apart from a computer language such as Logo which has the ability to generate interest in younger children and has value for exploring geometry and problem solving, it is doubtful if adeptness in a language such as BASIC or Pascal is essential to the instructional uses of computers by elementary classroom teachers.

4. Teacher Involvement

Teachers feel left out of the decision-making process in instructional computing and in planning inservice training.

(a) Discussion

In the theoretical framework portion of this dissertation, some factors which may induce resistance to innovation were discussed. These include: lack of communication resulting in the feeling on the part of teachers that their ideas are not important; ignorance or lack of interest in new ideas by principals; lack of continuing education programs for teachers; fear of evaluation on the part of teachers; need for new skills or

extra effort by teachers without compensatory arrangements such as substitute teachers; and the sheer fear of technology by some teachers.

The study found that 63 percent of teachers feel left out in the planning of inservice training (Table 7.1). This is strongly confirmed by Table 7.2 where teachers' overwhelming preference for inservice scheduling appears not to have been taken into serious consideration by local computer training agencies.

While about 59 percent of the teachers surveyed indicated willingness to use computers for instruction more often if they had the choice, the two major constraints expressed were that there are too few computers (48.1%) and that there are too many other things for teachers to do in school (40.7%) (Table 9). The second constraint indicates that teachers view computer instruction as an add-on subject to those they already teach. One major source of the add-on feeling may be in the inservice training strategy itself. The "comprehensive" approach which insists that a "computer literate" person must know everything about computers from their history, technical details, operation, digital and analog number systems, social implications and ethics, to how to program computers, has the potential for creating this type of feeling. Recounting their experience in Ireland, Brendan Mackey (1987) wrote:

> First was the most fundamental error of all -- one of strategy. In introducing the technology to our teachers, and in their introducing it to their students, we started with a study of the technology itself (computer familiarization, number systems, logic circuits, programming, etc.) and, almost as an after-thought (or, perhaps, after we had lost a lot of teachers) we then introduced applications which we felt would be relevant (p. 74).

This is an experience that teacher computer trainers should ponder seriously.

(b) Recommendations

The issue raised by teachers that there are too few computers is highly dependent on funds available, and so it will continue to be a problem in the foreseeable future. However, for cost-effectiveness, the computer lab/network used by most schools studied appears to be advisable for instructional computing at the elementary level.

Change theorists such as Rogers (1962), Rogers and Shoemaker (1971), Pilon and Bergquist (1979), Zaltman and Duncan (1977), Havelock (1973), Zaltman et al. (1972), and Morton and Morton (1974) all stress the need for the involvement of the change target in the change process. While it might be argued whether it is necessary to involve teachers in matters such as hardware purchase, their involvement in matters such as the scheduling of inservice is crucial to the success of the program. Evidently, teachers would prefer to participate in inservice training scheduled during their working hours than in schedules which

call for sacrifice of their non-classroom time or schedules which encroach on their holiday plans. The latter types of schedules reinforce the "add-on" feeling which teachers have about computer instruction. To further minimize the "add-on" effect, the goal of teacher training programs should be to integrate computer instruction into the existing curiculum. For example, units on history and ethics of computers can be effectively taught as part of social studies where concepts such as the development of technology and issues relating to the uses of technology are, or should be, part of the curriculum. Word processing can be part of a language curriculum and database usage can be integrated into several curricular areas particularly science and social studies. Emphasis of teacher training programs should be to enable the teacher to view the computer as a tool of instruction in a variety of subject areas because, as Zamora (1983) has put it, "we don't use the computer; we make use of it through its applications" (p. 8).

5. Support Services

Teachers need a variety of services and support materials from local and other agencies in their instructional uses of computers.

(a) Discussion

Teacher training apart, there are essential services which teachers require from their local districts and

Intermediate School Districts in their instructional uses of computers. For example, the study found that Intermediate School Districts, Regional Educational Media Centers and local school districts make hardware and software purchase arrangements with computer vendors on behalf of schools. Mention has also been made of software evaluation which the TIME centers, Intermediate School Districts and local school districts do to assist teachers.

The ISDs studied and their specialized departments issue newsletters and manuals on specific software packages for teachers. One of the local school districts studied maintains its own collection of journals and books on instructional computing for teachers' use, while two districts publish local newsletters. One of the local districts also writes and distributes idea sheets, worksheets, and instructional manuals to classroom teachers. The study also found that 55.2 percent of teachers find such materials useful in their instructional uses of computers. However, not all local ditricts provide such materials to classroom teachers.

The issue of access to school computers by teachers outside school hours has been raised by experts like Komoski et al. (1986). Whereas most school districts and buildings studied allow teachers to take school computers home, not all have this policy. Consequently, for a good part of the year such as in the evenings and during

holidays, school computers sit unused in school closets and computer labs. The problem of security which goes with open access to school computers is a major concern of some administrators but Komoski et al. maintain that free access actually has the effect of making people take ownership of, and responsibility for, school computers.

Komoski et al. (1986) and Dunnaway (1985) have also suggested the need to involve parents and local businesses in the computer programs of schools. For example, Dunnaway suggests that schools could help parents select software which support the school's learning programs for the uses of their children on their home computers. He also feels that computer manufacturers would be willing to organize orientation sessions for teachers of schools which purchase their products. This study found one school district where parents are gainfully used as volunteer computer aides but community involvement does not generally go beyond financial assistance by Parent-Teacher associations in computer purchase. The study did not find any partnership between local businesses or computer manufacturers or vendors beyond purchase arrangements between them and some of the educational agencies.

(b) Recommendations

For budgetary reasons, local school districts will continue to have final decisions in matters such as hardware

purchase but the suggested educational technology units of the ISDs could continue to assist smaller and less affluent districts through advice and purchasing arrangements with hardware and software companies. Since the number of software programs for educational applications is growing, software evaluation should be centralized state-wide by pooling together software evaluations such as those done by the TIME centers in an easy-to-use reference like the California matrix.

The publication of newsletters, idea sheets, worksheets and instructional manuals and their distribution to teachers should be encouraged. While some districts may not be able to afford such publications, the ISDs and REMCs could be funded to assist such districts.

A policy of open access does not automatically guarantee that teachers will make more use of school computers; two of the schools studied have such a policy but no teacher in those schools had borrowed a school computer in the six months preceding the study. However,a combination of inducements such as training in word processing skills may attract teachers, thereby making them more comfortable with the technology through unthreatening personal hands-on experience.

The successful use of parents as computer aides in one of the districts studied makes it an attractive option for districts with limited funds. Furthermore, although equity

of access to computers is not a direct concern of this study, parent involvement may provide access to parents who may not be able to afford their own home computers. However, no general model is being proposed here for all schools and local districts; the logistics for such a program will have to be determined by local situations.

Computer companies have been known to donate hardware, software, and staff time, and to give special purchasing concessions to educators. Districts should take advantage of such arrangements. Also, the fact that schools eventually prepare students for industry and business makes this investigator feel that it should not be impossible to obtain the support of major local businesses in the computer programs of schools. Training in the uses of computers has direct benefit for local employers.

In summary, this study found a great need for a state-wide policy on instructional computing which would guide school districts in planning their teacher inservice programs. It is also felt that the TIME regions as presently constituted are too large for local districts to benefit from their training efforts. It is suggested that the training programs of the regions be transferred to specialized units at the ISDs.

The position of a coordinator for instructional computing is important at the local district level and it is recommended that every school district should have at least

one part-time coordinator. It is also recommended that computer coordinators should have a teaching background as this is crucial to their understanding of teachers' problems.

Teacher inservice training should be directed toward the instructional needs of teachers. While in the long term training should be provided for all teachers, it is suggested that in the short term, such training should be directed at teachers who actually need to use computers for instruction. It is highly recommended that teachers be fully involved in matters such as scheduling inservice training and that local districts and the ISDs provide classroom teachers with support in software evaluation, newsletters, idea sheets, worksheets and so forth for their instructional uses of computers. The cooperation between computer companies and local businesses and the instructional computer programs of schools is also suggested as a possible option.

Problems Encountered During the Study

A number of problems were encountered in the course of this study. Many of these were related to doing research with schools. Some of these are presented here with the hope that they will serve to help other researchers in avoiding similar problems.

One of the issues to think about in doing research with schools is the proximity of such schools or school districts to universities and other research institutions. Whereas close proximity may appear to be an advantage in the sense that such schools or districts may have been exposed to research from the universities or institutions, it may also constitute a major obstacle. Researchers and students from the universities inundate the local schools with so many research projects that school administrators devise ways of turning away as many research projects as they can. For example, while it was relatively easy to obtain the cooperation of administrators in many school districts away from large institutions, the Lansing School District which is close to MSU had a lengthy and bureaucratic process for evaluating every research proposal. In spite of the efforts put into meeting the district's requirements, participation in the study was refused because district administrators explained that district schools had been over-surveyed during the school year (Appendix O).

It is also important to note that administrators vary widely in their accessibility and their attitudes toward certain research projects. For instance, in some districts some administrators saw this research as an evaluation of their computer programs. While some administrators felt comfortable with the project after an initial discussion, some were very defensive and, in one district, a coordinator

acting as a gatekeeper frustrated the study. A way around this type of problem is to have a good lead-in time to discuss the study even before the writing of the research proposal is completed.

Timing is vital in planning a study involving schools. Although contacts for this study were begun in the Fall of 1985, the study itself did not begin until May, 1986. This is a particularly bad time of the year to do research in schools because it is the end of the school year when teachers and administrators are involved with testing, grading, filling out report cards, graduation and a host of other year-end activities. It appears that it is best to conduct a study involving schools between late Fall and early Spring.

Suggestions for Further Study

This study has examined the teacher inservice computer training programs and support services offered by selected public education agencies to elementary classroom teachers in two Intermediate School Districts in Michigan. A logical follow-up is a replication of this study in other Michigan ISDs. The findings of the study suggest the following as possible areas for further study:

1. Coordination between elementary and secondary school instructional computer programs and the implications thereof for teacher training

2. Individual teachers' approaches to integrating computers into the curriculum aimed at developing a possible model for computer integration

3. Software evaluation models and their practical values for classroom uses

4. The TMT Modules and how they may be adapted for specific training situations in schools.

A P P E N D I C E S

A P P E N D I X A

INTERVIEW SCHEDULE:
MICHIGAN STATE DEPARTMENT OF EDUCATION

A STUDY INTO TEACHER INSERVICE COMPUTER TRAINING PROGRAMS AND SUPPORT SERVICES

Interview Schedule

1. State Department of Education (SDE)

2. Organizational chart of the SDE

3. Organizational chart showing lines of relationship between the SDE, State Board of Education, the IDS's, the REMC's, Computer Training Centers and Local Districts.

4. Who is reponsible for instructional computer-related matters?

5. How are responsibilities for teacher computer inservice and support services shared between these agencies?

6. Are there Advisory Committees which include classroom teachers and administrators?

7. State Policies/Guidelines on instructional computing
   a. Philosophy
   b. Goals and Objectives
   c. Scope and Sequence
   d. Any congress-mandated policies?

8. What does SDE feel its primary functions and responsibilities relating to teacher computer training and support services are?

9. Does SDE have any policy on the following?:
   a. Hardware purchase
   b. Software purchase
   c. Computer competency for teachers
   d. Computer competency for students
   e. Equity issues (e.g. urban vs. rural, SES differences)

10. How does SDE translate legislative guidelines, recommendations, mandates, resolutions, etc., into action at the local level?

11. What is the history of the SDE in instructional computer training?

12. What support materials are provided by the SDE relating to instructional computing?

13. Future plans

14. Questions arising from interview

A P P E N D I X B

INTERVIEW SCHEDULE:
INTERMEDIATE SCHOOL DISTRICTS

A STUDY INTO TEACHER INSERVICE COMPUTER TRAINING PROGRAMS AND SUPPORT SERVICES

Interview Schedule

1. ISD

2. Number of school districts

3. Structural relationship between ISD, REMC, Training Center and districts

4. Role of ISD vis-a-vis school districts in curriculum matters

5. Role of ISD vis-a-vis districts in matters relating to instructional computing:
   a. Hardware/Software purchase
   b. Type of computers recommended/mandated
   c. Software evaluation and purchase
   d. Purchase arrangement with company/distributor
      i. hardware
      ii. software
   e. Drawing up objectives for teacher training
   f. Deciding on support services

6. ISD policy on instructional computing
   a. Philosophy
   b. Goals and Objectives
   c. Scope and Sequence
   d. Computer Committee
      i. membership
      ii. responsibilities
   e. Any Computer Coordinator or Department?
   f. How ISD perceives its role in teacher training

7. How is coordination between ISD and districts achieved?

8. Any ISD policy on who should be responsible for computer instruction in schools?
   a. Classroom teacher?
   b. Computer aide?
   c. Computer teacher?
   d. Other (specify)

9. ISD history in computer inservice training
   a. Date of earliest inservice
   b. Type of first inservice
   c. Type of computers initially used for teacher inservice

d. Source of funding for teacher training/inservice
   i. federal grant
   ii. state grant
   iii. corporate grant
   iv. locally generated funds
   v. other

10. Types of inservice training
    a. Introduction to Computers
    b. Programming (languages used)
    c. Introduction to Software
    d. Software Evaluation
    e. Word Processing
    f. Record Keeping
    g. Database Usage
    h. Classroom Management
    i. Content Area Applications
    j. Integration into Curriculum
    k. Social Implications and Ethics
    l. Other (specify)

11. Which of the following strategies are used for teacher inservice training?
    a. After school workshops
    b. Evening workshops
    c. Summer workshops
    d. Saturday workshops
    e. College course
    f. Other (specify)

12. Who initiates ISD workshops?

13. What options are used for ISD training sessions? (e.g. held at the ISD, district level, building)

14. Support materials provided by ISD
    a. Does ISD maintain a collection of journals and/or books relating to instructional computing?
    b. Does ISD publish any newsletter relating to instructional computing?
    c. Does ISD distribute any instructional units, idea sheets, lessons, etc., relating to instructional computing?

15. What are the ISD's perceptions about:
    a. Successes in teacher computer training
    b. Problems relating to teacher computer training

16. Future plans

17. Questions arising from interview

A P P E N D I X C

INTERVIEW SCHEDULE:
REGIONAL EDUCATIONAL MEDIA CENTERS

A STUDY INTO TEACHER INSERVICE COMPUTER TRAINING PROGRAMS AND SUPPORT SERVICES

Interview Schedule

1. REMC

2. Number of Counties

3. Structural relationship between REMC, ISD, Training Centers and Local Districts

4. Role of REMC vis-a-vis school districts in curriculum matters

5. Role of REMC vis-a-vis districts in matters relating to instructional computing:
   a. Hardware/software purchase
   b. Type of computers recommended/mandated
   c. Software evaluation
   d. Purchase arrangement with company/distributor
      i. Hardware
      ii. Software
   e. Drawing up objectives for teacher training
   f. Deciding on support services

6. REMC policy on instructional computing
   a. Philosophy
   b. Goals and Objectives
   c. Scope and Sequence
   d. Computer Committee
      i. membership
      ii. responsibilities
   e. Any Computer Coordinator or Department?
   f. How REMC perceives its role in teacher training

7. How is coordination between REMC and districts achieved?

8. Any REMC policy on who should be responsible for computer instruction in schools?
   a. Classroom teacher
   b. Computer aide
   c. Computer teacher
   d. Other (specify)

9. REMC history in computer inservice training
   a. Date of earliest inservice

b. Type of first inservice
c. Type of computers initially used for teacher training

10. Types of inservice training
    a. Introduction to Computers
    b. Programming (languages used)
    c. Introduction to Software
    d. Software Evaluation
    e. Word Processing
    f. Record Keeping
    g. Database Usage
    h. Classroom Management
    i. Content Area Applications
    j. Integration into Curriculum
    k. Social Implications and Ethics
    l. Other (specify)

11. Which of the following strategies are used for teacher inservice training?
    a. After school workshops
    b. Evening workshops
    c. Summer Workshops
    d. Saturday workshops
    e. College course
    f. Other (specify)

12. Who initiates REMC workshops?

13. What options are used for REMC training sessions? (e.g. held at REMC, district level, individual building)

14. Support materials provided by REMC
    a. Does REMC maintain a collection of journals and/or books relating to instructional computing?
    b. Does REMC publish any newsletter relating to instructional computing?
    c. Does REMC distribute any instructional units, idea sheets, lessons, etc., relating to instructional computing?

15. What are the REMC's perceptions about:
    a. Successes in teacher computer training?
    b. Problems relating to teacher computer training?

16. Future plans

17. Questions arising from interview

A P P E N D I X D

INTERVIEW SCHEDULE:
SOFTWARE EVALUATION/TRAINING (TIME) CENTERS

A STUDY INTO TEACHER INSERVICE COMPUTER TRAINING PROGRAMS AND SUPPORT SERVICES

Interview Schedule

1. TIME CENTERS

2. Number of Counties

3. Structural relationship between Training Centers, REMC, ISD, and Local Districts

4. Role of Center vis-a-vis school districts in curriculum matters

5. Role of Center vis-a-vis districts in matters relating to instructional computing:
   a. Hardware/Software purchase
   b. Type of computers recommended/mandated
   c. Software evaluation
   d. Purchase arrangement with company/distributor
      i. Hardware
      ii. Software
   e. Drawing up objectives for teacher training
   f. Deciding on support services

6. Center's policy on instructional computing
   a. Philosophy
   b. Goals and Objectives
   c. Scope and Sequence
   d. Computer Committee/Board
      i. membership
      ii. responsibilities
   e. How Center perceives its role in teacher training

7. How is coordination between Center and districts achieved?

8. How is Center funded?

9. Types of inservice training
   a. Introduction to Computers
   b. Programming (languages used)
   c. Introduction to Software
   d. Software Evaluation
   e. Word Processing
   f. Record Keeping

g. Database Usage
h. Classroom Management
i. Content Area Applications
j. Integration into Curriculum
k. Social Implications and Ethics
l. Other (specify)

10. Which of the following strategies are used for teacher inservice training?
    a. After school workshops
    b. Evening workshops
    c. Summer workshops
    d. Saturday workshops
    e. College course
    f. Other (specify)

11. Who initiates Center workshops?

12. Support materials provided by Center
    a. Does Center maintain a collection of journals and/or books relating to instructional computing?
    b. Does Center publish any newsletter relating to instructional computing?
    c. Does Center distribute any instructional units, idea sheets, lessons, etc., relating to instructional computing?

13. What are the Center's perceptions about:
    a. Successes in teacher computer training?
    b. Problems relating to teacher computer training?

14. Future plans

15. Questions arising from interview

A P P E N D I X E

INTERVIEW SCHEDULE:
TRAINING MODULES FOR TRAINERS (TMT)

A STUDY INTO TEACHER INSERVICE COMPUTER TRAINING PROGRAMS AND SUPPORT SERVICES

Interview Schedule

1. Training Modules for Trainers

2. What is the TMT project?
   a. How and when it started
   b. Purpose

3. Relationship between TMT and other TIME regions
   a. What training does TMT offer teachers?
   b. Any direct support services to classroom teachers?

4. Sources of funding

5. How are objectives and content chosen for TMT modules?

6. Are modules software specific? If so, what software?

7. What is TMT's connection with the University of Michigan?

8. Are TMT modules used for teaching U of M students?

9. What is TMT's definition of computer literacy?

10. How is programming handled in the modules?

11. How are TMT modules disseminated?

12. What does TMT view as effective teacher training in instructional computing? Any models?

13. Information on Minnesota Educational Computing Consortium, Florida project and others

14. Questions arising from interview

A P P E N D I X F

INTERVIEW SCHEDULE:
LOCAL EDUCATION AGENCIES
(LOCAL SCHOOL DISTRICTS)

A STUDY INTO TEACHER INSERVICE COMPUTER TRAINING PROGRAMS AND SUPPORT SERVICES

Interview Schedule

1. School District

2. Number of Elementary Schools

3. Teacher/Student Ratio

4. Per Pupil Expenditure

5. District Policy on instructional computing
   a. Philosophy
   b. Goals and Objectives (Theoretical Expectations)
   c. Scope and Sequence
   d. Computer Committee
      i. membership
      ii. responsibilities

7. Computer Coordinator
   a. Full time/Part time?
   b. Background

8. Instructional uses of computers
   a. Drill and Practice
   b. Tutorial
   c. Simulation
   d. Database Usage
   e. Problem Solving
   f. Word Processing
   g. Record Keeping
   h. Programming
   i. Other Uses (specify)

9. Who is responsible for computer instruction?
   a. Classroom teacher
   b. Computer aide
   c. Computer teacher
   d. Other (specify)

10. Physical Arrangement
    a. Network/computer lab
    b. Individual classroom
    c. Combination

11. Hardware
    a. Number of computers in District
    b. Breakdown by school
    c. Student/Computer ratio
    d. Purchase policy
    e. Type of computers recommended/mandated by District
    f. Purchase arrangement with company/distributor

12. District history in instructional computing
    a. Mainframe projects
    b. Who initiated introduction of computers?
    c. Date of earliest purchase of microcomputer
    d. Date of first inservice
    e. Who organized first inservice -- ISD? SD? Building?
    f. Type of computers initially used for teacher training
    g. Type of computers now used for teacher training

13. Types of inservice training
    a. Introduction to Computers
    b. Programming (e.g. BASIC)
    c. Introduction to Software
    d. Word Processing
    e. Record Keeping
    f. Database Usage
    g. Classroom Management
    h. Social Implications and Ethics
    i. Other (specify)

14. Which of the following strategies are used for teacher inservice training?
    a. After school workshops
    b. Evening workshops
    c. Summer workshops
    d. Saturday workshops
    e. College course
    f. Release time workshops
    g. Other (specify)

15. Software
    a. Who is responsible for software evaluation and selection?
    b. Any recommended software?
    c. Any mandated software?
    d. District policy on software selection
    e. Does District provide training for specific pieces of software?
    g. Has District developed any model lessons or activities that match software with District objectives?
    h. Do individual schools receive any District funds for software purchase?

16. Support materials provided by District
    a. Does District maintain a collection of journals and/or books relating to instructional computing?
    b. Does District publish any newsletter relating to instructional computing?
    c. Does District distribute any instructional units, idea sheets, worksheets, etc., relating to instructional computing?

17. What are the District's perceptions about:
    a. Successes in instructional computing
    b. Problems relating to instructional computing

18. Future plans

19. Questions arising from interview

A P P E N D I X G

TEACHER QUESTIONNAIRE

A STUDY INTO
TEACHER INSERVICE COMPUTER TRAINING PROGRAMS
AND SUPPORT SERVICES

F. TEACHER

1. Do you use computers for classroom instruction?
   yes_____(go to question 2) no_____ (go to question 9)

2. What is the average amount of time your class spends using computers each week? _____

3. How long have you been using computers for instruction?
   _____

4. If you had the choice, would you spend more time using computers for instruction? yes_____ no_____

5. If YES, which of the following factors prevent(s) you from spending more time in using computers for instruction?

   too few computers_____ lack of software_____
   lack of sufficient training_____ lack of support services_____
   too many other things to do_____ scheduling_____
   other (please specify) _____

6. Who directs the class computer sessions?
   self_____ aide_____ computer teacher_____
   other (please specify) _____

7. For what instructional purposes do you use computers?
   (please check all that apply)

   programming (e.g. Logo)_____ drill and practice_____
   record keeping_____ accessing a database_____
   word processing_____ tutorial_____
   simulation_____ problem solving_____
   other (please specify) _____

8. If you teach programming, what language(s) do you use?
   Logo_____ BASIC_____ other (please specify) _____

9. In general, how would you rate the value of computers for instruction?
   of no value_____ of little value_____
   of moderate value_____ of great value _____

10. Have you had any inservice training in using computers for instruction?
yes_____ (go to 11) no_____ (go to 22)

11. How were you introduced to using computers for instruction?

local district inservice_____ ISD inservice_____
REMC inservice_____ State Training Center_____
formal college course_____ self-taught on home computer___
other (please specify) _____

12. For the following agencies please indicate the amount of time of instructional computer inservice training you have received. (Please write the number of times you received training)

	1/2day	full day	1 week	1 semester/ term
Local District				
ISD				
Regional Media Center				
State Training Center				
College				

13. In general what type of training did you receive from the following agencies? (check all that apply)

	Local District	ISD	REMC	State Training Center	College
Introduction to Computers					
Programming (e.g. BASIC)					
Introduction to Software					
Word Processing					
Record Keeping					
Database Usage					
Classroom Management					
Other (please specify)					

14. If you learned programming at any of the following agencies please indicate the language you were taught.

	Local District	ISD	REMC	State Training Center	College
Logo					
BASIC					
other (please specify)					

15. In general how would you rate the amount of training you received from each of the following agencies?

	not enough	enough	more than enough
Local District			
ISD			
REMC			
State Training Center			
College			

16. In general how would you rate the value of the training you received from each of the following agencies to your classroom work?

	no value	little value	moderate value	great value
Local District				
ISD				
REMC				
State Training Center				
College				

17. In general how would you rate the support you get from the following agencies in your use of computers for instruction?

	no value	little value	moderate value	great value
Local District				
ISD				
REMC				
State Training Center				
College				

18. How would you rate your involvement in planning the introduction of computers in your school?

highly involved_____ moderately involved_____
slightly involved_____ not involved_____

19. Rate your involvement in your school NOW in the following computer-related activities.

	highly involved	moderately involved	slightly involved	not involved
hardware purchase				
software selection				
scheduling				
planning inservice				

20. In which of the following do you think you should be involved? (check all that apply)

hardware purchase_____ software selection_____
scheduling_____ planning inservice_____
other (please specify) _____

21. Besides traditional inservice training, in which of the following ways do you think you could gain more information relating to instructional computing?
(check all that apply)

books about computing_____ journals/magazines_____
newsletters_____ attending conferences_____
membership in computer clubs_____ membership on committees_____
individual time on a computer_____ peer coaching_____
other (please specify) _____

22. Which of the following does your district have relating to the use of computers for instruction?

philosophy____ goals and objectives____
scope and sequence____ suggested activities/lessons____

23. What type of inservice training do you think you would prefer to assist you in instructional uses of computers? (indicate your 1st, 2nd, and 3rd choices)

Introduction to Computers____ Programming (e.g. BASIC)____
Introduction to Software____ Software Evaluation____
Word Processing____ Database Usage____
Classroom Management____ Other (please specify)_____

24. Out of the following possibilities rank your 1st, 2nd and 3rd choice for training:

After school workshops____ Evening workshops____
Summer workshops____ Saturday workshops____
College course____ Release time workshops____
Other (please specify) _____

25. Do you own a personal computer? yes____ no____

26. Do you ever take a school computer home? yes____ no____

27. What grade level do you presently teach? _____

28. How long have you been teaching at the elementary level?

0-5 yrs____ 6-10 yrs____ 11-15 yrs____ 16 yrs or more___

29. If you do not use computers for classroom instruction please list your major reasons for not using them:

_____
_____
_____
_____

A P P E N D I X H

PRINCIPAL QUESTIONNAIRE

A STUDY INTO
TEACHER INSERVICE COMPUTER TRAINING PROGRAMS
AND SUPPORT SERVICES

F. PRINCIPAL

1. What is the average amount of time each grade level spends using computers each week in your school?

kindergarten _____ 1st_____ 2nd_____
3rd_____ 4th_____ 5th_____ 6th_____

2. How long has your building been using computers for instruction? _____

3. If you had the choice, would you like the teachers on your staff to spend more time using computers for instruction?
yes_____ no_____

4. If YES, which of the following factors prevent(s) your staff from spending more time in using computers for instruction?

too few computers_____ lack of software_____
lack of sufficient training_____ lack of support services_____
too many other things to do_____ scheduling_____
other (please specify) _____

5. Who directs the class computer sessions?
classroom teacher_____ aide_____ computer teacher_____
other (please specify) _____

6. For what instructional purposes are computers used in your school? (please check all that apply)

programming (e.g. Logo)_____ drill and practice_____
record keeping_____ accessing a database_____
word processing_____ tutorial_____
simulation_____ problem solving_____
other (please specify) _____

7. If programming is taught, what language(s) are used?
Logo_____ BASIC_____ other (please specify) _____

8. In general, how would you rate the value of computers for instruction?
of no value_____ of little value_____
of moderate value_____ of great value _____

9. How was your staff introduced to using computers for instruction?

local district inservice_____ ISD inservice_____
REMC inservice_____ State Training Center_____
formal college course_____ self-taught on home computer___
other (please specify) _____

10. For the following agencies please indicate the amount of time of instructional computer inservice training your staff has received. (Please write the number of times they received training)

	1/2day	full day	1 week	1 semester/ term
Local District				
ISD				
Regional Media Center				
State Training Center				
College				

11. Which of the following does your district have relating to the use of computers for instruction?

philosophy____ goals and objectives____
scope and sequence____ suggested activities/lessons____

12. In general what type of training did your staff receive from the following agencies? (check all that apply)

	Local District	ISD	REMC	State Training Center	College
Introduction to Computers					
Programming (e.g. BASIC)					
Introduction to Software					
Word Processing					
Record Keeping					
Database Usage					
Classroom Management					
Other (please specify)					

13. If programming was learned at any of the following agencies please indicate the language that was taught.

	Local District	ISD	REMC	State Training Center	College
Logo					
BASIC					
other (please specify)					

14. What type of inservice training would you prefer for your staff in instructional uses of computers?
(indicate your 1st, 2nd, and 3rd choices)

Introduction to Computers____ Programming (e.g. BASIC)____
Introduction to Software____ Software Evaluation____
Word Processing____ Database Usage____
Classroom Management____ Other (please specify)_____

15. In general how would you rate the amount of training your staff received from each of the following agencies?

	not enough	enough	more than enough
Local District			
ISD			
REMC			
State Training Center			
College			

16. In general how would you rate the value of the training your staff received from each of the following agencies?

	no value	little value	moderate value	great value
Local District				
ISD				
REMC				
State Training Center				
College				

17. In general how would your rate the support your staff gets from the following agencies in the use of computers for instruction?

	no value	little value	moderate value	great value
Local District				
ISD				
REMC				
State Training Center				
College				

18. How would you rate the involvement of teachers in planning the introduction of computers in your school?

highly involved_____ moderately involved_____
slightly involved_____ not involved_____

19. Rate the involvement of teachers in your school NOW in the following computer-related activities.

	highly involved	moderately involved	slightly involved	not involved
hardware purchase				
software selection				
scheduling				
planning inservice				

20. In which of the following do you think teachers should be involved? (check all that apply)

hardware purchase_____ software selection_____
scheduling_____ planning inservice_____
other (please specify) _____

21. Besides traditional inservice training, in which of the following ways do you think your staff could gain more information relating to instructional computing? (check all that apply)

books about computing____ Journals/magazines____
newsletters____ attending conferences____
membership in computer clubs____ membership on committees____
individual time on a computer____ peer coaching____
other (please specify) _____

22. Out of the following possibilities rank your 1st, 2nd and 3rd choice for training for your staff:

After school workshops____ Evening workshops____
Summer workshops____ Saturday workshops____
College course____ Release time workshops____
Other (please specify) _____

23. Are teachers allowed to take school computers home?
yes____ no____

24. If yes, in the last 6 months how many individual teachers on your staff have taken a school computer home at least once? _____

25. How long have your been an administator at your present school? _____

26. How long have you been an administrator at the elementary level?

0-5 yrs____ 6-10 yrs____ 11-15 yrs____ 16 yrs or more___

A P P E N D I X I

INVESTIGATOR'S LETTER TO MICHIGAN STATE UNIVERSITY COMMITTEE ON RESEARCH INVOLVING HUMAN SUBJECTS

723 S. Francis Ave.
Lansing, Mich. 48912

May 15, 1986

Chairman
UCRIHS
238 Administration Building
Michigan State University
East Lansing, Mich. 48824

Dear Sir,

I am applying for "expedited" review of my doctoral dissertation research proposal entitled "The Effectiveness of Teacher Inservice Computer Training Programs and Support Services: A Study of the Role of Selected Educational Agencies in two Michigan Intermediate School Districts."

1. BRIEF ABSTRACT

The research will involve the study of policies, guidelines, goals and objectives of teacher invservice training programs and the support services provided by the agencies outlined in the Research Design portion of the proposal which is enclosed. Teachers and principals' perceptions of the adequacy, value and effectiveness of the inservice training and support they receive from the selected agencies will also be studied.

For the purpose of the study, face-to-face interviews will be conducted with selected top officials of the agencies responsible for computer usage in instruction in elementary schools. Documents stating policies and guidelines will also be requested and studied (please see Document Search/ Interview Schedules enclosed).

At each of the local school districts, two elementary schools will be studied through the administration of survey questionnaires to teachers and principals. Teachers' and principals' questionnaires will deal with similar information but adapted to suit each category (see Principal and Teacher questionnaires enclosed). To insure anonymity, questionnaires will be sent in bulk to the schools through the local school administration but will be returned individually by the subjects to the investigator in a stamped self-addressed envelope. Responses will be aggregated so that no individual's responses will be identifiable.

Written consent for the study has been obtained from the State Department of Education while verbal consent and cooperation is being obtained from Directors of Elementary Education/Curriculum Directors and the Computer Coordinators at the district level. In addition, each questionnaire will include an introductory letter stating the aim of the study.

It is hoped that the study will identify some of the problems confronting the elementary classroom teacher in computer utilization for instruction and elicit data which will yield suggestions as to how these problems may be ameliorated.

2. EXEMPTION FROM FULL COMMITTEE REVIEW AND EXPEDITED REVIEW

The proposed research falls under categories 1A, 1C, 1E, 2C, 2H, and 2I of University Committee on Research Involving Human Subjects guidelines.

I would appreciate an early review so as to enable me to start the research immediately.

Thank you.

Yours sincerely

Paul Kofi Egbo

(Student No. 0836766)
(Phone No. 372-2741)

A P P E N D I X J

LETTER OF APPROVAL FROM MICHIGAN STATE UNIVERSITY COMMITTEE ON RESEARCH INVOLVING HUMAN SUBJECTS

MICHIGAN STATE UNIVERSITY

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING
HUMAN SUBJECTS (UCRIHS)
238 ADMINISTRATION BUILDING
(517) 355-2186

EAST LANSING • MICHIGAN • 48824-1046

May 23, 1986

Mr. Paul Kofi Egbo
723 S. Francis Avenue
Lansing, Michigan 48912

Dear Mr. Egbo:

Subject: Proposal Entitled, "The Effectiveness of Teacher Inservice Computer Training Programs and Support Services: A Study of the Role of Selected Educational Agencies in Two Michigan Intermediate School Districts"

I am pleased to advise that because of the nature of the proposed research, it was eligible for expedited review. This process has been completed, the rights and welfare of the human subjects appear to be adequately protected, and your project is therefore approved.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval prior to May 23, 1987.

Any changes in procedures involving human subjects must be reviewed by the UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to our attention. If we can be of any future help, please do not hesitate to let us know.

Sincerely,

Henry E. Bredeck
Chairman, UCRIHS

HEB/jms

cc: Dr. Erling Jorgensen

A P P E N D I X K

INVESTIGATOR'S LETTERS TO PRINCIPALS

723 S. Francis Ave.
Lansing, MI. 48912

May 15, 1986

Dear Principal,

The attached questionnaire deals with a study into teacher inservice computer training and support services. Please distribute them to the teachers on your staff. You will also find one survey marked "PRINCIPAL" for you to fill out.Your frank responses and those of your staff to each question will be useful in making suggestions as to how to plan future inservice training for teachers.

Realizing how busy teachers are, the questionnaire has been designed in such a way that it should take only a few minutes to complete. Your responses will be aggregated with others for analysis and no individual responses will be identifiable. To insure complete anonymity, your name or school is not requested and the questionnaires have been sent in bulk to your school.

Please note the letters from my academic advisor and Dr. John Osborne of the State Department and be assured too that the project has been cleared with the appropriate administrators in your district.

I would be grateful if you will kindly complete your questionnaire and place it in the envelope I have provided.

Thank you for your assistance.

Yours sincerely,

Paul K. Egbo
(Investigator)

723 S. Francis Ave.
Lansing, MI. 48912

May 28, 1986

Dear Principal,

The enclosed questionnaires deal with a study into teacher inservice computer training and support services. Please distribute them to the teachers on your staff. You will also find one survey marked 'PRINCIPAL' for you to fill out. Your frank responses and those of your staff will be useful in making suggestions as to how to plan future inservice for teachers.

Realizing how busy teachers and principals are, the questionnaires have been designed in such a way that it should take only a few minutes to complete. Furthermore, it has been arranged with your school district that you may wish to complete it after the school year ends. However, I would be grateful if you will kindly mail yours to me in the attached stamped, self-addressed envelope by June 30, 1986.

All responses will be aggregated for analysis and no individual responses will be identifiable. To insure complete anonymity, your name or school is not requested and the questionnaires have been sent to your school in bulk.

Please note the letters from my academic advisor and Dr. John Osborne of the State Department of Education and please be assured too that this project has been cleared with the appropriate administrators in your district. If you have any questions, please feel free to contact me at (517) 372-2741.

Thank you for your assistance.

Yours sincerely,

Paul K. Egbo
(Investigator)

A P P E N D I X L

INVESTIGATOR'S LETTERS TO TEACHERS

723 S. Francis Ave.
Lansing, MI. 48912

May 15, 1986

Dear Teacher,

The attached questionnaire deals with a study into teacher inservice computer training and support services. Your frank responses to each question will be useful in making suggestions as to how to plan future inservice training for teachers.

Realizing how busy teachers are, the questionnaire has been designed in such a way that it should take only a few minutes to complete. Your responses will be aggregated with others for analysis and no individual responses will be identifiable. To insure complete anonymity, your name or school is not requested and the questionnaires have been sent in bulk to your school.

I would be grateful if you will kindly complete the questionnaire and place it in the envelope I have given to your principal.

Thank you for your assistance.

Yours sincerely,

Paul K. Egbo
(Investigator)

723 S. Francis Ave.
Lansing, MI. 48912

May 28, 1986

Dear Teacher,

The attached questionnaire deals with a study into teacher inservice computer training and support services. Your frank responses to each question will be useful in making suggestions as to how to plan future inservice training for teachers.

Realizing how busy teachers are, the questionnaire has been designed in such a way that it should take only a few minutes to complete. Furthermore, it has been arranged with your district that you may wish to complete it after the school year ends. However, I would be grateful if you will kindly mail it to me in the attached stamped, self-addressed envelope by June 30, 1986.

All responses will be aggregated for analysis and no individual responses will be identifiable. To insure complete anonymity, your name or school is not requested and the questionnaires have been sent to your school in bulk.

If there are any questions, please feel free to contact me at (517) 372-2741.

Thank you for your assistance.

Yours sincerely,

Paul K. Egbo
(Investigator)

A P P E N D I X M

INTRODUCTION LETTER FROM PROFESSOR ERLING JORGENSEN

MICHIGAN STATE UNIVERSITY

LIFELONG EDUCATION PROGRAMS • KELLOGG CENTER EAST LANSING • MICHIGAN • 48824

May 9, 1986

Selected Michigan Educators in Ingham and Oakland Counties, Regional Educational Media Centers and the State Department of Education.

Dear Colleague:

This letter will introduce Mr. Paul Egbo, a doctoral student in the College of Education, Michigan State University. Mr. Egbo is studying the introduction and use of computers in the elementary classroom. He is particularly interested in the role of various elements of school administration and of other agencies involved in assisting teachers who use computers for instruction.

Your assistance in his collection of data will be greatly appreciated. His research design calls for interviews with selected administators and responses to a questionnaire by principals and teachers in selected schools.

Thank you for your assistance.

Sincerely,

Erling S. Jorgensen, Professor
Educational Systems Design

RJ/jm

A P P E N D I X N

INTRODUCTION LETTER FROM DR. JOHN OSBORNE, STATE DEPARTMENT OF EDUCATION

STATE OF MICHIGAN

DEPARTMENT OF EDUCATION

Lansing, Michigan 48909

PHILLIP E. RUNKEL
Superintendent
of Public Instruction

May 9, 1986

Lansing, Michigan 48909

Selected Michigan Educators in Ingham and Oakland Counties and Regional Educational Media Centers

Dear Colleague:

This letter will serve to introduce Mr. Paul Egbo, a doctoral student in the College of Education, Michigan State University. Mr. Egbo is studying the introduction and use of computers in elementary classrooms. He is particularly interested in the role of various elements of school administration and the role which other agencies play in assisting teachers who use computers for instruction.

I would appreciate any assistance which you could provide Mr. Egbo as he conducts his data collection. It is my understanding that his research design calls for interviews with selected administrators as well as securing responses to a questionnaire from principals and teachers in selected schools.

I would like to take this opportunity to thank you for your assistance in this professional undertaking. If you have any questions regarding this study please feel free to call me at (517) 373-1808.

Cordially,

John Osborne

John Osborne, Ph.D.
Michigan Department of Education

JO:wb

A P P E N D I X O

LETTER FROM LANSING SCHOOL DISTRICT OFFICE OF EVALUATION SERVICES

LANSING SCHOOL DISTRICT

OFFICE OF
EVALUATION SERVICES
500 W. LENAWEE
LANSING, MICHIGAN 48933

June 19, 1986

Mr. Paul Egbo
723 S. Francis Avenue
Lansing, MI 48912

Dear Mr. Egbo:

In regard to your research study titled, "The Effectiveness of Teacher Inservice Computer Training Programs and Support Services: A Study of the Role of Selected Educational Agencies in Two Michigan Intermediate School Districts", the request to conduct the study in the Lansing School District has ____ been approved, __X__ has not been approved.

The following comments apply to your study:

It was the judgment of the Committee that Lansing staff have already completed several questionnaires about computer use as part of district programs. Thank you for your interest in the Lansing Schools.

If you have any questions or need additional information, please contact me (374-4347).

Thank you,

Pat Petersen
Evaluation Specialist

PP/mlc

cc: Research Review Committee Members

A P P E N D I X P

THREE PAGES OF SOFTWARE EVALUATION INVENTORY OF TIME CENTERS

NETWORK SOFTWARE INVENTORY - 4/1/86

Key to Field Descriptors for Software Inventory

Center - Site entering information:

1. SEMTEC
2. South Central Regional
3. TIME North
4. Upper Peninsula Consortia
5. West Michigan Region
6. University of Michigan

Location - Center(s) having on-site software:

1. SEMTEC
2. South Central Region
3. TIME North
4. Upper Peninsula Consortia
5. West Michigan Region
6. University of Michigan

Brand - Computers which support software:

1. A: Apple
2. AT: Atari
3. C: Commodore
4. I: IBM
5. O: Other
6. T: TRS 80
7. V: VIC
8. IBMP: PCJ

Modes - Special Features of software:

1. A: Animation
2. G: Graphics
3. I: Integrated
4. S: Sound
5. T: Text
6. O: Other

Storage - Type(s) of storage device(s):

1. CA: Cassette
2. C: Cartridge
3. D: Diskette

Printer - (Y) for yes, (N) for no

Grades - Appropriate usage level:

1. PS: Pre-school
2. LE: Lower Elementary (1-3)
3. UE: Upper Elementary (4-5)
4. MS: Middle School (6-8)
5. HS: High School (9-12)
6. Not applicable

Purpose - Intent of software use:

1. A: Assessment
2. AD: Administrative task
3. D: Drill
4. E: Enrichment
5. G: Game
6. P: Problem Solving
7. R: Remediation
8. S: Simulation
9. T: Tutorial

Manage - (Y) for instructional management component or (N) for no

Author - (Y) for authoring capabilities or (N) for no

Document - software documentation:

1. P: Program
2. T: Text
3. B: Both

Subject - General academic or application area(s):

1. AD: Administration services
2. C: Computer Literacy
3. ESL: English as a second language
4. F: Foreign Language
5. FA: Fine Arts
6. H: Health
7. I: instructional Management
8. L: Language Arts
9. M: Math
10. MD: Media
11. PE: Physical Education
12. R: Reading
13. S: Science
14. SS: Social Science

Topic - Specific academic or application area(s):

Spec Ed - Special Education applications:

Voc Ed - Vocational Education applications:

Review - Evaluation Rating:

A. Highly recommended for preview
B. Recommended for preview
C. Not recommended for preview

Evaluation - Source of evaluation:

1. C: Evaluation by Center
2. CA: CA Preview Guide
3. D: Digest of Software Reviews
4. M: Microsift
5. T: Tess
6. O: Only the Best
7. S: Software Reports
8. ME: MINN. List
9. MA: MACUL
10. E: EPIE

PAGE NO. 00001
04/08/86

NETWORK SOFTWARE INVENTORY

TITLE	PUBLISHER	SUBJECT	TOPIC	PURPOSE	GRADES	BRANDS	EVALUATIONS	REVIEW	COST	LOCATION
U.S. Constitution Tutor	MicroLab Inc.	SS	Amer.Hist	T	MS,HS	A I C	S,CA,ME,D,	S	30.00	2
Across The Plains	Micro-Ed	SS	History	T	UE-HS	C	MA,CA	B	39.95	2
Africa	Brain Bank Inc.	SS	History	P,S,G	MS-HS	A,C	ME,T,O	A	58.50	2
Agent U.S.A	Scholastic	SS	History	S	LE-HS	A	CA	A	39.95	2
American History : The Decades Game	Brain Bank Inc.	SS	History	G	HS	A,C	S	B	46.75	2
Battle For Normandy	Strat Sims	SS	History	G,S	HS	A,AT,C,I	MA	S	39.95	2
Battle of Shiloh	Strat Sims	SS	History	S	MS-HS	A,AT,T	MA,CA	B	39.95	2
Cartels and Cutthroats	Strat Sims	SS	Economics	S,P	HS	A	D,MA,ME,O	A	39.95	2
Coast to Coast	CBS	SS	History	T	LE-HS	A,C	CA	A	49.95	2
Code Quest	Sunburst	All	PR	P	LE-HS	A	O	S	49.00	2
Color Keys	Sunburst	SS	PR	P,S,G	LE-HS	A	T	A	55.00	2
Demo-Graphics	Conduit	SS	History	T	HS	A	CA,MA,T,S	A	85.00	2
Discrimination, Attributes, and Rules	Sunburst	SS	PR	P	LE-HS	A	T	B	100.00	2
Energy House	Hecc	SS	Ecology	P,S		A	MA,CA	A	49.95	2
Facts and Fallacies	Hartley	SS	History	T		A		A	15.00	2
FlashCalc	VisiCorp	SS,AD	Utility	AD	HS,MS	A		A	92.00	2
Forest Fire	Dynacomp	SS	Ecology	S	UE-MS	AT	MA,CA	A	19.95	2
Free Enterprise	SRA	SS	Economics	S	MS	A	O	A	100.00	2

A P P E N D I X Q

THE TMT TRAINING MODULES

THE TMT TRAINING MODULES

The TMT series consists of 14 modules, each which addresses a major aspect of educational computing:

1. Training Methods
2. The Process of District Planning
3. Instructional Methods
4. Applications Concepts
5. The Process of Software Evaluation
6. Hardware Configuration
7. Basic Technical Skills
8. Instructional Management
9. Software Design
10. Computers in the Curriculum
11. Computer-Mediated Communication
12. Administrative Uses
13. Future Images
14. The Computer and Media Services

Each module contains:

* an overview
* goals
* training leader prerequisites
* competency list
* issues narrative
* activity lists
* activity cards
* blackline masters
* feedback forms

SOURCE: TMT Brochure, 1987

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