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## A descriptive survey of computers in the kindergarten through twelfth grade classrooms

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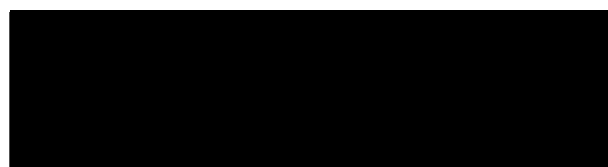
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## CHAPTER 1

### INTRODUCTION

#### Purpose for the Study

In this age of technology, there is a growing availability of multimedia in schools. There are many manufacturers developing computer technology for classrooms, especially computer software programs. Teachers everywhere are confronted with integrating computers into their classroom and learning how to use computer technology. Computers are the wave of the future, as stated by Janowiak (1990).

The author's personal experience as an editor with an educational publisher has inspired the content of this study. Publishers especially need to know what technology is working in the classroom and what is not. The author sees a great technological advantage when students are using computers. It is up to the cooperative effort of publishers and teachers to work together to integrate computer technology into the curriculum so it can be adaptable, flexible, dynamic, meaningful. Computer technology can be a worthwhile tool to prepare students for this age of technology.

The author agrees with Henry (1993) that there are many computers and computer software programs in schools that are not used effectively nor often enough. Henry further states that, this is due to the lack of computer training, the lack of funds for effective software, and teachers being unfamiliar with the possibilities of computer integration into their curriculum. The author

acknowledges, as well as other educators, (Rogers, 1992; O'Connor, 1993) that computers are a powerful teaching tool that can enhance education in all subject areas by improving attitudes towards learning, making learning more engaging, and adapting teaching to individual styles of learning. By identifying what hardware, software, types of applications, and ways teachers use computers as an educational tool other teachers can apply this knowledge to their own teaching style. Publishers can develop software and printed materials to meet the needs of the teachers, so they can be applying this knowledge for the present and preparing for the future of computers.

#### Problem Statement

The purpose of this project was two-fold: to determine what computers are used in classrooms, grades kindergarten through twelve, and to determine how computer technology is used and integrated into curriculums of all subjects in grades kindergarten through twelve.

#### Research Questions

The research questions of this project were to determine what kinds and how many computers are accessible in grades kindergarten through twelve. How much and to what extent are computers used in grades kindergarten through twelve? Why don't computers get utilized? What are the problems teachers are confronted with when computers have been introduced into classrooms grades kindergarten through twelve?

### Assumptions

When this survey was carried out, the author made several assumptions. First, the author assumed that the responses given to the questionnaire were honest. Second, the author assumed that the questionnaire developed was a valid and reliable measurement of the availability and functions of computer technology present in classrooms grades kindergarten through twelve. Third, the survey results were based upon returned responses. Last, results analyzed are skewed due to the fact that the sample group surveyed was not random sampling.

### Limitations

There was one major limitation to this study. The limitation of this study was that the participants surveyed were to be teachers with which the author has contacts from various districts in Ohio. Therefore, the sample group for this study was not random. This will enable the return rate of questionnaires to be higher than if surveys were given to teachers that the author had no previous contact with.

### Definition of Terms

Compact Disc-Read Only Memory (CD-ROM) is an educational computer software tool that consists of illustrated encyclopedias, clip art, libraries, and interactive games and videos. All can be accessed through a computer terminal with CD-ROM hardware.

Computer technology is any equipment teachers use that is associated with a computer.

Computer-Assisted Instruction is instruction where software assists students by performing drills, explanations, or tests.

Courseware is any computer software that aids instruction.

Local-Area Networks (LAN) is a network of computers connected together to provide shared information and enable students or teachers to interact electronically.

Videodisc is an educational tool where still images and video clips can be viewed on a television monitor. Images are accessed by using a remote control or a barcode wand. Computer software is available to facilitate accessing laserdisc images.



## CHAPTER II

### LITERATURE REVIEW

#### How Computer Technology Is Used in Classrooms By Teachers and Students

Computers have become valuable resources and teaching aids in education in the last few years. There are many applications for computers in the classroom. The author will explain various ways in which they are used in the educational process, as well as reasons why the field of education is benefiting from their use.

For teachers, computers become a resource to help them perform various everyday classroom management duties. Some of the common duties include: developing tests and hand-outs, preparing letters to parents, and keeping track of grades and attendance for all students. Computers aid in the lecture process and can be a valuable teaching tool that can be connected to overhead projectors or calculators to project images on a large screen for the whole class to view (Janowiak, 1990).

The wordprocessing capabilities on any computer enable teachers to compile tests, hand-outs, letters, or any other print material needed for the class. Before the computer, typewritten or hand-written materials were used. This becomes a very time consuming chore for a teacher when he/she may teach three to five different classes a day. With the computer, tests can be typed in and questions re-arranged, added or removed easily. Year to year these test files can be saved for the following year, to be altered or adapted to the specific class's needs depending on the concepts taught for that specific unit. There are even

software programs that are testbanks of topic-related questions that can be selected according to what is needed for that particular test. Then these specific questions can be printed out for the class's test; questions can even be edited, if necessary.

The most common task teachers track are attendance and grades. There are specific database software programs designed just for this function. Not only are the programs tracking grades and attendance, but also it will automatically compute grade averages as directed. Therefore, at any time when grades are entered for each student, their student's average grade is being calculated. This will save teachers from using a calculator and adding all the scores for each student. Databases can also be set up for addresses and emergency contacts, as well as, biographical data (Judd, 1993).

Many times a program is developed specifically for scheduling students into classes every semester. In a database all classes offered and when they meet would be are inputted. The administration would enter student's elective schedule and the computer would arrange students in classes as selected. By having such a program, it would make scheduling more efficient and systematic, as well as, saving administration a lot of time.

Computers not only help teachers accomplish daily duties, but enable students to benefit in the learning process. There are many different ways students learn using the computer. One way is computer-assisted software in the form of drill and practice activities (Princeton Survey Research Association, 1993).

Drill and practice activities are objective questions and exercises a student would work through on a particular topic. By working on these programs, students can work at their own pace. Drill and practice software allow students to work on areas they are unfamiliar with or need additional help or practice. But too much drill and practice may be counterproductive; the student may become bored and not think through the exercises, essentially not benefitting from the activities (DeBrosse, 1994).

Local-area networks (LAN) are becoming more popular in classrooms. It becomes a way for students and teachers to interact electronically (Lipman, 1993). Information is shared in computer networks. Computers that are connected together can work from the same software. The entire class can work on a selected piece of software. Using networks can be cost-saving. For example, you do not have the expense of having software disks for every student or worry about software programs requiring large amounts of memory (Radisich, 1994). A company called Genentech, a biotechnology company in California, is sponsoring a ten million dollar program over the next three years giving over one hundred biology teachers across the country access to a laptop computer. Their laptops are networked together to collaborate input on specific projects that all one hundred classes can supply data to. From this data students can form hypotheses and predictions. One example is a project tracking the changing colors of leaves in the fall. Teachers can share information and develop lesson plans together. Genentech is working on involving more classes in the next year

(Doulin, 1995).

Another application of networks is the use of online databases. Being connected to online databases such as *Dialog*, *CompuServe*, *Internet*, *ERIC*, *First Search*, or *Grolier's Electronic Encyclopedia* allows wide-range access to encyclopedias, movies, articles, and book reviews all from one computer monitor. Students can retrieve information of their own interest.

Computers are also versatile and can be used in junction with laserdiscs. Laserdiscs are a new technology similar to videotapes, only more advanced. Laserdiscs store video clips and still images. Using a hand controller or barcode wand one can designate what portion of the laserdisc to access. This can have many applications with more interactive possibilities. Lessons can be developed where lectures evolve around segments from the laserdisc giving bits of information from stills and video clips to give a visual presentation of the subject matter.

Computers in the classroom allow for a variety of individualized or group utilization. This technology has enhanced teaching in many ways. There are considerable reasons why computers enhance learning and teaching. The author has tried to mention the substantial reasons why using a computer can be advantageous.

For teachers, computers assist with preparation and enhancement of the delivery of instruction. Having computer technology changes the way educators teach. Teachers can choose to use the computer software which makes extensive

use of color in 3D graphics, elaborate animations, and simulations (Charp, 1994). Computers allow for interactive lectures, more group work, and a student-centered approach to teaching (O'Connor, 1993). Science and math teachers have shown a positive impact in teaching procedures, being able to perform activities and simulations with the use of the computers. As stated by O'Connor, 1993 on page 5, "Teachers report that technology has enabled students to actually do more science opposed to simply reading about it." Researchers have always said that students learn by doing. By using the computer one is definitely doing.

By allowing students to work on computers independently or in a group, teachers can spend more time facilitating learning and allowing themselves more time to guide and direct learning (Littauer, 1994). This can allow for students to discover learning for themselves. Technology can provide a better educational environment for all students (Carey, 1993). Allowing students to work independently with more complex materials will make them work to their potential. Computer applications increase student-to-student interaction and communication (O'Connor, 1993). Technology also allows at-risk students or students that have problems with subject matter a chance to produce materials equivalent to other students in the class (O'Connor, 1993).

For students computers enable them to work at their own pace using programs adapted to meet each student's learning style. Students can spend time investigating things for themselves.

Databases provide a plethora of information where they can direct their own

learning in areas of choice. As stated by Nichols (1994) on page 14 "databases are wonderful gateways of knowledge." Outlets of knowledge that students can gain access to through their computers. There are all kind of databases that one can gain access on topics such as: encyclopedias, sports, movie and book reviews, newspaper articles. These databases can provide up-to-the-minute news and also users can print information on the screen. Another nice feature is that some databases are available on CD-ROM, having information on CD-ROM enables one to save space on their hard drive (Nichols, 1994).

Computer technology stimulates independent hands-on learning, group discussion, cooperative learning, and individual learning. Another important reason for using computer technology in classrooms is that it exposes students to technology outside of the classroom, thus preparing them for the future (Cagey, 1993).

## CHAPTER III

### PROCEDURE

A survey was developed by the author to ascertain information about the kind of computers, the quantity of computers, the applications of computers, the periods of time they are in use, and the reasons that computers can be difficult to use to guide learning in classrooms grades kindergarten through twelve. The author consulted other surveys to develop questions for this study (see Appendix A for a copy of the survey).

The questionnaire for this study was comprised of demographical questions and seventeen specific computer-related questions. The demographics about the participants that the author was interested in were, the city and state, type of school and district, number of students in a class, grade and subjects taught, and years of teaching experience. The author wanted to investigate the backgrounds of the teachers surveyed. From this demographical information, the author was able to determine at what grade level computers are used and if the number of years of teaching had an impact on the usage of computers during a weeks time.

The next seventeen questions were specific to use of computers. The first question assessed was the kinds of computers that teachers have access to in their school. The choices were limited to Apple IIe, Macintosh, IBM or IBM compatible, and graphic calculator. Teachers were asked to check all that apply. Teachers were then asked how many computers they have in their classroom. The categories to check were zero, one, two to five, six to ten, eleven to twenty, or twenty-one or more. The next questions asked were concerned about the

location and thus, the availability of the computers if they are not in their classroom. They were asked how often do they have access to the computer lab.

In order to determine what kinds of computer disk drives schools have in their buildings, they were asked whether they had 5.25 or 3.50 disk drives. They were asked whether the computers were purchases new or used.

To determine if teachers have formal training on computer usage, a question was directed towards inservice on computers and if any other training is offered by their school district. The author was curious to find out where teachers obtained their computer knowledge.

The author ascertained how computers are used in the classroom by asking these three questions. The first question focused on the use of computers for instructional purposes. The question choices were working one-on-one with a student, working with a group of students, accessing online database services, integrating applications, word processing, and graphics. It asked teachers to check all uses that they use. The next two questions are directly stated "Do you use your computer for administration (or management) duties?" and "Do you use your computer for intervention or remediation?" The author described remediation as individualized computer activities using computer-assisted software, specifically drill and practice software.

Next the teachers were asked to identify how they used computers with their students in an integrated manner. Teachers were directed to check only one time frame zero times a week, one to two times a week (fifteen to thirty minute



segment), two to three times a week (fifteen to thirty minute segment), or four to five times a week (fifteen to thirty minute segment).

The next two questions addressed the degree that computer technology has improved their effectiveness as a teacher and the ways it has improved their effectiveness. The first question had teachers respond with very much, somewhat, not to much or not at all. The other question had them specify ways computer technology has improved their effectiveness in teaching.

The author had recognized from her research some negative aspects that might prevent teachers from using computers as a teaching tool. The next question focused directly on the aspect of why teachers do not use computers. Teachers were asked to check those that apply to negative aspects that they have encountered. These selections were lack of funds for computer equipment and software, lack of technical support, insufficient electrical wiring in the building, unfamiliarity with computers or lack of computer training, and lack of good computer software for instructional use.

The last question on the questionnaire asked what software programs teachers use in their classroom. Teachers listed various software programs. At the end of the questionnaire a place for comments/recommendations/suggestions was provided.

The questionnaire was designed to be a reasonable length and printed on one piece of paper, front and back. It was inevitable that teachers would be more inclined to complete the survey if it was relatively short. Teachers weren't asked

to fill in their names, so anonymity could be maintained.

Two educational professionals reviewed the survey. From their comments and suggestions the survey was completed. As a pilot study, surveys were completed by ten participants. From the analysis of data and comments from this pilot study the survey was finalized.

The survey was sent along with a letter of explanation (see Appendix B for a copy of this letter) to various schools in the Columbus, Ohio area. Included with the survey was a self-addressed stamped envelope to return the survey to the author or instructions to leave completed surveys in a designated teacher's mail box. Surveys were distributed to teachers the author knew from a professional relationship and distributed in that school where the teacher taught. Elementary, junior/middle, high school teachers were represented. Fifteen questionnaires were given to teachers to fill out at an educational conference.

As surveys were returned they were sorted by the following categories: suburban/local district, suburban/city district, urban/local district, urban/city district, rural/local district, and rural/city district, and public school. As data was reviewed from this breakdown of school districts, it was concluded that this data from these categories was not substantial for analysis. Therefore, surveys were then sorted by grade level designation, elementary school level, middle school level, and high school level. Each survey was coded with a number for reference purposes. It should be noted that approximately twenty surveys were disregarded from this study because participants did not fill out both sides of the questionnaire. Results

from surveys were charted on spreadsheets for further analysis. Data was represented in three major charts, one for the elementary school level, one to the middle school level, and the third high school level teachers (see Appendices C, D, E for these charts).

## CHAPTER IV

### RESULTS

#### Presentation of the Results

Eighty-six teachers responded to the mailing of two hundred and sixty-two surveys, or about a thirty-three percent (33%) return. Fifteen additional surveys were filled out by teachers at an educational conference. Therefore, one hundred and one surveys were analyzed. More elementary teachers, forty-two percent (42%), answered the survey compared to twenty-five percent (25%) middle school, or thirty-three percent (33%) high school teachers. There were a variety of experienced teachers that responded. There was no target group that answered the survey more than another.

When asked what kind of computers teachers used, most teachers reported using the Macintosh at seventy-two percent (72%) and the least used computer is the graphic calculator at eighteen percent (18%). Fifty-three percent (53%) reported using the IBM and fifty percent (50%) have access to Apple computers. It should be noted that Macintosh, IBM, and Apple computers are accessible to teachers per the high percentages reported in this study.

The survey results report that thirty-five percent (35%) of the teachers reported having one computer in their classroom, twenty-five percent (25%) reported having zero computers in their classroom, thirty-one percent (31%) reported having two to five computers in their classroom, one percent (1%) reported having six to ten computers in their classroom, two percent reported having eleven to twenty computers in their classroom, and seven percent (7%)

reported having twenty-one or more computers in their classroom. Therefore, there are only sixty-six percent of the classrooms containing one to five computers and surprising the other one-third have no computers in the classroom.

Forty-nine percent (49%) of the teachers surveyed reported having a computer lab with many computers where a class can work individually on a computer.

When asked what kind of hardware teachers have access to, they reported fifty-two percent (52%) reported that they have access to 5.25 floppy disks and seventy-eight percent (78%) reported that they have access to 3.50 hard disks. Obviously, many have access to either.

Seventy-three percent (73%) of teachers surveyed have inservice on computers available at their school.

Analyzing data regarding how computers are used by teachers eighty percent (80%) of the teachers use computers to do management-type duties, such as typing tests, hand-outs, or letters. Remediation or intervention is an application of computer use by students, that is reported being used six-one percent (61%). Remediation or intervention would be drill and practice activities where students are quizzed on various subjects.

The data shows that thirty-eight percent (38%) of the teachers surveyed reported using computers one to two times a week. Thirty-five percent (35%) of teachers reported using computers zero times a week, eleven percent (11%) of teachers use computers two to three times, and seventeen percent (17%) of

teachers use computers four to five times a week.

When participants were asked what applications they used computers for there was the highest percentages in the use of computers for word processing by students, one on one basis with students, and working with a group of students, sixty-three percent (63%) , sixty-two percent (62%), and fifty-six percent (56%) respectively. Students use computers to do graphics forty-seven percent (47%). Integrating applications data was calculated at only thirty-one percent (31%) of teachers surveyed and accessing online databases at nineteen percent (19%), (see Appendix G for a bar graph of these results.)

The two major problems teachers report being a negative aspect of using computers are the lack of funds for computer equipment and software at fifty-eight percent (58%) and lack of good software for instructional use forty percent (40%) of teachers surveyed. Some of the other problems teachers indicated were lack of technical support, thirty-three percent (33%). Unfamiliarity with computers and lack of computer training, thirty-two percent (32%) and insufficient electrical wiring in the building, twenty-five percent (25%). All these factors enable teachers from using computers on a regular basis (see Appendix H for a bar graph of these results.)

From the chart below it is evident that elementary school teachers have the highest percentage of computer usage. Fifty-eight percent (58%) of the elementary teachers surveyed use computers one to two times a week. Where middle school teachers use the computer one to two times a week at thirty-one percent (31%). High school teachers have the high percentage of not using the computer at all during a week at forty-nine percent (49%).

Grade Levels Compared to Times a Week the Computer is Used				
	0 times a week	1-2 times a week	2-5 times a week	
Elementary School Teachers	5 = 14%	21 = 58%	10 = 28%	36
Middle School Teacher	11 = 4%	8 = 31%	7 = 27%	26
High School Teachers	19 = 49%	9 = 23%	11 = 28%	39
				101

Follow the chart on the top of the next page to analyze a comparison of the number of years of experience compared with the number of times a week computers are used. It should be noted that one survey was disregarded from this comparison because the number of teaching experience was not given. Teachers with zero to eight years of teaching experience use the computer seventy-four percent (74%) - less than two times a week and twenty-seven percent (27%) - more than two times a week. Teachers with nine to sixteen years of teaching experience use the computer seventy-seven percent (77%) -less than two times a week and twenty-three percent (23%) - more than two times a week. Teachers with seventeen to twenty-four years of teaching experience use the computer sixty-seven percent -(67%) less than two times a week and thirty-three percent (33%) - more than two times a week. Teachers with twenty-five to thirty-six years of teaching experience use the computer seventy-five percent (75%) -less than two times a week and twenty-five percent (25%) - more than two times a week. In these different years of teaching experience categories there is no significant data to infer that one group uses the computer more than another, but it can be inferred that all groups use it less than two times a week.



Years of Teaching Experience Compared to Number of Times a Week Computers are Used			
	0-2 times a week	2-5 times a week	Totals
0-8 years	25 = 74%	9 = 27%	34
9-16 years	23 = 77%	7 = 23%	30
17-24 years	26 = 67%	8 = 33%	24
25-36 years	9 = 75%	3 = 25%	12
			100

Looking at the distribution of number of computers in a classroom compared to usage less than two times per week and more than two times per week, it can be concluded that classrooms with six or more computers in a them were not more likely to use computers more frequently.

Number of Computers Compared to Number of Times Used a Week			
	Less than two times a week	More than two times a week	Totals
0	26 = 100%	0 = 0%	26
1	26 = 74%	9 = 26%	35
2-5	15 = 50%	15 = 50%	30
6-10	0 = 0%	1 = 100%	1
11-20	2 = 100%	0 = 0%	2
21+	4 = 57%	3 = 43%	7
			101

When studying teachers having inservice, forty-three percent (43%) reported using computers one to two times a week, thirty-six percent (36%) reported using computers two to five times a week, and twenty percent (20%) reported using computers zero times a week. It is interesting to find that with no inservice that still four percent (4%) of teachers surveyed used the computer two to five times a week. These higher percentages represented with teachers having inservice suggest that it is more likely for teachers to use computers if they have inservice.

Presence of Inservice Compared to Number of Times a Week Computers are Used				
	0	1-2	2-5	Totals
Yes Inservice	15 = 20%	32 = 43%	27 = 36%	74
No Inservice	20 = 74%	6 = 22%	1 = 4%	27
				101

Those teachers surveyed, which have a computer lab in their school, reported the highest percentage of use forty-seven percent (47%) using computers one to two times a week, eighteen percent (18%) using computers two to five times a week, and thirty-five percent (35%) not using the computer at all during the week. When reviewing data from those teachers without a computer lab it was reported that twenty-nine percent (29%) use the computers one to two times a week, thirty-five percent (35%) using computers two to five times a week, and thirty-seven percent (37%) not using computers at all. It can be concluded that from these teachers surveyed that having a lab does not necessarily lead to using computers more times a week.

Having a Computer Lab Compared to Number of Times a Week Computers are Used				
	0	1-2	2-5	Totals
Having a Computer Lab	17 = 35%	23 = 47%	9 = 18%	49
Not Having A Computer Lab	19 = 37%	15 = 29%	18 = 35%	52
				101

## Discussion of Results

Looking at the overall data collected about computer usage in classrooms at grades kindergarten through twelve, a few generalizations can be made. Macintosh computers are the most accessible computer from teachers surveyed in this study. Graphic calculators are not used very much, currently. Computers are not used as might be expected, considering that there are one to five computers in the classroom in two-thirds [sixty-six percent (66%)] of the all classrooms surveyed. Approximately, twenty-five percent (25%) of schools surveyed do not have any computers in the classroom. Most schools have some type of computer lab. We are seeing computers with 3.50 and 5.25 hardware available for software programs. Inservice is being offered in various schools. Computers are being used for management/administration duties by teachers, and remediation activities, individualized one-on-one instruction, group work, word processing, and graphics are being used by students. There is limited use of computers to access online databases. On an average a computer doesn't get used anymore than two times a week. Therefore, it can be inferred that there is a average sized group of teachers using computers from the analysis of data from this study.

## Chapter V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Summary

In order for computers to be used as an integral part of education, it is necessary to evaluate what roles computers currently play in classrooms. Computers are a new intervention into classrooms for educational purposes, not just to help teachers perform management duties, but to enhance learning by making education more engaging, and adaptable to different learning styles of students. But for this educational tool to be a valuable teaching aid there must be studies to assesses how they are used at different grade levels and to see what is available in different content areas. The pertinent information acquired from computer studies allows educational publishers to develop materials suited for educational needs in the future.

The purpose of this study was to assess teachers' computer technology and teachers' implementation of computers at all grade levels. The author evaluated the following research questions: what kind of computers, how many computers, how often computers are used, what application computers are used for, and what periods of times computers are used, and why computers can be difficult to use to assist or facilitate learning.

In order to fulfill these research questions the author developed a questionnaire. The questionnaire was distributed to two hundred and sixty-two teachers at all grade levels, elementary, middle, and high schools. A total of eight-six surveys were returned, a thirty-three percent (33%) return rate. At an

educational conference fifteen additional teachers completed the questionnaire. As the questionnaires were returned they were coded with an identification number and the data was tabulated in various combination for analysis.

The results from this study indicated that Apple, Macintosh, IBM, and graphic calculators are available in classrooms, Macintosh being the most widely accessible represented by seventy-two percent (72%) of the teachers surveyed having Macintosh computers available. Twenty-five percent (25%) of the teachers surveyed do not have computers in their classrooms. Most classrooms have only one computer, thirty-five percent (35%). Computer labs are available in about half the schools surveyed. It is evident that computers get used one to five times a week as reported by sixty-five percent (65%) of teachers. Inservice is available for teachers in three-fourths of the teachers surveyed. Eighty percent (80%) of the teachers use the computer for management duties. Sixty-one percent (61%) of teachers surveyed use computers for remediation, or drill and practice types of activities. Teachers use the computers for a variety of instructional purposes such as: individualized instruction, group work, word processing, graphics, and drill and practice activities. There are few classrooms that have access to online databases, approximately nineteen percent (19%) of teachers have access to these services.

Teachers report various problems in integrating computers into their curriculums because of the little funds, insufficient technical support, poor electrical wiring, little good and appropriate software, and lack of knowledge about their

instructional use. The most important difficulty teachers have with integrating computers into their curriculums is time. Time in terms of figuring out how to integrate computers and time to incorporate computer usage into the day. These problems that inhibit teachers from using computers efficiently lead to computers not being used as often as expected.

## Conclusions

The author theorizes from the assessment of computers in schools that computers are in classrooms, seventy-five percent (75%) of schools surveyed have one to twenty-one plus computers in their classrooms. Schools have computer labs, but are not used as much as might be expected, sixty-six percent (66%) of teachers surveyed reported using them only one to five times a week. While the author believes that there is money available for computers, it is evident that not enough inservice is offered. Seventy-three percent (73%) of schools surveyed have inservice available, but not all or even most teachers are involved with this opportunity. If one accepts the fact that computers are valuable teaching tools, then why aren't they used? The author believes that teachers are having difficulty determining how to use them. It is noticeable that they have figured out how to do management duties. Eighty percent (80%) of teachers surveyed reported using them for preparing tests, hand-outs, letters, and other necessary printed materials. The author concludes that they are finding it too challenging and too time consuming to integrate computer software into their specific subject area. The author also infers that lack of computer knowledge, poor electrical wiring, insufficient software, and technical support make the job of integration also problematic.



## Recommendations

The author believes that the best recommendation she can suggest to teachers is to be patient, persistent, and to continue learning how to integrate computers into their teaching practices. They might incorporate computers into lessons at least one time a week, even if it is a simple exercise. These simple exercises will make students more familiar with them. Computers are the wave of the future (Janowiak, 1990), and it is extremely important to make computers part of every classroom and every household.

The author also recommends to educational publishers to keep the communications lines open with teachers and schools. Work with educators to determine what types of software are needed for specific content areas.

The author believes that teachers need more technical support and training on computer integration. It will be up to the Administration with support of the Boards of Education to see to it that not just computers are available but also inservice and support on computer capabilities are provided.

Computers are here to enhance our lives. It is important to educate everyone about their capabilities. The future of a technological world is knocking at our front door eager to lead to the betterment of all humans, and all we need to do is to open the door and begin to utilize computer capabilities to fit our needs.

Appendix A  
**Study About the Use of Computers in Classrooms**

City and state you teach in \_\_\_\_\_, \_\_\_\_\_

Type of school demographics:

Urban \_\_\_\_\_ Rural \_\_\_\_\_ Suburban \_\_\_\_\_

Private \_\_\_\_\_ Public \_\_\_\_\_

Type of District: City school \_\_\_\_\_ Local School \_\_\_\_\_ Exempted village \_\_\_\_\_

Average number of students in your class: \_\_\_\_\_

Grade and subjects taught: Grade \_\_\_\_\_ Subjects \_\_\_\_\_

Years of teaching \_\_\_\_\_

What kind of building do you teach in? Elementary \_\_\_\_\_ Junior High or Middle \_\_\_\_\_ High School \_\_\_\_\_

1. Which of the following types of computers do you have access to? (Check all that apply.)

- \_\_\_\_\_ Apple IIe
- \_\_\_\_\_ Macintosh
- \_\_\_\_\_ IBM or IBM compatible
- \_\_\_\_\_ Graphing Calculator
- \_\_\_\_\_ Other (specify) \_\_\_\_\_

2. How many computers are in your classroom?

- \_\_\_\_\_ 0 computers
- \_\_\_\_\_ 1 computer
- \_\_\_\_\_ 2-5 computers
- \_\_\_\_\_ 6-10 computers
- \_\_\_\_\_ 11-20 computers
- \_\_\_\_\_ 21 or more computers

3. If your computers aren't in your classroom, where are they? \_\_\_\_\_

4. How often do you have access to a computer lab?

- \_\_\_\_\_ anytime
- \_\_\_\_\_ frequently
- \_\_\_\_\_ occasionally

5. Are your computers purchased as new or as used models? (Check all that apply.)

- \_\_\_\_\_ New
- \_\_\_\_\_ Used

6. What kind of software do you have? (Check all that apply.)

- \_\_\_\_\_ 5.25 floppy disks
- \_\_\_\_\_ 3.5 hard disks
- \_\_\_\_\_ Other (specify) \_\_\_\_\_

7. Have you had inservice on computer training? Yes or No

8. If NOT, what training have you received? \_\_\_\_\_

9. Does your district offer computer training or workshops for the teacher staff?

Yes or No      If YES, please specify content of training \_\_\_\_\_

10. How do you use your computers for instructional purposes? (Check all that apply.)

- ☐ Working one-on-one basis with a student
- ☐ Working with a group of students
- ☐ Accessing online database services
- ☐ Integrating applications
- ☐ Students using word processing
- ☐ Students using graphic software

11. Do you use your computer for administrative duties? Yes or No

12. Do you use your computers for intervention or remediation (For example, A student working independently on the computer to improve subject knowledge using computer-assisted software)? Yes or No

13. How often do you use your computers with your students in an integrated manner? (Check one that applies.)

- ☐ 0 times a week
- ☐ 1-2 times a week (15-30 minute segment)
- ☐ 2-3 times a week (15-30 minute segment)
- ☐ 4-5 times a week (15-30 minute segment)
- ☐ Other

(Specify) \_\_\_\_\_

14. How much would you say computer technology has improved your own effectiveness as a teacher?

- ☐ Very much
- ☐ Somewhat
- ☐ Not too much
- ☐ Not at all

15. How has the computer improved your own effectiveness? Specify \_\_\_\_\_

16. What have been some of the negative aspects of using computers in your classroom. (Check all that apply.)

- ☐ Lack of funds for computer equipment and software
- ☐ Lack of technical support
- ☐ Insufficient electrical wiring in the building
- ☐ Unfamiliarity with computers or lack of computer training
- ☐ Lack of good computer software for instructional use
- ☐ Other (Specify) \_\_\_\_\_

17. What software programs do you use in your classroom?

\_\_\_\_\_  
\_\_\_\_\_

Comments/Recommendations/Suggestions

How you use the computer as an educational tool in the classroom.

Thank you for your time and effort.

Appendix B

Shelly Becker  
936 Eastwind Drive  
Westerville, Ohio 43081  
(614) 899-4210 (Work)

\*\*\*\*\*

February 10 , 1995

Dear Educator,

My name is Shelly Becker. I am working on a research project for my Master's Degree in Teacher Education at the University of Dayton at Capital University and would appreciate if you could take a few minutes to complete this questionnaire. I am determining what computers are present in schools today and how they are used in the educational process. This questionnaire is voluntary. If you wish, you may also leave any of the following questions blank. Please place completed survey in Shirley's mailbox by March 3, 1995.

Thank you,

Shelly Becker

# Appendix C Data of 101 Surveys Returned

#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 computers	1 computer	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk	1-2xs a wk	2-3xs a wk	4-5 xs a wk
1	✓			10			✓		✓						✓	✓	✓	✓	✓	✓	✓			
2	✓			9			✓		✓						✓		✓	✓	✓			✓		
3	✓			24			✓				✓							✓		✓		✓		
4	✓			8		✓	✓				✓				✓		✓	✓	✓	✓		✓		
5	✓			11			✓				✓				✓		✓	✓	✓	✓				✓
6	✓			5			✓								✓			✓	✓	✓			✓	
7			✓	24	✓		✓		✓						✓		✓		✓		✓			
8			✓	22	✓		✓			✓					✓	✓			✓	✓		✓		
9			✓	25		✓	✓							✓		✓	✓	✓	✓					✓
10			✓	8	✓	✓				✓					✓	✓	✓	✓	✓		✓	✓		
11			✓	16		✓	✓	✓			✓				✓		✓	✓			✓	✓		
12			✓	23		✓	✓		✓						✓		✓	✓	✓		✓			
13			✓	22	✓	✓	✓					✓			✓	✓	✓	✓	✓					✓
14			✓	20	✓	✓			✓						✓	✓	✓	✓	✓		✓			
15			✓	9	✓			✓	✓						✓						✓			
16			✓	15		✓			✓						✓		✓	✓	✓		✓			
17			✓	5	✓	✓	✓	✓	✓						✓				✓	✓	✓			

# Appendix C

#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 computers	1 computer	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1-2xs a wk.	2-3xs a wk.	4-5 xs a wk.
18			✓	8	✓	✓	✓	✓			✓				✓	✓	✓	✓	✓	✓				✓
19			✓	29	✓		✓				✓					✓	✓		✓			✓		✓
20			✓	15		✓	✓		✓	✓					✓	✓	✓		✓		✓			
21			✓	25	✓	✓									✓	✓	✓		✓		✓			
22			✓	31		✓	✓			✓					✓	✓	✓		✓		✓			
23			✓	28	✓	✓			✓						✓	✓	✓		✓		✓			
24			✓	8	✓	✓	✓				✓				✓	✓	✓		✓		✓			
25			✓	6	✓	✓	✓	✓							✓	✓	✓		✓		✓			
26			✓	1	✓	✓	✓	✓	✓						✓	✓	✓		✓		✓			
27			✓	13		✓	✓	✓	✓						✓	✓	✓		✓		✓			
28			✓	3		✓	✓	✓		✓						✓	✓	✓	✓	✓		✓		✓
29			✓	36		✓	✓	✓			✓				✓	✓	✓	✓	✓					✓
30			✓	7		✓		✓						✓	✓	✓	✓	✓	✓	✓		✓		✓
31			✓	7	✓		✓	✓						✓	✓	✓	✓	✓	✓	✓				✓
32	✓			20	✓		✓			✓					✓	✓	✓	✓	✓	✓		✓		
33	✓			17	✓	✓	✓			✓					✓	✓	✓	✓	✓	✓		✓		
34	✓			25			✓			✓					✓	✓	✓	✓		✓		✓		
35	✓			9	✓		✓			✓					✓	✓	✓	✓	✓	✓		✓		

# Appendix C

#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 computers	1 computer	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a w/k.	1-2xs a w/k.	2-3xs a w/k.	4-5 xs a w/k.
36	✓			13			✓		✓						✓		✓					✓		
37	✓			10	✓	✓			✓						✓	✓	✓		✓	✓		✓		
38	✓			6	✓		✓		✓						✓		✓		✓	✓		✓		
39	✓			15	✓		✓			✓					✓	✓	✓		✓			✓		
40	✓			7			✓				✓				✓	✓	✓		✓			✓		
41	✓			4	✓		✓								✓	✓	✓		✓	✓			✓	
42	✓			11	✓		✓				✓					✓	✓		✓	✓			✓	
43	✓			3	✓	✓	✓			✓					✓	✓	✓		✓	✓		✓		
44	✓			12	✓		✓			✓					✓	✓	✓		✓	✓		✓		
45	✓			16			✓		✓	✓					✓	✓	✓		✓	✓		✓		
46	✓			12	✓		✓								✓	✓	✓		✓	✓		✓		
47	✓			2	✓		✓				✓					✓	✓		✓	✓		✓		
48		✓		19		✓					✓					✓	✓				✓			
49		✓		4	✓	✓				✓					✓	✓	✓		✓		✓			
50		✓		21		✓			✓								✓		✓		✓			
51		✓		6		✓			✓								✓		✓		✓			
52		✓		5		✓	✓				✓						✓		✓	✓		✓		
53		✓		10		✓				✓						✓		✓		✓		✓		✓

# Appendix C

36

#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 computers	1 computer	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1-2xs a wk.	2-3xs a wk.	4-5 xs a wk.
54		✓		7		✓				✓					✓	✓			✓	✓		✓		
55		✓		11		✓					✓					✓		✓	✓	✓	✓			
56		✓		12		✓	✓			✓							✓	✓	✓	✓	✓			
57		✓		13		✓							✓				✓		✓	✓	✓			
58		✓		3		✓					✓						✓		✓	✓	✓			
59		✓		3		✓		✓		✓								✓	✓	✓	✓			
60		✓		1		✓				✓	✓						✓	✓		✓	✓			
61		✓		26		✓	✓			✓							✓	✓	✓		✓			✓
62		✓		17		✓				✓						✓	✓		✓		✓			
63		✓		25			✓		✓		✓					✓	✓		✓	✓			✓	
64		✓		18		✓					✓						✓	✓	✓	✓				✓
65		✓		1		✓					✓						✓	✓	✓			✓		
66		✓		1		✓					✓						✓	✓	✓		✓			
67		✓		17		✓					✓						✓	✓	✓	✓	✓		✓	
68		✓		12		✓				✓	✓					✓	✓	✓	✓	✓		✓		
69		✓		1		✓	✓				✓					✓	✓	✓	✓	✓	✓			
70		✓		17			✓		✓					✓		✓	✓	✓	✓	✓	✓	✓		
71			✓	22	✓		✓	✓						✓		✓	✓				✓			



# Appendix C

#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 computers	1 computer	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1-2xs a wk.	2-3xs a wk.	4-5 xs a wk.
72		✓		20		✓					✓						✓	✓		✓			✓	
73	✓			2	✓	✓				✓					✓			✓	✓	✓				
74	✓			2	✓	✓	✓			✓							✓	✓	✓	✓				
75	✓			✓		✓				✓							✓	✓	✓	✓			✓	
76			✓	11		✓	✓		✓						✓		✓	✓	✓	✓	✓			
77			✓	13					✓						✓									
78			✓	20	✓	✓			✓												✓			
79		✓		4		✓					✓						✓	✓	✓	✓			✓	
80	✓			19		✓				✓							✓	✓	✓	✓			✓	
81	✓			17	✓	✓					✓					✓	✓	✓	✓	✓	✓			
82	✓			9	✓	✓				✓						✓	✓	✓	✓	✓				
83	✓			6	✓	✓					✓					✓	✓	✓	✓	✓				✓
84	✓			17	✓	✓					✓					✓	✓	✓	✓	✓				✓
85	✓			22	✓	✓					✓					✓	✓	✓	✓	✓	✓			
86	✓			17	✓	✓					✓					✓	✓	✓	✓	✓	✓			✓
87			✓	29	✓	✓		✓					✓			✓	✓	✓	✓	✓	✓			
88			✓	15		✓		✓						✓	✓		✓	✓	✓	✓				✓
89			✓	13	✓	✓	✓	✓						✓		✓	✓	✓	✓	✓		✓		

## Appendix C

#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 computers	1 computer	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1-2xs a wk.	2-3xs a wk.	4-5 xs a wk.
90		✓		6	✓	✓		✓		✓					✓	✓	✓			✓		✓		
91			✓	14		✓		✓					✓				✓	✓	✓		✓			
92	✓			9	✓	✓				✓					✓	✓	✓	✓	✓	✓			✓	
93	✓			28	✓	✓					✓				✓	✓		✓		✓			✓	
94	✓			8	✓	✓	✓			✓					✓	✓		✓	✓		✓			✓
95	✓			15	✓		✓				✓					✓		✓	✓	✓				
96	✓			13	✓	✓	✓		✓						✓	✓	✓	✓	✓		✓			✓
97	✓			17	✓	✓				✓					✓	✓	✓	✓	✓	✓		✓		
98	✓			17	✓	✓	✓			✓					✓	✓	✓	✓	✓	✓				
99	✓			7	✓	✓			✓							✓	✓	✓	✓	✓		✓		
100	✓			31	✓	✓				✓					✓	✓	✓	✓	✓	✓		✓		
101	✓			7	✓	✓	✓			✓					✓	✓	✓	✓	✓	✓			✓	
Grand Totals	42	26	33		51	73	54	18	25	35	31	1	2	7	49	53	79	74	81	62	35	38	11	17
Percentages					50%	72%	53%	18%	25%	35%	31	1%	2%	7%	49%	52%	78	73%	80%	61%	35	38	11	17

# Appendix D

ELEMENTARY SCHOOL TEACHERS SURVEYED																								
#	K-5	6-8	9-12	Years of Teach- ing	Apple	Mac	IBM	Graph. Cal.	0 compu ters	1 comp uter	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remedi- ation	0 xs a wk.	1- 2xs a wk.	2- 3xs a wk.	4- 5xs a wk
1	✓			10			✓		✓						✓	✓		✓	✓	✓	✓			
2	✓			9			✓		✓						✓		✓	✓	✓			✓		
3	✓			24			✓				✓							✓		✓		✓		
4	✓			8		✓	✓				✓				✓	✓	✓	✓	✓	✓		✓		
5	✓			11			✓				✓				✓	✓	✓	✓	✓	✓				✓
6	✓			5			✓				✓				✓			✓	✓	✓			✓	
44	✓			12	✓		✓			✓					✓			✓					✓	
45	✓			16			✓		✓						✓	✓				✓		✓		
46	✓			12	✓		✓			✓					✓	✓	✓	✓		✓		✓		
32	✓			20	✓		✓			✓					✓	✓	✓	✓	✓	✓		✓		
33	✓			17	✓	✓	✓			✓							✓	✓	✓	✓		✓		
34	✓			25			✓			✓					✓	✓		✓		✓		✓		
35	✓			9	✓		✓			✓						✓	✓	✓	✓	✓		✓		
36	✓			13			✓		✓						✓		✓	✓				✓		
37	✓			10	✓	✓			✓						✓	✓	✓	✓	✓	✓		✓		
38	✓			6	✓		✓		✓						✓		✓	✓	✓	✓		✓		

## Appendix D

ELEMENTARY SCHOOL TEACHERS SURVEYED																								
#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 computers	1 computer	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1-2xs a wk.	2-3xs a wk.	4-5xs a wk.
39	✓			15	✓		✓			✓					✓	✓		✓	✓			✓		
40	✓			7			✓				✓				✓	✓		✓	✓			✓		
41	✓			4	✓		✓			✓					✓	✓		✓	✓	✓				
42	✓			11	✓		✓				✓				✓	✓		✓	✓	✓			✓	
43	✓			3	✓	✓	✓			✓					✓	✓		✓	✓	✓				
45	✓			16			✓		✓						✓	✓				✓				
46	✓			12	✓		✓			✓					✓	✓		✓		✓				
47	✓			2	✓		✓				✓				✓	✓		✓	✓	✓				
73	✓			2	✓	✓				✓					✓			✓	✓	✓				✓
74	✓			2	✓	✓	✓			✓						✓		✓	✓	✓			✓	
75	✓			✓						✓								✓	✓	✓			✓	
80	✓			19		✓				✓								✓	✓	✓			✓	
81	✓			17	✓	✓					✓					✓		✓	✓	✓	✓			
82	✓			9	✓	✓				✓						✓			✓	✓				✓
83	✓			6	✓	✓					✓					✓		✓	✓	✓				✓
84	✓			17	✓	✓					✓					✓		✓	✓	✓				✓
85	✓			22	✓	✓					✓					✓		✓	✓	✓	✓			

# Appendix D

ELEMENTARY SCHOOL TEACHERS SURVEYED																								
#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 comp.	1 comp.	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1-2xs a wk.	2-3xs a wk.	4-5xs a wk.
86	✓			17	✓	✓					✓					✓	✓	✓	✓					✓
92	✓			9	✓	✓				✓					✓	✓	✓	✓	✓	✓			✓	
93	✓			28	✓	✓					✓					✓		✓		✓			✓	
94	✓			8	✓	✓	✓		✓						✓	✓		✓	✓		✓			
95	✓			15	✓		✓				✓					✓		✓	✓	✓				✓
96	✓			13	✓	✓	✓		✓						✓	✓	✓	✓	✓		✓			
97	✓			17	✓	✓				✓						✓	✓	✓	✓	✓				
98	✓			17	✓	✓	✓			✓					✓	✓	✓	✓	✓	✓		✓		✓
99	✓			7	✓	✓			✓							✓	✓	✓	✓	✓		✓		
100	✓			31	✓	✓				✓					✓	✓	✓	✓	✓	✓		✓		
101	✓			7	✓	✓	✓			✓					✓	✓	✓	✓	✓	✓			✓	
Total					31	23	28	0	8	21	14	0	0	0	26	31	34	41	35	36	5	24	8	7
Percentages					74%	55%	67%	0%	19%	50%	33	0%	0%	0%	62%	76%	81	98%	83%	86%	12	57	19	17%

## Appendix E

MIDDLE SCHOOL TEACHERS SURVEYED																								
#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 comp.	1 comp.	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1- 2xs a wk.	2- 3xs a wk.	4- 5xs a wk.
49		✓		4	✓	✓				✓					✓	✓	✓	✓	✓	✓	✓			
50		✓		21		✓			✓						✓		✓		✓		✓			
51		✓		6		✓			✓								✓	✓	✓		✓			
52		✓		5		✓	✓				✓						✓	✓	✓	✓				✓
53		✓		10		✓				✓						✓		✓		✓		✓		
54		✓		7		✓				✓					✓	✓			✓	✓		✓		
55		✓		11		✓					✓					✓		✓	✓	✓	✓			
56		✓		12		✓	✓			✓							✓	✓	✓			✓		
57		✓		13		✓							✓				✓	✓	✓	✓	✓			
58		✓		3		✓					✓						✓		✓	✓	✓			
59		✓		3		✓		✓		✓							✓	✓	✓	✓	✓			
60		✓		1		✓				✓								✓	✓	✓	✓			
61		✓		26		✓	✓				✓						✓	✓		✓				✓
62		✓		17		✓				✓							✓	✓	✓					
63		✓		25			✓		✓							✓					✓			
64		✓		18		✓					✓						✓	✓	✓	✓			✓	

# Appendix E

MIDDLE SCHOOL TEACHERS SURVEYED																								
#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 comp.	1 comp.	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 x's a wk.	1-2 x's a wk.	2-3 x's a wk.	4-5 x's a wk.
65		✓		1		✓					✓						✓	✓	✓	✓				✓
66		✓		1		✓					✓						✓	✓	✓		✓			
67		✓		17		✓					✓						✓		✓		✓			
68		✓		12		✓				✓							✓	✓	✓	✓				
48		✓		19		✓					✓						✓	✓				✓		
69		✓		1		✓	✓				✓					✓	✓	✓	✓	✓		✓		
70		✓		17			✓		✓									✓	✓	✓				
72		✓		20		✓					✓						✓	✓		✓			✓	
79		✓		4		✓					✓						✓	✓	✓	✓			✓	
90		✓		6	✓	✓		✓		✓					✓	✓	✓			✓		✓		
TOTALS					2	24	6	2	4	9	12	0	1	0	4	7	20	20	20	18	11	8	4	3
Percentages					8%	92%	23%	8%	15%	35%	46%	0%	4%	0%	15%	27%	77%	77%	77%	69%	42%	31%	15%	12%

# Appendix F

## HIGH SCHOOL TEACHERS SURVEYED

#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 comp.	1 comp.	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1-2xs a wk.	2-3xs a wk.	4-5xs a wk.
7			✓	24	✓		✓		✓						✓		✓		✓		✓			
8			✓	22	✓		✓			✓					✓	✓			✓	✓		✓		
9			✓	25		✓	✓						✓				✓	✓						✓
10			✓	8	✓	✓				✓					✓		✓	✓	✓		✓			
11			✓	16		✓	✓	✓			✓				✓		✓	✓					✓	
12			✓	23		✓	✓		✓						✓		✓		✓		✓			
13			✓	22	✓	✓	✓					✓			✓	✓	✓	✓	✓					✓
14			✓	20	✓	✓			✓						✓	✓	✓	✓	✓			✓		
15			✓	9	✓			✓	✓						✓						✓			
16			✓	15		✓			✓						✓		✓	✓	✓		✓			
17			✓	5	✓	✓	✓	✓	✓						✓				✓	✓	✓			
18			✓	8	✓	✓	✓	✓			✓				✓	✓	✓	✓	✓	✓				✓
19			✓	29	✓		✓				✓						✓		✓			✓		
20			✓	15		✓	✓			✓					✓		✓	✓	✓	✓				✓
21			✓	25	✓	✓			✓						✓	✓			✓		✓			
22			✓	31		✓	✓			✓					✓	✓	✓		✓		✓			
23			✓	28	✓	✓			✓						✓	✓			✓		✓			



## Appendix F

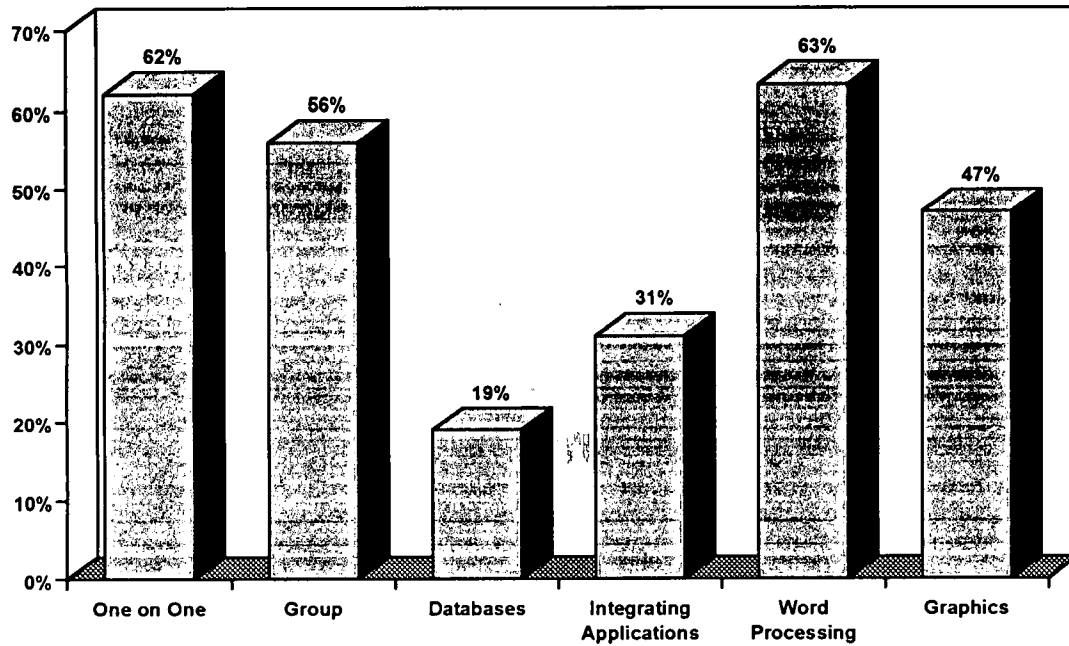
HIGH SCHOOL TEACHERS SURVEYED																								
#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 comp.	1 comp.	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1- 2xs a wk.	2- 3xs a wk.	4- 5xs a wk.
24			✓	8	✓	✓	✓				✓					✓	✓		✓		✓			
25			✓	6	✓	✓	✓	✓		✓					✓		✓		✓		✓			
26			✓	1	✓	✓	✓	✓	✓						✓		✓		✓		✓			
27			✓	13		✓	✓	✓	✓						✓		✓			✓				
28			✓	3		✓	✓	✓		✓							✓		✓			✓		
29			✓	36		✓	✓	✓			✓					✓	✓	✓	✓					✓
30			✓	7		✓		✓					✓	✓	✓		✓	✓	✓			✓		
31			✓	?	✓		✓	✓						✓		✓	✓	✓	✓	✓				✓
71			✓	22	✓		✓	✓					✓	✓		✓	✓				✓			
76			✓	11		✓	✓		✓								✓	✓	✓	✓	✓			
77			✓	13					✓						✓						✓			
78			✓	20	✓	✓			✓												✓			
87			✓	29	✓	✓		✓					✓			✓	✓	✓	✓		✓			✓
88			✓	15		✓		✓						✓	✓		✓	✓	✓	✓				✓

## Appendix F

HIGH SCHOOL TEACHERS SURVEYED																								
#	K-5	6-8	9-12	Years of Teaching	Apple	Mac	IBM	Graph. Cal.	0 comp.	1 comp.	2-5	6-10	11-20	21+	Lab	5.25	3.5	Inservice	Mgmt. Duties	Remediation	0 xs a wk.	1- 2xs a wk.	2- 3xs a wk.	4- 5xs a wk.
89			✓	13	✓	✓	✓	✓						✓		✓		✓	✓			✓		
91			✓	14		✓		✓						✓			✓	✓	✓		✓			
TOTALS					19	26	21	26	13	6	5	1	1	7	20	16	26	14	26	9	19	7	0	7
Percentages					58%	79%	64%	79%	39%	18%	15 %	3%	3%	21%	61%	48%	79 %	42%	79%	27%	58 %	21 %	0%	21%

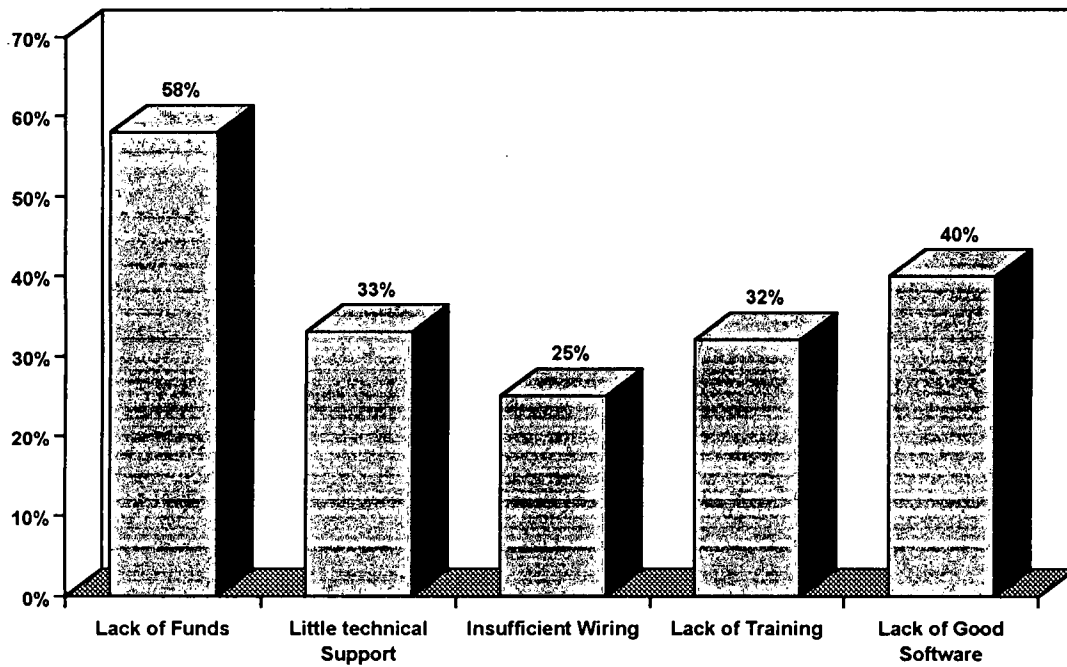
## APPENDIX G

### PERCENT AGE OF USE OF INSTRUCTION



## APPENDIX H

### NEGATIVE ASPECTS OF USING COMPUTERS



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