

A STUDY TO DETERMINE THE LEVEL OF
COMPUTER LITERACY IN SECONDARY BUSINESS,
MATHEMATICS, AND COMPUTER SCIENCE TEACHERS
IN THE STATE OF IDAHO

by

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APPROVAL

of a professional paper submitted by

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This paper has been read by each member of the graduate committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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CHAPTER I

INTRODUCTION

"Arguments over whether students should be taught the use of applications programs or taught to program appear increasingly to be more a matter of difference in degree than difference in kind. There is growing evidence that to the extent they are different, both sets of skills will be very important." (NAEP, 1986)

It is assumed that education should not only have as its objective to educate students, but also to teach those same students to educate themselves. Teachers cannot be expected to teach students everything they will need to be successful in the business world. The more education can be geared towards problem-solving and reasoning skills, the better adapted each student will be upon obtaining employment or continuing his/her education.

Need for the Study

Early computer literacy courses, which stressed learning to program in BASIC, were generally of poor quality in terms of teacher training, course curriculum, time allocated to computer use, ratio of computers to students, and type of hardware and software used. Teachers were basically untrained and minimally qualified; program instruction was inadequate in scope, depth and choice of language. (Lockheed 1986:21)

Currently, computer literacy is a term that has many

people, professional and non-professional, at a point of confusion. Computer literacy can be defined in a variety of ways and is dependent on the definer's interpretation. All seem to agree, though, that some level of computer literacy is necessary to be successful in the working world. The question is, at what level of computer literacy or computer competence is an individual deemed successful.

Statement of the Problem

The major purpose of this study is to determine the level of computer literacy of secondary Business, Mathematics, Science and Computer Science teachers in the state of Idaho.

Questions to be Answered

In the normal course of this paper, the researcher hopes to answer the following questions:

1. What is computer literacy?
2. What level of education was attained by those teachers currently using computers in their classrooms?
3. Which teachers are teaching computer literacy and computer programming courses?
4. What high school courses are currently utilizing computers?
5. Are new teachers (1-5 years) using more computers than teachers who have taught for more than 5 years?
6. How important do teachers feel computer skills are with respect to their teaching?

7. To what extent do teachers utilize computer skills in their teaching?
8. What do teachers feel are the most important computer skills for high school students to have?
9. What do teachers feel are the most important computer related goals in education?
10. Do teachers feel they are attaining these goals?
11. What are the strengths and weaknesses in the computer skills among the surveyed teachers?

Limitations of the Study

The researcher limited her study to secondary schools in Idaho, specifically business teachers, computer science teachers, science teachers and mathematics teachers. The purpose of surveying these categories is as follows. The majority of business teachers and science teachers specifically teach applications software; the majority of computer science teachers specifically teach programming languages and computer literacy; and the majority of mathematics teachers teach all three, computer literacy, programming and applications. Therefore, the researcher felt the need to survey all four categories to receive an accurate and clear view of the level of computer literacy in these areas.

Terminology

The following terminology is given to aid the reader of this study.

applications: The use to which a data processing system is put; for example, a payroll application, an airline reservation application, a network application. (Rosenberg, 1984)

applications software: Programs and packages designed to satisfy applications. (Rosenberg, 1984)

CAI: Computer Aided Instruction. A data processing application in which a computing system is used to assist in the instruction of students. (Rosenberg, 1984)

computer competence: turning the system off/on, getting the printer to print properly, properly setting parameters on communication equipment, copying selected files from one disk to another. (NAEP, 1986)

high school: Students in grades 9-12, business curriculum, computer science curriculum, science curriculum and mathematics curriculum.

information literacy: ability to manage the effective use of information technology and information resources. (Neal, 1987)

robotics: An area of artificial intelligence applied to the industrial use of robots doing repetitive tasks. (Rosenberg, 1984)

Summary

Computer literacy seems to mean something different to every individual at every level of education. Secondary schools must prepare their students to succeed in the working environment. This success must include some level of computer literacy.

"A personal approach is an exploration of the potential for productivity unencumbered by constraints imposed before the individual appears on the scene...Individuals are offered an opportunity to use the computer to accomplish their

jobs limited only by their own initiative, creativity and will to succeed. No limitations are imposed on the tools. The tool becomes an extension of the mind of the user." (Zembke, 1983:24)

If students are to succeed in the business world they must be knowledgeable of what the computer will do for them, and what the computer will do to them. Students need to realize the aspects of a computer in relation to its potential, limitation and impact on society.

CHAPTER II

REVIEW OF LITERATURE

Changing Trends

"The United States has evolved through periods of development classified as the agricultural age and the industrial age. The present period of development is often referred to as the information age. The source of power in the agricultural age was land; in the industrial age, capital. Information is power in the information age." (D'Onofrio, 1983:19)

Neal (1987) also noted that our society is changing from an industrial society to an information society. Information literacy is the key to the future, not computer literacy. Traditional trends stressed computer literacy, teaching it at the elementary and junior high level. Computer literacy education was at the knowledge, comprehension and application levels. The shift from computer literacy to information literacy is a necessary one. Current trends are stressing information literacy at the application, analysis/synthesis and evaluation levels. If we are to be effective teachers, we must teach at these higher levels. (Neal, 1987:14)

According to Lockheed (1986), early computer literacy courses, which stressed learning to program in BASIC, were generally of poor quality in terms of teacher training, course curriculum, time allocated to computer use, ratio of computers to students, and type of hardware and software used. Teachers were usually untrained and minimally qualified. The programming instruction was also inadequate in scope, depth

and choice of languages.

The outcome of this poor curriculum development was a negative association of girls' attitudes towards BASIC programming courses. In contrast, there was a positive association for boys. Girls were less likely to volunteer to take elective computer programming courses. By comparison, courses dealing with applications software seemed to appeal to both sexes more than courses dealing with programming.

Some of the current trends in computer literacy show alternatives to the original computer literacy courses. (Norton, 1988:7) Short term objectives of these current trends include an applications based curriculum emphasizing generalizable skills related to planning, gathering and interpreting data. Long term objectives include integrating computers as a tool for students and teaching computer applications in conjunction with the curriculum.

In the beginning, computer education was a programming education with logical operations and looping structures. Experts suggest that only 7% of all jobs between 1980 and 1990 will be occupations utilizing high technology. Although 75% of all jobs will relate to computers, they will be computer use, not computer programming.

Computer Literacy Defined

Computer literacy means something different at every level of education. (Zembke, 1983:24) What may be considered computer literate for one curriculum or grade may not be computer literate for another curriculum or grade. The definition of computer literacy is also interpreter dependent and constantly changing.

According to the National Assessment of Educational Progress Committee, computer literacy is defined as:

"the ability to turn a system off and on, to get the printer to print properly, to properly set the parameters on communications equipment, and copying selected files from one disk to another." (NAEP, 1986)

An alternate definition of computer literacy is stated as being:

"an understanding of the computer's capabilities and limitations, the ability to demonstrate a fundamental knowledge of computers and their effects on society, the ability to communicate to others using computer vocabulary, the ability to operate the computer effectively, the ability to access information in the computer, the ability to input information with speed and accuracy using keyboarding skills, and the ability to use the computer as a tool for problem-solving." (Neal, 1987:15)

The definition of computer literacy, according to Malpiedi, is progressive and ever changing.

"Computer literacy, in general, means having the understanding and skills needed to live in a society that is increasingly dependent on computer technology. Initially in the 1970's, a computer literate person was someone who had learned to write programs. Meanwhile, computer instruction at the post-secondary level was focusing on the use of computers in business applications or research. In this setting, a computer literate person could use

the mainframe data processing procedure. When Radio Shack TRS80 and Apple II's hit colleges and some high schools, the computer literate person was expected to use a microcomputer. By 1982, the definition of computer literacy had broadened considerably. Computer literacy included the ability to operate computers, use applications software, comprehend robotics, and solve problems through programming and simulations." (Malpiedi, 1989:24)

Computer literacy has also been defined using a much broader interpretation of the word.

"Computer literacy is defined as programming skills, computer awareness, computer vocabulary, computer ethics, knowing how a computer works, and the advantages and disadvantages of computers." (Norton, 1988:7)

The Northwest Council for Computer Education has defined computer literacy as:

"a general education computer course that tends to emphasize basic knowledge about computers and computer technology needed by all students in colleges and universities, a general understanding of how a computer operates, computer-oriented terminology, applications of computers and the impact of computers on society." (Moore, 1984:48)

Relevance of Computer Literacy

"Arguments over whether students should be taught the use of applications programs or taught to program appear increasingly to be more a matter of difference in degree than difference in kind. There is a growing evidence that to the extent they are different, both sets of skills will be very important." (NAEP, 1986)

The following are results of a report on training for working in the computer age prepared by the National Commission for Employment Policy. Teachers and students need not fear being passed over for jobs because they lack computer expertise. Because, most workers learn what they need to know

on the job and do not need extensive training or computer courses. Also, the report stated that only 5% of all jobs (in the workforce) require technical expertise on computers, less than 1% of the workforce by 1995. (Because so few workers will need advanced computer training to do their jobs, the schools should recognize the lack of value in teaching programming in computer literacy courses.)

As a difference of opinion, Noble (1984) states that computer literacy is a useless term. He continues on to state:

"people do not have to be computer literate in today's society. With the trends in computers, manufacturers work to invent computers that no one knows are computers. With manufacturers thinking along these lines, the consumer does not need to be computer literate. Computers in education are at the "Kitty Hawk" stage and are spread so thin that it is hardly considered a computer revolution; students do not need to be computer literate. Less than 7% of all new jobs between 1980 and 1990 will be high technology positions; the worker does not need to be computer literate. In society, one only needs political understanding and a knowledge of who controls the direction, they do not need to understand the technology behind "Star Wars" or an unmanned factory; society does not need to be computer literate."

Value of a Needs Assessment

What Nobel says appears to be true. An individual does not need to be computer literate to be a successful citizen. Again, computer literacy means something different at every level of education. (Zembke, 1983:24)

Computer literacy may no longer mean an indepth knowledge of hardware and proficiency in many programming languages.

The first step in defining computer literacy is an assessment of needs. (Zembke, 1983:24). Zembke also defines two approaches to computer literacy. The first approach is termed the institutional approach. Computers are brought in, hooked up in a line, the limits of use are imposed, and the product of each machine is assembled into one unit at the end. A person is brought in and instructions are given on how to use the tool. The second approach is termed the personal approach. It is an exploration of the potential for productivity unencumbered by constraints imposed before the individual appears on the scene. Individuals are offered an opportunity to use the computer to accomplish their jobs, limited only by their own initiative, creativity and will to succeed. No limitations are imposed on the tools. The tool becomes an extension of the mind of the user.

After defining computer literacy to fit your educational need, an educational philosophy regarding computers must be developed. Step two is bringing those findings back to your supervisor. Research is done to decide what you want as objectives. Find those within your system who can perform those objectives. In this phase, both successful and unsuccessful users can be helpful.

Step three is to tailor computer literacy to your needs and write objectives relatively general and system independent.

Step four is to quantify the need. Find out where people are in contrast to where they should be. This helps gear

training to achieve maximum effectiveness.

Step five is to take these recommendations back to your supervisor.

Upon completion of these five steps, computer literacy will be tailored to your organization and objectives developed. (Zembke, 1983:24)

Attitudes of Teachers

A test was administered (Woodrow, 1987:27) to determine if there was a measurable difference between attitudes of teachers predisposed towards the educational use of computers and teachers in general, if there was a measurable difference between attitudes of student teachers predisposed towards the educational use of computers and student teachers in general, and if there was a measurable difference between teachers predisposed towards the educational uses of computers and student teachers.

Woodrow's study concluded there are measurable differences in attitudes and there is a need for more education for teachers. In addition to this result, it was also found that high school students should be computer literate upon graduation, teachers do not feel strongly confident in their ability to teach computer literacy, teachers strongly agree on the potential usefulness of computers in all areas of education and teachers would like the opportunity for further training.

Teacher Competencies

A study was done to determine the current status of teachers with relation to computers. (Stockman, 1986) This study researched an instructional design consisting of the knowledge, process and attitudinal domains of 23 teachers.

In the pre-assessment study of the level of comfort 61% of the teachers said they had no comfort with computers, 31% had some comfort, and 8% said they were comfortable with computers. When pre-assessing the level of knowledge 52% said they had no knowledge, 35% said they had some knowledge, and 13% said they were knowledgeable about computers. Stockman's study suggested the following objectives in the field of knowledge. Participants will be able to demonstrate a working knowledge of computers by engaging in hands-on experiences and will be able to locate features and characters on the keyboard. In the field of processing the following objectives were suggested. Participants will actively participate in computer activities regardless of outcomes and participants will experiment with given activities. In the field of affective objectives the following were suggested. Participants will willingly help others who need help, participants will choose to do computer activities during their free time, participants will choose partners to accomplish problem-solving tasks, and participants will react favorably to professor guidance in assuming lower level computer tasks or more challenging computer tasks.

Possible strategies for training educators and teacher

trainees were determined by Worth. (1984) These competencies are as follows. The teacher will know the capabilities of microcomputer systems, the operation of microcomputer systems including terminology, some appropriate methods for evaluating software, ingredients of a programming language (usually BASIC), the societal effects of the microcomputer as an element in the age of information, and how to survey educational materials. Worth states these are the general competencies and additional competencies may be added relevant to specific curriculum.

The Northwest Council for Computer Education funded a project to develop a set of guideline competencies to aid in the development of teacher training programs. Three areas of concern became apparent in this development: general education, computer education and computer science education.

Competencies recommended for teachers teaching in the general education area stated the teacher should:

1. have an appreciation for using the computer as a tool for solving problems
2. have the experience of using computers in learning subject matter
3. have the knowledge of computer vocabulary
4. be able to use the computer as a tool
5. be familiar with the computer hardware, including the everyday operations and use of a variety of machines

Competencies recommended for teachers teaching in the computer education area stated the teacher should:

1. be familiar with computerized teaching materials
2. understand how computer use fits into a teacher's specialized area
3. be able to integrate effective computerized teaching materials into classroom activities

4. be able to evaluate the appropriateness and effectiveness of infusing computerized materials into specific training/learning situations
5. be familiar with sources of information on computers in education
6. have knowledge in the use of computers to enhance student writing
7. be knowledgeable about computer-managed instruction systems
8. be able to discuss moral, psychological and sociological issues of computing in society
9. be familiar with audio-visual materials suitable for use with computer-related subjects

Competencies recommended for teachers teaching at the secondary level in the computer science education area stated the teacher should:

1. meet the GENERAL competencies
2. be familiar with the suitable range of computing topics at the secondary level
3. understand the concept of structured programming
4. have knowledge of the criteria for creating efficient and well-structured computer programs
5. be familiar with educational materials available for computer science education
6. understand the basic architecture of computers
7. be able to compare and contrast programming languages suitable for secondary school level
8. be able to discuss and develop learning situations for moral, psychological and sociological issues of computers in society
9. be able to write readable, well-structured programs in at least two programming languages
10. utilize learning psychology for secondary students to interpret and design activities
11. be able to explain general algorithms and data structures
12. have knowledge of techniques used in programming graphics
13. be able to explain graphics capabilities of a computer and programming using graphics techniques
14. understand the basic architecture of high-level languages
15. be able to interface a computer to simple devices to demonstrate its capability for data collection and/or control applications

Curriculum Development

In the beginning, computer education was a programming education with logical operations, looping and languages. Norton's findings (1988) showed computer education as three separate curricula. A computer literacy curriculum was defined as programming skills, computer awareness, computer vocabulary, computer ethics, how a computer works, and the advantages and disadvantages of computers. His findings also showed that the knowledge of computers and the use of computers cannot be separated. The most important parts of the computer literacy curriculum are best learned in other classes; word-processing in English, graphics and spreadsheets in Math and Science, database management in Social Sciences, and art packages in Art.

A second curriculum, computers as a tool, views the computer as a tool which extends human intellectual power as other tools have extended human physical powers. It includes the teaching of skills associated with the use of a variety of applications software; ie word-processors, database management systems, spreadsheets and graphics. One problem discovered during the study showed that computers were not neutral, we must study what computers can do for us and what computers are doing to us. Database management systems are of minimal use if we do not know how to manage data. Tool applications are only worthwhile when students are prepared to use them to solve problems.

The third curriculum, centered on problem-solving,

enhanced students' ability to solve problems and helped them become better problem solvers in the real world.

From these findings Norton (1988) suggested an integrated curriculum; an evolving curricular model. An integrated model appeared to be the most beneficial when used to support existing curriculum. Given the curriculum objectives for a particular subject/grade level, the best computer curricula are those which determine where and how the instructional capability of the computer can be beneficially "infused" into lessons designed to help students achieve the objectives of an established curriculum. At first glance the computer integration curriculum seemed promising. It addressed programming, literacy, problem-solving, and tool curriculum. Also, it was manageable; rather than adding additional classes or competencies to already overcrowded teaching schedules, it fit nicely into already existing curricular structures. It was a component of the overall teacher designed and implemented lesson plan. Problems included its failure to recognize the unique potential of the computer and current changes in society. The curriculum rests on a concept of learning and education which emphasized the mastery of a set of basic skills and basic knowledge. An evolving curricular model has the potential to push curricular goals beyond current boundaries.

In partial agreement with Norton, Frey (1988) found that computer education in the Federal Republic of Germany was based on two similar models. The distribution model, an

introduction to computers in 5 - 10 different subjects, was a model of educational policymakers. These policymakers emphasized rapid and widespread application of computers in schools to compliment computer application in trade and industry. If schools were like trade and industry the country would prosper.

The second model, an integration model consisting of 60 - 120 hours of computer courses, showed the following. The first encounter with the world of computers at school would not merely involve using machines, but would have immediate relevance as a distinct subject matter itself. Students would encounter all the important aspects of computers, computer history and the effects on society. Young people would encounter a phenomenon from all angles, analyze it as far as possible and be able to manipulate it very thoroughly.

Objectives and Goals

Blurton (1984) listed objectives for grades K-12 with respect to computer awareness and programming. Below are the objectives for grades 7-12.

<u>Grade</u>	<u>awareness</u>	<u>programming</u>
7th	modeling robotics social issues data bases	BASIC: 1 dimensional arrays BASIC: functions
8th	computer crime algorithms	BASIC: 2 dimensional arrays graphics: sound & color
9th	computer capabilities computer related fields	BASIC: simulation programs matrices, files PILOT: introduction

10th	prediction, interpretation, generalization of Artificial Intelligence	PASCAL: introduction
11th	computer systems sampling techniques statistical applications	PILOT: programming sampling techniques statistical applications
12th	computer survival invasion of privacy	PASCAL: advanced data BASIC: advanced

An instructional microcomputer project for Arkansas, done by the Arkansas State Department of Education (1985), listed the following as goals for computer education, grades 9 - 12.

1. Students should understand and use computer terminology when discussing this form of technology.
2. They should have a good understanding of the capabilities and limitations of the computer.
3. They should interact with a computer using a variety of commands and software for CAI or problem solving.
4. They should be able to apply the knowledge gained about computers to the pursuit of career goals.
5. They should value ethics and legal responsibilities concerning the computer.

While attaining these goals, it was hoped that students would still be given the opportunity to advance their computer education through experiences in programming, an awareness of hardware and software, and their utilization and application of a computer system in simulating or solving practical problems.

CHAPTER III

PROCEDURES

Introduction

The major purpose of this study was to determine the level of computer literacy of secondary Business, Mathematics, and Computer Science teachers in the State of Idaho.

The purpose of this chapter is to 1) describe the sources of data, 2) explain the construction of the survey instrument, 3) explain the administration of the survey instrument, and 4) describe the procedure for the analysis of data.

Sources of Data

The data for this study were obtained from the following sources.

Research articles from Montana State University, Renne Library, utilizing the ERIC computer search system and reference and journal articles.

Data from a survey instrument administered to Idaho secondary school teachers, grades 9 - 12, class I, II, III and IV. The sample will be a stratified random sample consisting of business, computer science, science and mathematics teachers.

Construction/Design of Survey Instrument

A survey instrument was used for this study. The review of literature provided the basis for the content of the survey form.

The survey instrument was sent to secondary high school computer science, science, mathematics and business teachers

in the state of Idaho. The instrument contained questions relating to the following areas:

- (1) A relevant definition of computer literacy.
- (2) The level of computer literacy of teachers currently teaching business, mathematics, science and computer science.
- (3) Current goals of business, mathematics, science and computer science teachers who utilize computers in their curriculum.
- (4) The extent to which teachers actually use their computers.
- (5) The attitude differences between teachers who had been teaching more than five years and those who have been teaching fewer than five years.

In addition to these areas, the researcher hopes to find the following.

- (1) What teachers who are using computers actually teach.
- (2) What teachers feel are the most important computer goals in education.

The initial survey instrument was reviewed by the researcher's advisor, Dr. Norman Millikin, College of Business, Montana State University. At that time, revisions were made to clarify the questions and to include statements necessary to obtain the desired information. Upon completion, the instrument was tested on a selected group of high school business, computer science, science and mathematics teachers at Kellogg High School, Kellogg, Idaho. Final revisions were made with the approval of Dr. Norman Millikin.

Administration of Survey Instrument

February, 1990 Pilot survey, Kellogg High School
May 1, 1990 Mail survey/cover letter to sample
population
July 1, 1990 Conclude data collection

Analysis of Data

The data will be analyzed in narrative or graphical format. Each of the original questions from Chapter one will be addressed individually followed by the corresponding narrative and graphical presentation.

CHAPTER IV

ANALYSIS OF DATA

Introduction

A description of the data obtained from the survey administered in this study is presented in this chapter. The information collected from this survey was used to determine the level of computer literacy of secondary Business, Mathematics, Science and Computer Science teachers in the state of Idaho.

This data was also used to answer the following questions.

1. What is computer literacy?
2. What level of education was attained by those teachers currently using computers in their classrooms?
3. Which teachers are teaching computer literacy and computer programming courses?
4. What high school courses are currently utilizing computers?
5. Are new teachers (1-5 years) using more computers than teachers who have taught for more than 5 years?
6. How important do teachers feel computer skills are with respect to their teaching?
7. To what extent do teachers utilize computer skills in their teaching?
8. What do teachers feel are the most important computer related skills for high school students to have?
9. What do teachers feel are the most important computer related goals in education?

10. Do teachers feel they are accomplishing these goals?
11. What are the strengths and weaknesses in computer skills among the surveyed teachers?

Biographical Overview

There were two hundred Idaho secondary teachers involved in this study. Two hundred surveys were mailed to this population. Sixty-two percent (124 of 200) of the subjects returned their surveys.

Analysis of the Data

Question #1 addressed the issue of a viable definition for the term "computer literacy". The researcher found this question difficult to answer. The term "computer literacy" was found to be interpreter dependent and constantly changing. Definitions ranged from "the ability to turn a system off and on" to "the ability to operate computers, use applications software, comprehend robotics and solve problems through programming and simulations".

Question #2 addressed the respondent's level of education. Fifty-one percent of the respondents had attained a bachelor's degree, 47% a master's degree, and 2% a doctorate's degree. These findings were consistent with the researcher's expectations. The levels of education are graphically shown in Figure 4.1.

Level of Education of Respondents

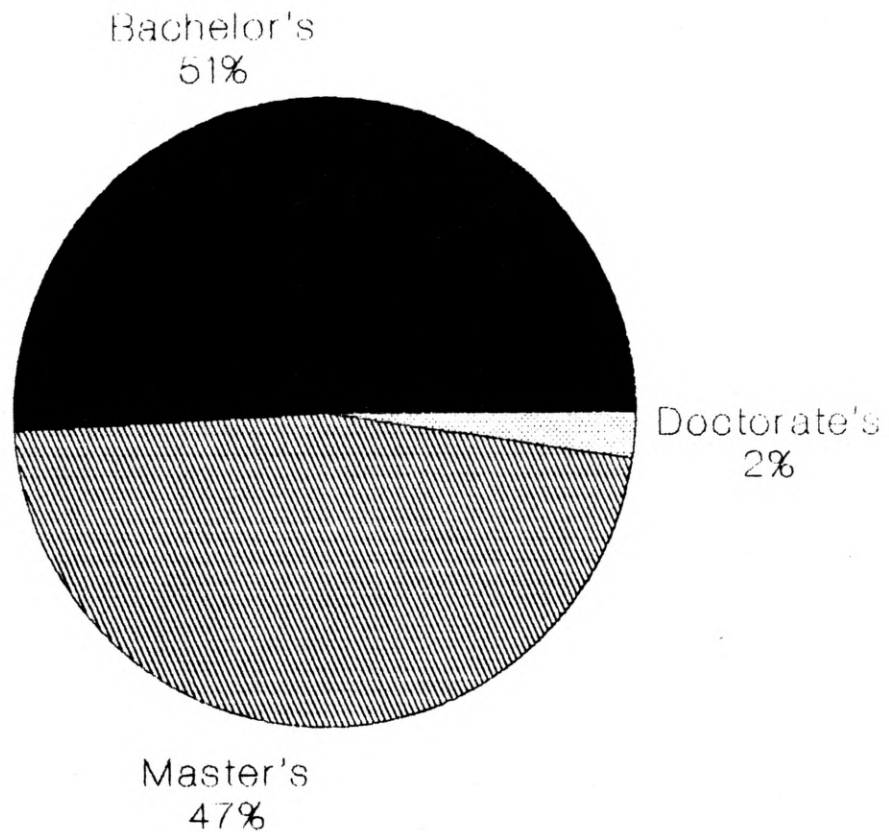


Figure 4.1
25

Question #3 asked which respondents taught a computer literacy or computer programming course. Of those teaching a computer literacy or computer programming course, 5% were mathematics teachers, 19% were computer science teachers, 5% were business teachers, and 70% were teaching a combination of mathematics, computer science, business, or science. These findings not only showed the researcher who was teaching the computer literacy or computer programming courses, but also that there are very few teachers who teach strictly in the computer science curriculum. The percentages of respondents teaching computer literacy or computer programming courses are shown in Figure 4.2.

CL/CP Instructors By Curriculum

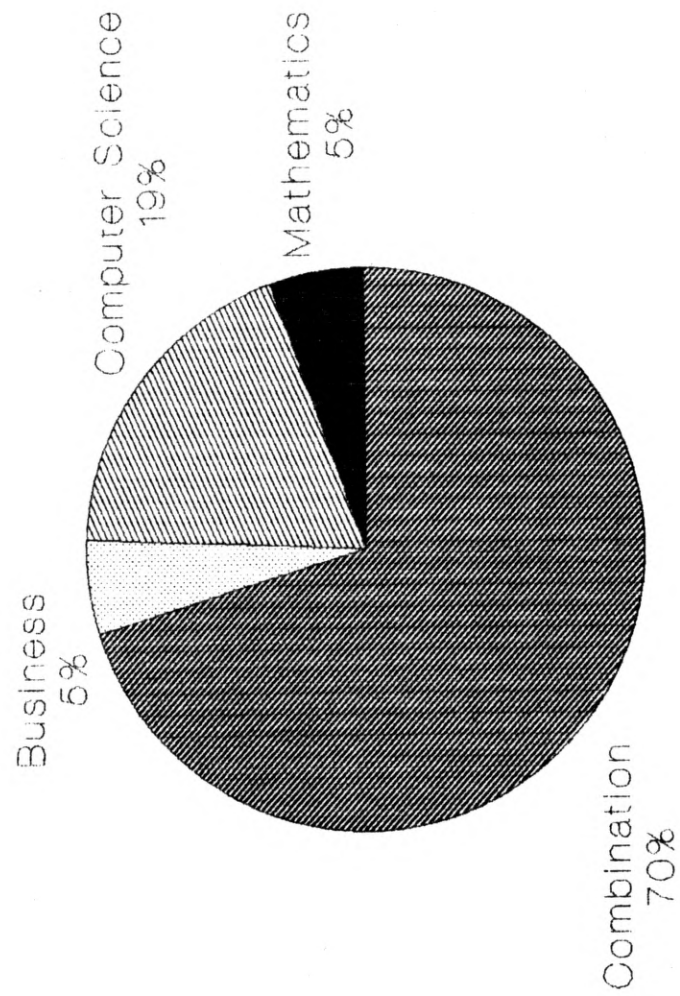


Figure 4.2

Question #4 asked respondents, of those courses they were currently teaching, which were utilizing computers. Word processing courses utilized computers more often than computer programming and computer literacy courses. This finding surprised the researcher. As shown in Figure 4.3, 31% responded they utilized computers in their Word Processing courses. This percentage may seem low since it is based on the responses of the total sample. Of those teachers who actually teach a Word Processing course, 100% utilize computers.

Courses Utilizing Computers By Percentages

<u>COURSE</u>	<u>PERCENTAGE</u>
Word Processing	31
Computer Programming	25
Computer Literacy	23
Keyboarding/Typing	16
Accounting	15
Office Procedures	14
Algebra I & II	13
Record Keeping	10
Basic Math	9
Biology, Chemistry	8

Figure 4.3

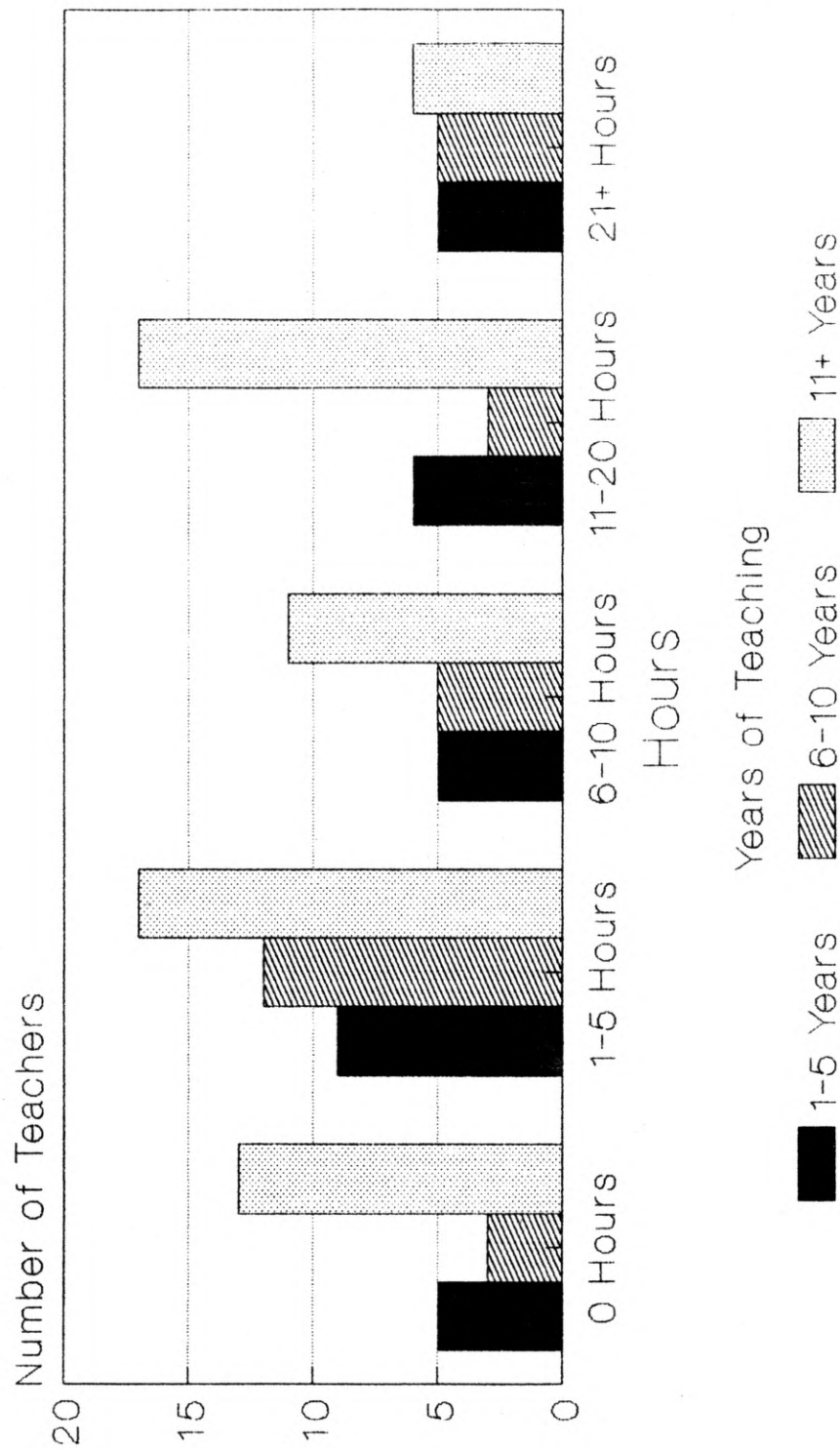
Question #5 asked respondents how many hours they utilized computers in class on a weekly basis and how many years they had been teaching. The findings were as follows.

Of those teaching 1-5 years, 5 indicated they did not use the computer on a weekly basis, 9 used the computer 1-5 hours, 5 used the computer 6-10 hours, 6 used the computer 11-20 hours, and 5 used the computer more than 21 hours.

Of those teaching 6-11 years, 3 indicated they did not use the computer on a weekly basis, 12 used the computer 1-5 hours, 5 used the computer 6-10 hours, 3 used the computer 11-20 hours, and 5 used the computer more than 21 hours.

Of those teaching 11 or more years, 13 indicated they did not use the computer on a weekly basis, 17 used the computer 1-5 hours, 11 used the computer 6-10 hours, 17 used the computer 11-20 hours, and 6 used the computer more than 21 hours. Those respondents with 11+ years of teaching experience utilized more computer hours than those with 1-5 or 6-10 years. This difference surprised the researcher as it was expected that newer teachers would be the heaviest users. The correlation between these three categories of teachers and their level of computer usage is shown in Figure 4.4.

Weekly Computer Usage By Years of Teaching Experience



Graph 4.4

Question #6 addressed the importance of computer skills in the teaching process. Eight skills on the survey instrument were specific to computer usage in the teaching process. Of those skills 56.60% responded with a low level of importance, 32.96% a medium level and 10.54% a high level. These findings concur with what the researcher expected. Figure 4.5a graphically shows this data.

Question #7 asked to what extent respondents utilized computers in the teaching process. The levels of weekly usage of the eight skills specific to the teaching process were somewhat uniform. Twenty five and seven tenths percent responded a low usage, 39.83% a medium usage and 34.47% a high usage. This surprised the researcher as she felt the level of computer usage in the teaching process would be much higher. Figure 4.5b graphically shows this data.

When comparing the high level of usage with the high level of importance in the skills specific to the teaching process, the researcher found an important variance. In seven of the eight skills, it was evident the level of usage was much higher than its corresponding level of importance. Only in one skill was the level of importance significantly higher than the level of usage. These findings are graphically shown in Figure 4.5c.

LEVEL OF SKILL IMPORTANCE

In the Teaching Process

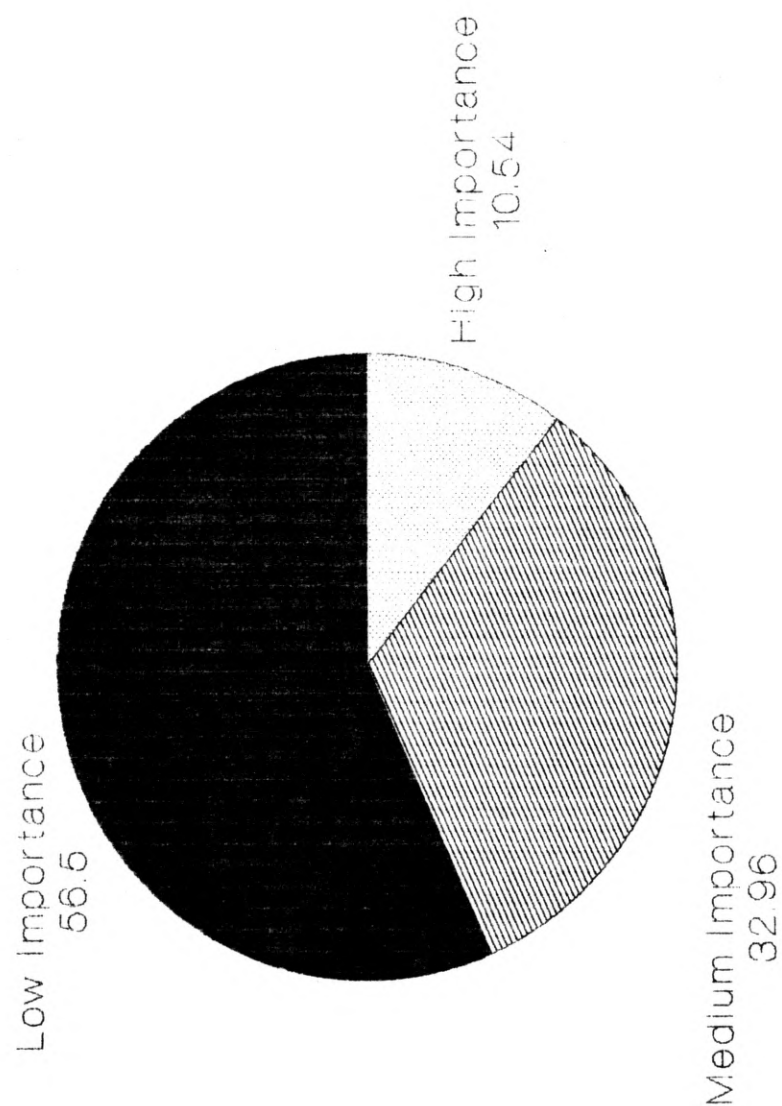


Figure 4.5a

LEVEL OF SKILL USAGE In the Teaching Process

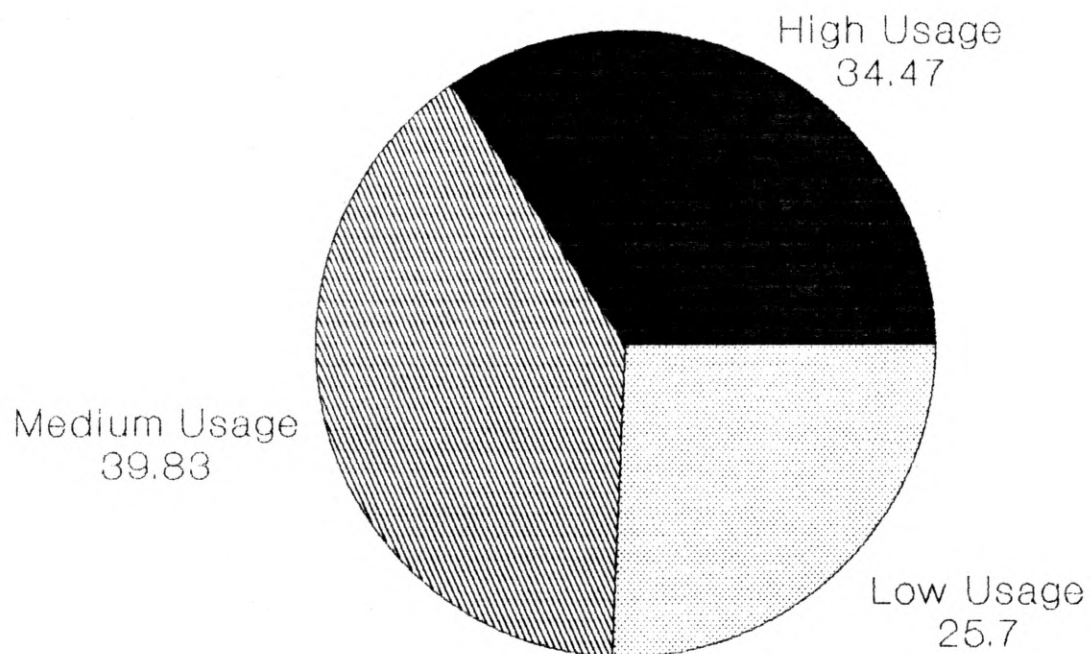


Figure 4.5b
34

COMPUTER SKILLS IN TEACHING

Importance and Usage

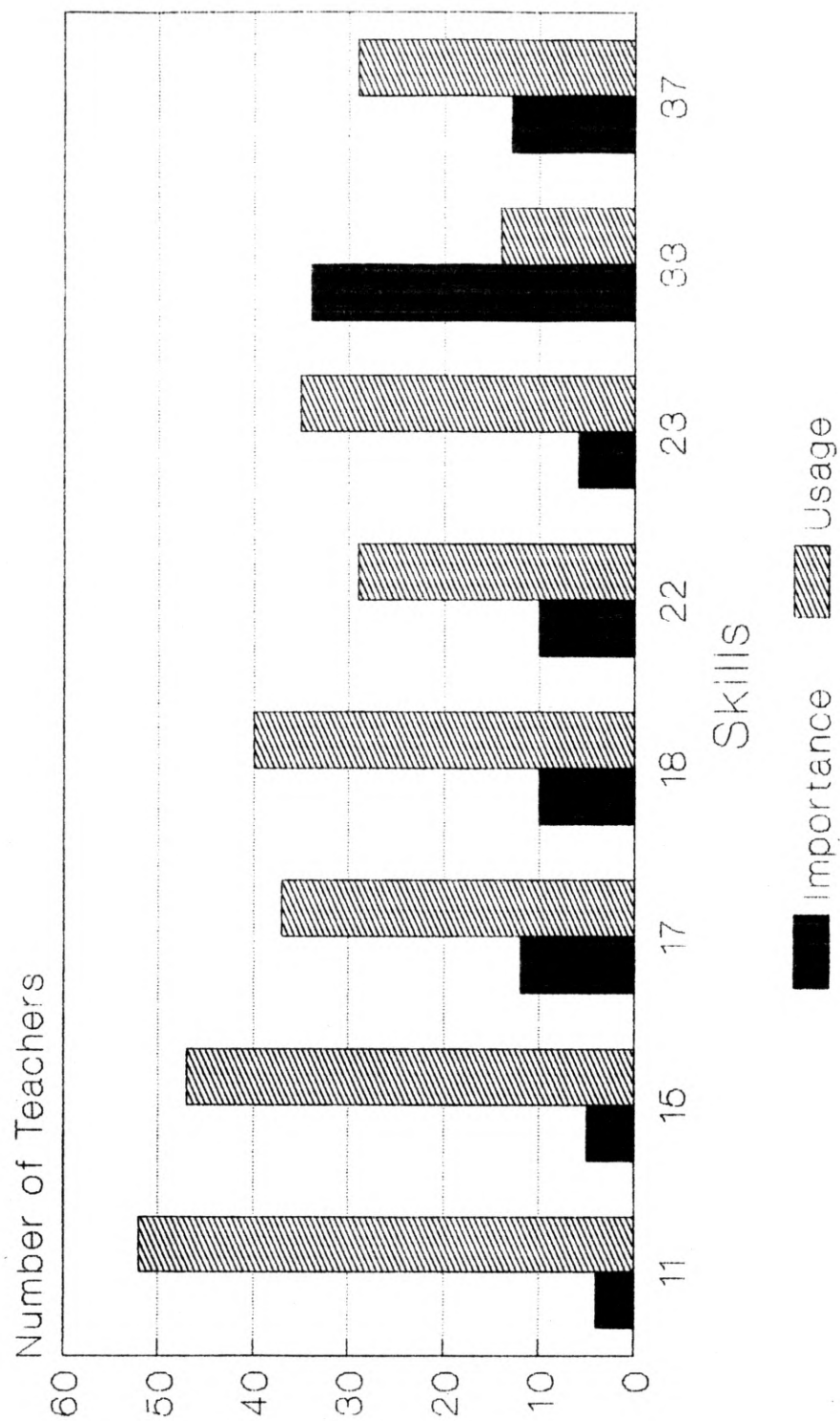


Figure 4.5c

Question #8 asked respondents which computer skills they felt were most important for high school students to learn. As expected by the researcher, using the printer to print output, loading, running and storing a program on diskette, and using a word processor were among the top ten. This data is shown in Figure 4.6.

Top Ten Skills By Percentages

<u>SKILLS</u>	<u>PERCENTAGE</u>
Use the printer to print output	84.4
Run a program from a diskette	80.8
Use word processing	80.7
Load a program from diskette	79.0
Properly store a diskette	78.8
Interpret keys on the keyboard	78.8
Save a program on diskette	75.2
Boot a computer	74.6
Supervise student activities on the computer	73.5
Correct typing errors using the keys	72.6

Figure 4.6

Question #9 asked respondents which computer goals they felt were most important for high school students to attain. Seventy-one and six tenths percent of the respondents felt that teaching the "hands on" approach was the most important goal. Other important goals included helping the student recognize the effect of computers on society and their everyday lives, understanding the potential in using computers as a tool for learning and problem solving and developing an awareness of its capabilities. The top ten goals from the responses are listed in Figure 4.7.

TOP TEN GOALS

By Percentages

GOALS	PERCENTAGE
The student participates in a variety of experiences using the computer in several subject areas (hands on)	71.6
The student uses computers as a tool for inquiry, problem solving and recreation	60.0
The student recognizes the effects of computers on society, directly and indirectly	51.3
The student shows an awareness of ethical obligations and legal responsibilities related to computer use, software and individual rights	51.3
The student identifies applications and limitations of the computer	49.6
The student acquires knowledge of business applications of computers as they affect the student's everyday environment	49.5
The student utilizes computers for examining issues, solving personal and social problems, and satisfying personal curiosity	44.3
The student recognizes the importance of making responsible decisions concerning computer uses which affect the student's everyday environment	43.5
The student relates knowledge about computers to career goals and identifies opportunities in computer related fields	40.0
The student shows an awareness of the aesthetic capabilities of the computer such as graphics, music, speech and simulations	40.0

Figure 4.7

Question #10 asked respondents whether they felt they were accomplishing these ten goals (shown in Figure 4.7a), The data reflected the following.

The level of accomplishment achieved with goal 1 was 25%, goal 2 was 33%, goal 3 was 24.8%, goal 4 was 17.4%, goal 5 was 15.9%, goal 6 was 22.6%, goal 7 was 7.3%, goal 8 was 13.8%, goal 9 was 11.9%, and goal 10 was 16.4%.

As suspected by the researcher, the level of accomplishment was amazingly below the level of importance. In nine out of ten goals, the level of accomplishment was less than 50% the level of importance, on some goals less than 25%. Figure 4.8 shows the correlation between the level of importance and level of accomplishment of the top ten goals.

Top Ten Goals

Importance and Accomplishment

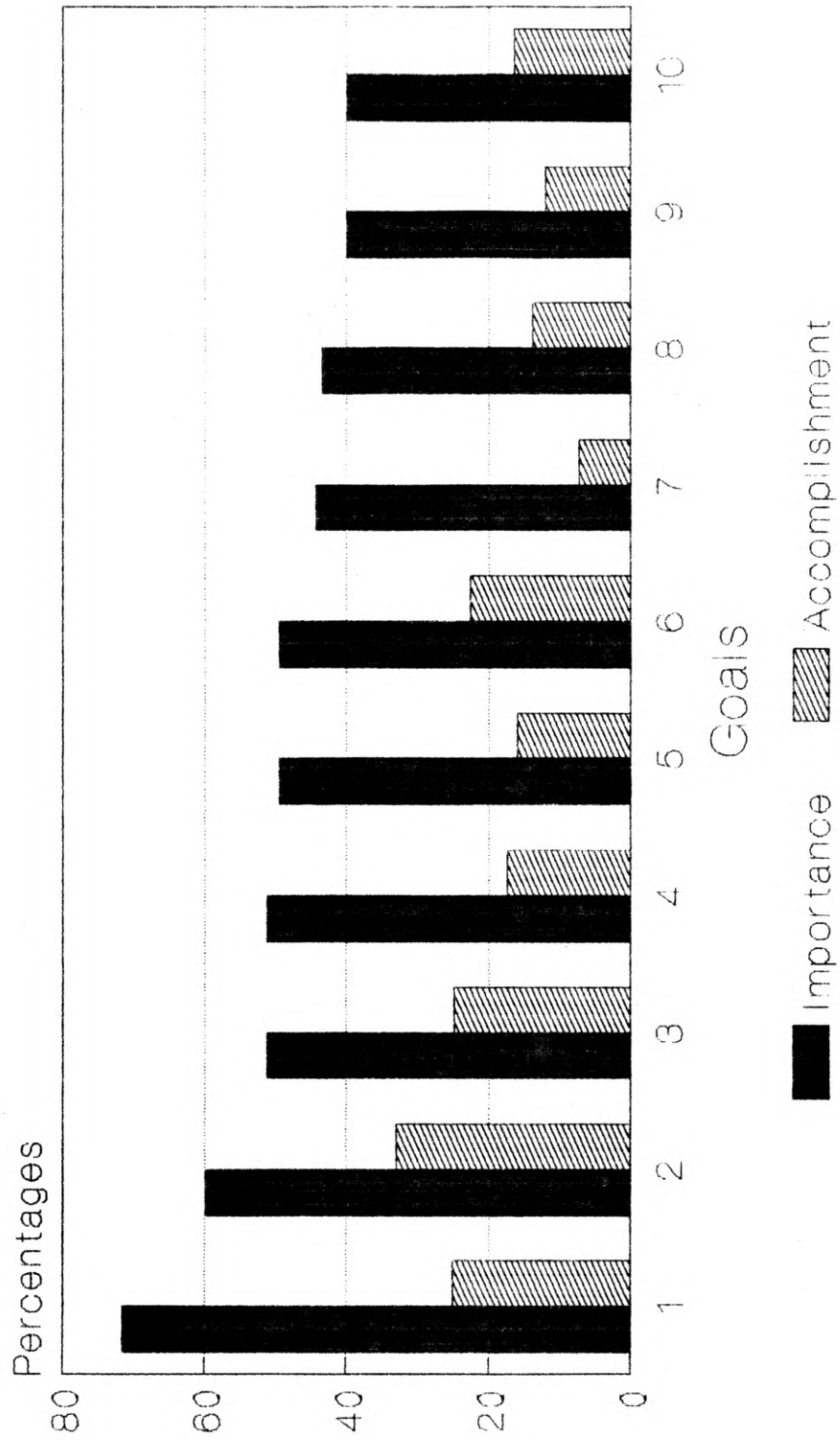


Figure 4.8

Question #11 asked the respondents to evaluate their level of comfort in using the skills listed on the survey instrument. The majority of their computer strengths involved the basic skills of loading, running and storing diskettes. Computer weaknesses included the more complex skills of identifying hardware related problems, selecting appropriate hardware and software, locking and unlocking programs and interpreting documentation. These findings concur with what the researcher expected. The responses are shown in the Figures 4.9a and 4.9b as the strengths and weaknesses of those surveyed.

Teacher Strengths By Computer Skills

<u>SKILL</u>	<u>PERCENTAGE</u>
Properly store a diskette	82.6
Load a program from a diskette	80.2
Correct errors using keyboard	79.2
Use printer to print output	76.9
Run a program from diskette	76.7
Boot a computer	74.4
Save a program to diskette	74.2
Properly label diskette	73.1
Interpret keys on the keyboard	68.1
Supervise student activities	64.5

Figure 4.9a

Teacher Weaknesses

By Computer Skills

<u>SKILLS</u>	<u>PERCENTAGE</u>
Identify hardware related problems	48.7
Unlock program on diskette	45.9
Develop an instructional program	44.9
Lock a program on diskette	42.1
Make small editing changes in a program	38.8
Use spreadsheet programs	36.4
Interpret documentation	31.6
Identify related software	31.6
Maintain office inventory, phone and mail lists	31.6
Select appropriate hardware	30.8

Figure 4.9b

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This study was conducted to determine the level of computer literacy of secondary Business, Mathematics, Science and Computer Science teachers in the state of Idaho.

Summary of Findings

Responses came from 62% of the total sample surveyed (124 out of 200). Because of the striking variance in the definition of the term "computer literacy" the researcher found herself unable to determine the level of computer literacy of secondary Business, Mathematics, Science and Computer Science teachers in the state of Idaho.

Conclusions

After a thorough analysis of the data obtained from this study, the following conclusions are presented.

1. The definition of computer literacy was found to be interpreter dependent. What may be considered computer literate for one curriculum or grade may not be computer literate for another curriculum or grade. Computer literacy must be tailored to the educational needs of the individual, department or curriculum. This concurs with the findings of Zembke (1983).
2. The most important goal in computer literacy education addresses the practice of "hands on" experience in a variety of subject areas. In addition, students should show an awareness of the ethical obligations and legal responsibilities when using the computer. Computer programming is no longer the main goal in computer literacy education. It has been replaced with the ability to use a variety of applications software

packages and with the ability to transfer the skills learned to other applications software packages. The findings of this study concur with the findings of Norton (1988) and the Arkansas State Department of Education (1985).

3. Teachers feel students should know the basic computer skills related to computer hardware and software. These basic skills include knowledge of diskettes, care and usage; knowledge of hardware, turning the computer off/on and being able to print; and knowledge of software, having an awareness of a variety of applications software packages.
4. Teachers who have been teaching 11 or more years utilize computers in the classroom much more than those teaching 1-5 or 6-10 years. According to Lockheed (1986) teachers are basically untrained and minimally qualified to teach computer education. The reason for this finding may justify further research.
5. The level of comfort in computer usage among teachers is increasing. A study involving teachers and their level of comfort in using computers was conducted by Stockman (1986). The results of Stockman's study showed 8% of the respondents felt comfortable using computers, 31% showed some comfort and 61% showed no comfort at all. These findings are in disagreement with the findings of the researcher. Survey results showed a high level of comfort in 50% of the respondents, a medium level in 32%, and a low level in 18%.
6. Even though there was no major difference between the levels of usage of computer skills in the teaching process, there was a difference between the levels of importance among those skills. Many teachers felt the skills they had and used so frequently were low in level of importance.
7. Teacher's strengths included the basic functions of starting, running and printing programs. Their weaknesses included more complex functions of identifying hardware related problems and software identification. These findings parallel the findings of Lockheed (1986).

Recommendations

Based upon the review of related professional literature and information compiled by this study on the level of computer literacy and conclusions drawn from the analysis of the study, the following recommendations are presented.

1. The researcher recommends that the state of Idaho determine a relevant definition for the term "computer literacy". This definition should contain computer related skills and goals fitting the level of computer literacy desired by the state of Idaho.
2. The researcher recommends that each secondary department or curriculum develop a needs assessment in conjunction with that of the state of Idaho to determine their definition of computer literacy and how that level of computer literacy could be obtained.
3. The researcher recommends that Teacher Education Programs in the state of Idaho evaluate the needs of the secondary computer oriented curriculums and develop a program to meet those needs. The researcher also recommends that this evaluation show the change from a computer programming based curriculum to an applications software based curriculum.
4. The researcher recommends that teachers be better educated in the area of computers and how they relate to the teaching process. Teachers should be made more aware of the benefits and advantages of computers in the classroom and/or be given more support to increase their usage.

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APPENDICES

February 1, 1990

Dear (teacher's name);

Computer education has come to play an important role in our American society. Arguments have been made over whether students should be taught the use of applications programs or taught to program. There is growing evidence that to the extent these skills are different, both will be very important.

I am currently conducting a study to determine the computer literacy education goals for Idaho and to evaluate the skills that teacher's feel are important in the field of computer education.

You have been identified as a knowledgeable teacher in the area of computer education in Idaho. With your help I will be able to attain the information necessary to evaluate teacher's opinions of computer education. Your opinions and input are valuable to the study. I have enclosed a survey that should take approximately 15 minutes. All responses will be confidential. Please complete this survey and return it in the enclosed envelope by March 15, 1990.

Feel free to include any other skills, goals or suggestions you may have to help improve computer education in Idaho's secondary schools. If you would be interested in the results of this survey, please indicate on the last page. Thank you for your help.

Sincerely,

Karen J. Wasson, Instructor
Kellogg High School
Kellogg, Idaho

SKILLS

Rate the following SKILLS by YOUR level of comfort, your usage in the classroom, and your opinion of the importance of that skill in a quality education. Enter N/A in not applicable.

SKILLS	YOUR Level of Comfort			Usage in the Classroom			Importance in Education		
	HI	MED	LOW	HI	MED	LOW	HI	MED	LOW
Run a program from a diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Select effective computer software	_____	_____	_____	_____	_____	_____	_____	_____	_____
Boot a computer	_____	_____	_____	_____	_____	_____	_____	_____	_____
Properly store a diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Load a program from a diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Correct typing errors using the keys	_____	_____	_____	_____	_____	_____	_____	_____	_____
Properly store computer hardware	_____	_____	_____	_____	_____	_____	_____	_____	_____
Use the printer to print output	_____	_____	_____	_____	_____	_____	_____	_____	_____
Interpret keys on the keyboard	_____	_____	_____	_____	_____	_____	_____	_____	_____
Save a program to a diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Supervise student activities on the computer	_____	_____	_____	_____	_____	_____	_____	_____	_____
Use spreadsheet programs	_____	_____	_____	_____	_____	_____	_____	_____	_____
Copy a program from one diskette to another	_____	_____	_____	_____	_____	_____	_____	_____	_____
Select appropriate computer hardware	_____	_____	_____	_____	_____	_____	_____	_____	_____
Provide instruction on how to use the computer	_____	_____	_____	_____	_____	_____	_____	_____	_____
Copy an entire diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Supervise independent study on the computer	_____	_____	_____	_____	_____	_____	_____	_____	_____

SKILLS	YOUR Level of comfort			Usage in the Classroom			Importance in Education		
	HI	MED	LOW	HI	MED	LOW	HI	MED	LOW
Properly label a diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Use simulations as part of instruction	_____	_____	_____	_____	_____	_____	_____	_____	_____
Properly transport computer hardware	_____	_____	_____	_____	_____	_____	_____	_____	_____
Make small editing changes in a program	_____	_____	_____	_____	_____	_____	_____	_____	_____
Use a tutorial program as part of instruction	_____	_____	_____	_____	_____	_____	_____	_____	_____
Use drill and practice program in instruction	_____	_____	_____	_____	_____	_____	_____	_____	_____
Initialize/format diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Delete/erase program from diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Identify hardware related problems	_____	_____	_____	_____	_____	_____	_____	_____	_____
Clear the memory of a computer	_____	_____	_____	_____	_____	_____	_____	_____	_____
Connect disk drives or other accessories	_____	_____	_____	_____	_____	_____	_____	_____	_____
Interpret documentation	_____	_____	_____	_____	_____	_____	_____	_____	_____
Use word processing	_____	_____	_____	_____	_____	_____	_____	_____	_____
Develop an instructional program	_____	_____	_____	_____	_____	_____	_____	_____	_____
Lock program on diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Maintain office inventory, phone and mail lists	_____	_____	_____	_____	_____	_____	_____	_____	_____
Unlock program on diskette	_____	_____	_____	_____	_____	_____	_____	_____	_____
Write protect diskettes	_____	_____	_____	_____	_____	_____	_____	_____	_____
Use Data Base System	_____	_____	_____	_____	_____	_____	_____	_____	_____
Maintain student grades on computer	_____	_____	_____	_____	_____	_____	_____	_____	_____
Identify related software	_____	_____	_____	_____	_____	_____	_____	_____	_____

GOALS

Rate the following GOALS by their importance and by the level of accomplishment you feel you achieve in your curriculum.

GOALS	Level of Importance			Level of Accomplishment		
	HI	MED	LOW	HI	MED	LOW
The student recalls the history and development of the computer	_____	_____	_____	_____	_____	_____
The student relates knowledge about computers to career goals and identifies opportunities in computer related fields	_____	_____	_____	_____	_____	_____
The student applies aspects of computer science to his/her level of computer use (i.e. algorithms, flowcharting)	_____	_____	_____	_____	_____	_____
The student identifies applications and limitations of the computer	_____	_____	_____	_____	_____	_____
The student recognizes the effects of computers on society, directly and indirectly	_____	_____	_____	_____	_____	_____
The student uses computers as a tool for inquiry, problem solving and recreation	_____	_____	_____	_____	_____	_____
The student shows an awareness of the aesthetic capabilities of the computer such as graphics, music, speech and simulations	_____	_____	_____	_____	_____	_____
The student utilizes computers for examining issues, solving personal and social problems, and satisfying personal curiosity	_____	_____	_____	_____	_____	_____
The student shows an awareness of ethical obligations and legal responsibilities related to computer use, software and individual rights	_____	_____	_____	_____	_____	_____
The student recognizes the importance of making responsible decisions concerning computer uses which affect the student's everyday environment	_____	_____	_____	_____	_____	_____
The student writes computer programs in language(s) compatible to the computer he/she is using	_____	_____	_____	_____	_____	_____

GOALS	Level of Importance			Level of Accomplishment		
	HI	MED	LOW	HI	MED	LOW
The student appreciates the knowledge of skills related to computing which enables individuals and groups to cope with the complexity of human society	_____	_____	_____	_____	_____	_____
The student acquires knowledge of business applications of computers as they affect the student's everyday environment	_____	_____	_____	_____	_____	_____
The student applies evaluative criteria to computer hardware and software in order to recommend modifications	_____	_____	_____	_____	_____	_____
The student participates in a variety of experiences with the computer in several subject areas ('hands on')	_____	_____	_____	_____	_____	_____
The student shows an awareness of the right to develop, hold, or express conventional or unusual ideas related to computers and their applications	_____	_____	_____	_____	_____	_____
According to the appropriate level, the student identifies characteristics of computer related hardware, software, documentation and principles underlying their design and use	_____	_____	_____	_____	_____	_____

COMMENTS: _____

IF YOU WOULD LIKE A COPY OF THE SURVEY RESULTS MAILED TO YOU, PLEASE INCLUDE YOUR NAME AND ADDRESS BELOW:

THANK YOU FOR YOUR HELP!