



Usage of computers in the Montana business community  
by Tracy Lin Alexander

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in  
Business Education  
Montana State University  
© Copyright by Tracy Lin Alexander (1991)

Abstract:

The major purpose of this study was to identify needs for information systems and related personnel of businesses in Montana. The population selected was limited to the 28,498 Montana businesses listed with U.S. West Communications. These businesses had telephone numbers and deliverable addresses. The sample size was 500. Data were gathered through a current literature review and a survey instrument. Of the 500 instruments mailed, 144 were returned and 137 were usable. The SAS statistical program was used to analyze the raw data. Frequency, Means and Chi-Square methods of statistical analysis were used to analyze the findings of this study.

The major findings of this study were: (1) Montana's business community use microcomputers extensively and the trend is to increase that use; (2) the average business had 16 employees, (10 full-time and 6 part-time). An average of 5 of the 16 employees used microcomputers; (3) businesses had written job descriptions for 44 percent of their personnel with predominantly microcomputer responsibilities while only 14 percent for personnel with some microcomputer related duties; (4) Montana businesses recommended extensive training in word processing, spreadsheet, accounting and database software, and local area networks; (5) over half of Montana's businesses have a gross revenue of \$250,000 or less and three-fourths are corporations and sole proprietorships.

The main conclusions of the study were: (1) the average Montana business is very small; (2) graduates require training in word processing, spreadsheets, accounting and database software, and local area networks; and (3) most businesses are not developing written job descriptions for their microcomputer personnel.

To information systems educators and professionals, the recommendations were: (1) training is needed in word processing, spreadsheet, accounting and database software, and in local area networks; (2) a well-rounded education should include business organization, oral and written communication, and management skills. To Montana business, recommendations were: (1) develop detailed written job descriptions; (2) seek advice and assistance from several sources before purchasing or upgrading information systems. For further research, recommendations were: (1) periodic longitudinal studies that revise and replicate this study while addressing additional related issues.

USAGE OF COMPUTERS IN THE MONTANA  
BUSINESS COMMUNITY

by

Tracy Lin Alexander

A thesis submitted in partial fulfillment  
of the requirements for the degree

of

Master of Science

in

Business Education

MONTANA STATE UNIVERSITY  
Bozeman, Montana

June 1991

N378  
AL 282

ii

APPROVAL

of a thesis submitted by

Tracy Lin Alexander

This thesis has been read by each member of the thesis 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.

May 24, 1991  
Date

Harman Melikian  
Chairperson, Graduate Committee

Approved for the Major Department

May 24, 1991  
Date

Harman Melikian  
Head, Major Department

Approved for the College of Graduate Studies

May 30, 1991  
Date

Henry L. Parsons  
Graduate Dean

## STATEMENT OF PERMISSION TO USE

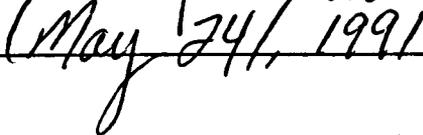
In presenting this thesis in partial fulfillment of requirements for a master's degree at Montana State University, I agree that the Library shall make it available to borrowers under rules of the Library. Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgment of source is made.

Permission for extensive quotation from or reproduction of this thesis may be granted by my major professor, or in his absence, by the Dean of Libraries when, in the opinion of either, the proposed use of the material is for scholarly purposes. Any copying or use of the material in this thesis for financial gain shall not be allowed without my written permission.

Signature



Date



## ACKNOWLEDGEMENTS

The author gratefully acknowledges the aid and supervision of the staff at Montana State University, especially Dr. Norman Millikin, committee chairperson, advisor and friend, who was instrumental in the author's success in obtaining her master's degree. In addition, she acknowledges Dr. Shannon Taylor, who as a committee member gave generously of his time, advice and support. She also acknowledges Dr. Robert Swinth, who contributed his expertise as a committee member.

Acknowledgement must go to the author's children, Jackie and Trenton Hancock, for their encouragement, willingness to sacrifice, and cooperation as they planned their activities around their mother's education. They greatly contributed to the author's ability to obtain her goal of a quality education.

## TABLE OF CONTENTS

	Page
LIST OF FIGURES . . . . .	vii
ABSTRACT . . . . .	ix
CHAPTER:	
I. INTRODUCTION . . . . .	1
Need for the Study . . . . .	1
Statement of the Problem . . . . .	2
Questions to be Answered . . . . .	3
Limitations of the Study . . . . .	3
Terminology . . . . .	4
Summary . . . . .	5
II. REVIEW OF LITERATURE . . . . .	6
Introduction . . . . .	6
Needs of Industry . . . . .	6
Role of the IS Professional Manager . . . . .	12
IS Curriculum . . . . .	14
Special Needs of Montana's Small Businesses . . . . .	16
Currently Emerging Trends . . . . .	18
Summary . . . . .	20
III. PROCEDURES . . . . .	22
Introduction . . . . .	22
Sources of Data . . . . .	23
Construction Methodology of Survey Instrument . . . . .	23
Administration of Survey Instrument . . . . .	24
Analysis of Data . . . . .	25

TABLE OF CONTENTS--Continued

	Page
IV. PRESENTATION OF DATA . . . . .	26
Introduction . . . . .	26
Section 1: Microcomputer Hardware . . . . .	26
Section 2: Local Area Networks and Modems . . . . .	28
Section 3: Software and External Databases . . . . .	33
Section 4: Computer Investment Strategies . . . . .	33
Section 5: Information Systems Personnel . . . . .	37
Section 6: Education Needs . . . . .	51
Section 7: Business Demographics . . . . .	54
Summary . . . . .	61
V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS . . . . .	62
Introduction . . . . .	62
Summary of the Study . . . . .	62
Conclusions . . . . .	67
Recommendations for IS Educators and Professionals . . . . .	69
Recommendations for the Montana Business Community . . . . .	70
Recommendations for Further Research . . . . .	72
BIBLIOGRAPHY . . . . .	74
APPENDICES . . . . .	79
Appendix A--Cover Letter . . . . .	80
Appendix B--Survey Instrument . . . . .	82

## LIST OF FIGURES

Figure		Page
1	Computer Usage By Montana Businesses . . . . .	27
2	Number of Microcomputers Used by Brand . . . . .	29
3	Microcomputer Comparison IBM/Compatible Versus All Others . . . . .	30
4	Own or Lease Microcomputer . . . . .	31
5	Local Area Network and Modem Use . . . . .	32
6	Local Area Network Usage . . . . .	34
7	Software Packages Being Used . . . . .	35
8	External Database Usage . . . . .	36
9	Average Microcomputer Investment . . . . .	38
10	Perception of Cost Effectiveness . . . . .	39
11	Intent to Update or Expand Within Twelve Months . . . . .	40
12	Full-time Versus Part-time Employees . . . . .	42
13	Comparison of Personnel Who Use Microcomputers With Those Who Don't . . . . .	43
14	Comparison of Businesses With/Without Predominant Micro Responsible Position . . . . .	44
15	Comparison of Businesses With/Without Positions Involving Some Micro Duties . . . . .	45
16	Businesses With Written Job Descriptions For Predominant Micro Positions . . . . .	47
17	Businesses With Written Job Descriptions For Positions With Some Micro Duties . . . . .	48

LIST OF FIGURES--Continued

Figure		Page
18	Microcomputer Personnel Qualification Methods . . . . .	49
19	Intent to Hire Microcomputer Personnel . . .	50
20	Business Areas As Recommended For IS Professionals . . . . .	52
21	Software Training Recommended For Graduates . . . . .	53
22	Knowledge of Networks Recommended For Graduates . . . . .	55
23	Types of Microcomputer Experience That Could Be Provided By Colleges . . . . .	56
24	Legal Status Of Responding Businesses . . . .	58
25	Gross Revenue of Responding Businesses . . .	59
26	Position of Respondents Who Filled Out Questionnaire . . . . .	60

## ABSTRACT

The major purpose of this study was to identify needs for information systems and related personnel of businesses in Montana. The population selected was limited to the 28,498 Montana businesses listed with U.S. West Communications. These businesses had telephone numbers and deliverable addresses. The sample size was 500. Data were gathered through a current literature review and a survey instrument. Of the 500 instruments mailed, 144 were returned and 137 were usable. The SAS statistical program was used to analyze the raw data. Frequency, Means and Chi-Square methods of statistical analysis were used to analyze the findings of this study.

The major findings of this study were: (1) Montana's business community use microcomputers extensively and the trend is to increase that use; (2) the average business had 16 employees, (10 full-time and 6 part-time). An average of 5 of the 16 employees used microcomputers; (3) businesses had written job descriptions for 44 percent of their personnel with predominantly microcomputer responsibilities while only 14 percent for personnel with some microcomputer related duties; (4) Montana businesses recommended extensive training in word processing, spreadsheet, accounting and database software, and local area networks; (5) over half of Montana's businesses have a gross revenue of \$250,000 or less and three-fourths are corporations and sole proprietorships.

The main conclusions of the study were: (1) the average Montana business is very small; (2) graduates require training in word processing, spreadsheets, accounting and database software, and local area networks; and (3) most businesses are not developing written job descriptions for their microcomputer personnel.

To information systems educators and professionals, the recommendations were: (1) training is needed in word processing, spreadsheet, accounting and database software, and in local area networks; (2) a well-rounded education should include business organization, oral and written communication, and management skills. To Montana business, recommendations were: (1) develop detailed written job descriptions; (2) seek advice and assistance from several sources before purchasing or upgrading information systems. For further research, recommendations were: (1) periodic longitudinal studies that revise and replicate this study while addressing additional related issues.

## CHAPTER I

## INTRODUCTION

"The rapid integration of Management Information Systems (MIS) into all aspects of business, and the great advancement in information technology during the past few decades, have created a demand for MIS professionals who are not limited to knowledge of the technical side of information systems, but rather, who possess a broad understanding of information systems, organizational behavior, and management." (Khosrowpour 1988)

The major purpose of this study was to identify the specific needs of businesses in Montana concerning Information Systems (IS) and related personnel. The researcher sought to define those skills which an IS professional should possess before seeking employment in the Montana business community.

Need for the Study

The IS field has changed and grown considerably over the past two decades. Traditionally, the focus of the IS professional centered solely on the technical knowledge and skills associated with the development and maintenance of computer information systems. The concentration on technical aspects of IS produced IS professionals with a narrow perception of the business organization and their own

contribution to it. There was a lack of integration of duties performed by computer personnel into the needs of the organizations they worked for. Consequently, the business community demanded IS professionals who had a broad understanding of how the organization operates.

In addition, businesses required IS professionals to possess the ability to communicate in both oral and written form to managers, end-users and others within and outside the organization.

This was especially true of small businesses where the IS skills required may be less technical and complex than in large organizations. The possession of a wide range of knowledge is likely to be essential to the value of the IS professional to the small business community.

#### Statement of the Problem

The major purpose of this study was to identify the current usage of computers by businesses in Montana; to assess the perceptions of persons involved in Montana business as to their requirements for information systems and IS professionals and whether those requirements were being met; and to determine what skills and knowledge an IS professional should possess to acquire employment in Montana.

### Questions to be Answered

This study focused primarily on the following list of questions in an attempt to obtain answers which satisfied the problem statement.

1. How are microcomputers used by businesses in Montana, what types, and how many per business?
2. Are local area networks used by businesses in Montana?
3. What are the types and brands of software used by businesses in Montana?
4. Are there any plans regarding future upgrading of microcomputers and staffing?
5. How many microcomputer related personnel are employed and what are their qualifications and job descriptions?
6. What are the perceptions of business owners or operators regarding which microcomputers and software training should be received by business graduates?

### Limitations of the Study

The researcher limited this study to businesses that operated in Montana at the time of the study. The purpose of this limitation was to focus on gathering a clear profile of how Montana businesses have adapted to the computer age. The researcher wanted to identify how small businesses incorporate computers into their daily operations and what skills and knowledge IS professionals seeking employment in this area must possess.

## Terminology

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

Downsizing: "The process of moving applications from large computers to smaller ones. It may entail wholesale migration to a smaller host or the sharing out of some tasks through cooperative processing...By extension, the term is also frequently used to describe development of applications of and for PC LANs." (Radding 1989)

End-Users: "Anyone who uses an information system or the information it produces." (O'Brien 1991)

IS Curriculum: College courses dedicated to the teaching of information systems and related material.

IS Specialist [Professional]: "A person whose occupation is related to the providing of information system services; for example, a system analyst, programmer, or computer operator." (O'Brien 1991)

Information Systems (IS): "An information system uses the resources of hardware (machines and media), software (programs and procedures), and people (specialists and end users) to perform input, processing, output, storage and control activities that transform data resources into information products." (O'Brien 1991) Past terms with the same meaning were: Management Information Systems (MIS), and Computer Information Systems (CIS).

Information Technology: "The technologies in modern computer-based information systems." (O'Brien 1991)

Small Business: "Under 20 employees, very small; 20-99, small; 100-499, medium sized; and over 500, large. These breaks are consistent with standard business employment, asset, and receipt size classes established on May 18, 1982, by the Office of Management and Budget to be used by all federal agencies when publishing business data." (Report of the President 1989)

Summary

Businesses must tailor their operations according to their environments. Those that operate within the state of Montana have requirements unique to that area. Therefore, persons seeking employment in Montana should develop their skills according to the needs of businesses within Montana. This study provided a profile of businesses operating in Montana and determined what their needs were. This data should facilitate the matching of business requirements with potential employees.

## CHAPTER II

### REVIEW OF LITERATURE

#### Introduction

This chapter provides an historical framework of IS from the early 1960's to the present in order to facilitate the study of the problem. First, needs of industry are addressed. Second, the development of the role of the IS professional manager is presented. Third, the IS curriculum as it has evolved during the past three decades is reviewed. Fourth, specific needs of Montana's small to tiny businesses are addressed, and finally, future trends of IS are considered.

#### Needs of Industry

"One thing is clear: IS is a long way from the days when it was viewed as an isolated, back-room operation, charged with the responsibility of reducing clerical costs but basically sheltered from the economic movements of the outside world." (Kolodziej 1989)

In the 1960s the advent of computer technology brought dynamic and permanent changes to private industry. It was during this period that most organizations first ventured into the ever-quickenning pace of the information age. Unfortunately, a study conducted more than ten years later by

Gallagher, Johnston and Cook (1978) led them to suggest that industry had rapidly become disillusioned. They proposed that this was a result of the organizations' lack of knowledge concerning the capabilities of computers, and a deficiency of individuals able to utilize these tools to the benefit of the organizations they served.

According to Falce (1985), the problem was compounded due to severely limited interdepartmental communication and isolated technicians who focused exclusively on the technical aspects of computing rather than the practical applications of what they produced. In addition, organizations did not establish adequate strategies to develop and implement efficient information systems.

Businesses soon began to look for consultants outside the organizations to meet their needs. This practice was commonly expensive and did not meet their requirements of on-going service and periodic updating of their information systems. Meanwhile, IS internal expenses grew at exponential rates.

According to Rothfeder (1988) and Weizer (1989), businesses have suffered the added expense of millions of dollars due to systems that exceed budgets set in the initial estimate. Businesses also have longer down-time when systems projects are not completed by the deadline date. For the larger projects, that could mean several months to a few years. These factors have contributed to the reduction of

the professional image of IS professionals in the business community and caused a more cautious approach to information systems. For example, Rothfeder states that

"such diverse systems integrators as the Big Eight accounting firms, computer suppliers, and even in-house data processing staffs are fast building a record of mediocrity."

According to Gupta (1974), a large number of companies have paid for computer systems which have a capacity far beyond what they actually need or the various hardware bought is not compatible. Most users are inefficiently trained to effectively utilize those computer functions that they do use. Gupta reached the conclusion that implementation of computer systems had most often resulted in draining profits and a loss of employee morale.

Rothfeder believes the situation is further complicated by the tendency of IS professional managers to raise the expectations of executives beyond what they can actually achieve. Gary Bramwell, the director of Kawasaki's data center services, responded similarly in an interview with Ludlum (1989).

"Management had undertaken too many aggressive projects. They were going to miss deadlines and started throwing people at them. People were not managed very well and their productivity was low."

These problems cannot reasonably be considered the sole responsibility of IS professionals. Businesses have not been sufficiently involved with the development and use of their information systems. Traditionally, there has been a

distinct lack of interaction between the IS professional manager and top corporate executives. Rothfeder made this statement.

"Most nontechnical executives are unwilling to take an active role in developing a computer system--until costs spiral out of control."

A similar assertion was made by Carper (1977)

"The resistance characteristic of the top management level is avoidance. While they pay lip service to the importance of a MIS, in reality, they tend to have little to do with one."

He addressed the effect of executive non-involvement on the attitudes of end-users who greatly decrease the information systems' efficiency.

"...top management does not always involve itself with the planning, design, and implementation processes. The chief executive may...leave the details of the system to systems engineers who tend to be more concerned with designing an efficient machine than they are with the dysfunctional behavior which such an installation might cause."

Gabel (1989) stated the view point of the IS professional on the lack of executive guidance very succinctly.

"It's a little like trying to play Simon Says with a blindfold on. You know that you are supposed to be doing something, but it is not always clear what. Most IS managers today have a sense that their companies are changing and their departments will also have to change. What is less evident is how fast to move and in what direction."

As long as corporate executives avoid the responsibility of becoming informed about information systems and of active participation in their development and use, productivity will be below potential and end-users will not fully utilize the

system. IS professionals will remain frustrated in their attempts to generate efficient information systems and to satisfy all those involved with them.

To put this situation in perspective, one must acknowledge overall changes in the industry methods of operation and the additional needs which have come to the fore. The advances in computers and database design have allowed various departments to access the same information without the need for duplication within each department. Departments may differ on the desired format of the information. Indeed, decisions are made in one department based on information provided by another department which further enhances the need for integration. (Falce 1985)

With the advent of greater departmental interaction in business comes the need for more sophisticated methods of providing security of information systems. (Grindlay 1985) The opportunities for fraud, vandalism and various other types of misuse or abuse of information systems have grown with the vastly increased value and availability of information to industry.

Corporate executives need a method of measuring the benefits of their information in comparison to the financial investment required to develop and operate it. (Lane & Hall 1989) (Appleton 1986) Currently, most organizations either make little or no attempt to systematically evaluate the level of returns on their investments. This is due for the

most part to a mistaken belief that much of the benefits of the information system are intangible, making an accurate estimation impossible. There are no easy answers to systems-valuation, although techniques are available for an organization to develop its own process tailored to suit its particular structure.

Another need of industry is the establishment of standards for information systems functions in such areas as "programming, procedures and documentation." (Grindlay 1985) Environmental aspects must be monitored closely to insure the organization has sufficient knowledge of advancements in technology, those organizations making use of them, how the advancements are utilized and what benefits are achieved through their implementation.

Much time and money is wasted due to the inability of end-users to specifically express their needs with regard to the information system. Finding ways to involve them in the development process would help circumvent this problem. (Spock 1985)

This is only one of the IS professional's responsibilities. The following section reviews the changes which have taken place within the role of the IS professional and gives greater insight into the type of knowledge and skills that are required to fill this position.

### Role of the IS Professional Manager

"It may be a bit tough to find the combination of communicator, educator, trainer, technician and office politician that characterizes the good micro manager [IS professional manager], but it's worth the time to get the best mix of skills you can. Micro managers are going to be important members of the MIS world for a long time to come."  
(Shoor 1986)

In the past, the IS professional has been primarily concerned with the technical nature of the information system. It is becoming increasingly clear that technical proficiency alone does not qualify an individual to manage an IS. Several other areas of expertise have emerged as integral parts of the requisite skills needed to be an effective IS professional. These additional areas of importance include communication, a broad knowledge of organizational and general business practices, and management skills.

The IS professional manager is responsible for eliciting active support from each member of the IS team and promoting participation with end-users. Gupta (1974) stated that a "pre-requisite to a successful MIS is the cooperation of all workers in all departments for the availability of accurate data gathered from all operations as soon as possible."

However, without help from corporate executives in obtaining this type of interaction, the IS professional manager is often placed in a no-win situation. According to Carper (1977), end-users usually feel threatened by the

introduction of an IS and can make it extremely difficult for the IS professional manager to produce the benefits expected from it. Gupta concurred when he stated that "Workers will have no faith in a system that may deprive them of their jobs or of their pride in their work. Where company policies are deficient in providing worker commitment to company objectives, MIS or any other system is doomed to failure before it starts."

To circumvent this type of resistance, the IS professional manager must have or acquire well developed communication skills and knowledge of psychological issues pertaining to the management of human resources. (Carper 1977)

In addition, the IS professional manager is expected to communicate frequently with corporate executives to insure that they are informed of various issues and events related to the IS. This is a radical change from past practices as expressed by Grindlay (1985).

"Previously, many IS managers had trouble getting to see their bosses let alone being invited to executive committee meetings. Now, however, in some firms, the IS manager is a member of the executive committee; in others he is frequently invited to attend the meetings to discuss profitable new applications of IT [information technology]."

The IS professional manager can no longer remain on the outer periphery of the organization. The new job description commonly requires presentations to both decision-makers and

end-users. This change requires the IS professional manager to concentrate on perfecting both oral and written communication skills.

The following section reviews the IS curriculum as it relates to accomplishing the task of preparing IS students for effective employment in the business community.

### IS Curriculum

"The direct impact and challenge for data [IS] educators is the creation and evolution of an appropriate course which covers the basic concepts and applications of information systems in business and administration." (Rosich 1982)

It is widely acknowledged that the IS curriculum is seldom up to date with the needs of industry. In fact, Teer and Spillman (1987) have concluded that one of the major flaws in the past and current IS curriculum is that its foundation has been reactive rather than proactive. By the time courses are revised to supply the knowledge and skills related to the technologies in use, the trend for the future has shifted. This can be easily seen in those areas that have greatly increased in dimension, such as database management, relative to other areas like programming, for which demand has diminished.

Teer and Spillman cite various causes for the reactive stance of IS educators in developing IS curricula. Included is "the shortage of resources such as money, qualified faculty and equipment." These very factors make it crucial

for IS educators to respond more effectively to the rapidly changing information system environment.

Schools/colleges of business which do not include a full IS degree program are especially affected by shortage factors. When the IS courses available to students are severely limited the necessity of offering relevant material is greatly intensified.

Teer and Spillman recommend a "future oriented" approach to IS curriculum development. IS educators should discover what the emerging trends are through a consensus of top researchers in the IS field. Once a trend has been identified, courses must be revised to reflect the primary base of knowledge and skills needed for students to enter the employment environment. In addition, Teel and Spillman suggest that "the area of emerging trends" provides many crucial research opportunities for IS educators. They recommend the performance of new studies and periodic replication of studies to ascertain where the IS curriculum can be further revised as time passes.

Some of the trends emerging in the late 1980's are presented in the following section of this chapter. These are examples of some of the key issues confronting IS educators today.

### Specific Needs of Montana's Small Businesses

"These organizations demand analysts who understand their client's entire business, can identify the key success factors, can develop a management plan that will capitalize on these factors and take advantage of future opportunities and then design, purchase and deliver a turn-key information system." (Taylor & Ross 1989)

Several current IS professionals agree that the increase in microcomputer capabilities and decrease in costs have made them more attractive to small businesses. Included is Will (1986), who adds that "increased information requirements by government agencies, increased competition and increased need for better information" has encouraged small business owner-operators to venture into the computer age.

Since the vast majority of Montana businesses are small to very small in size, as defined by A Report of the President (1989), there is a unique set of needs which must be identified, evaluated and met by the information systems, IS professionals, and IS educators.

In their study, Taylor and Ross (1989) identified such issues as lack of microcomputer expertise and available learning time as major reasons owner-operators of tiny businesses require IS professional consultants.

Taylor and Ross recommend IS professionals acquire general knowledge of how an organization is operated before attempting to provide a workable information system. They provided the following as a basic guideline for IS

professionals to follow as consultants to or employees of tiny businesses.

"For tiny organizations the analyst/consultant has to be a managerial generalist instead of a computer specialist. The consultant must know the client's business and industry so well that he or she can correctly identify the key success factors and build an information system that easily addresses those factors, otherwise a system may be built that no one will ever use."

According to Owens (1987), 75 percent of small businesses with microcomputer systems are satisfied. However, she presented the following two reasons for dissatisfaction: reduced employee productivity during microcomputer training, and lack of software available to meet their particular needs. Even so, Owens wrote that "these same companies intend to buy more microcomputers and use them in additional applications."

The consensus is that small businesses are continuing to increase purchase and applications of microcomputers. This is confirmed by a study done by Dunn, Moen and Powell (1989), in which they found that 68 percent of their sample of small businesses had microcomputers in-house and 18 percent used computer service bureaus.

This is the trend for small businesses. The following section presents the current trends for the information systems industry as a whole.

Currently Emerging Trends

"I think our greatest challenge in the next few years lies in the fact that we are responsible for processing not only data, but effectiveness, relevance, and value as well. As the share of the corporate budget representing information systems and services continues to soar, there comes an increasing need for accountability." (Feeney 1979)

The growing demand by businesses for accountability is only one of the causes of some of the currently emerging trends. In the past decades, there has been a drastic increase in organizational size and the trend is expected to continue. The result of these larger organizations has been that internal and external information has become crucial to their survival.

Organizational goals have become the primary focus of the IS department so that systems are tailored to meet the needs of the organization rather than simply existing within it. IS professional managers are being moved to executive levels with greater access to or actual participation on the board of directors. This move is to facilitate an increase in top executive knowledge and participation and to enable the organization to increase the accountability of IS professional managers. Since they are no longer able to hide in the closet, IS professional managers are required to demonstrate communication skills which match their rise in position and meet the needs of both executives and end-users.

Furthermore, top executives are acquiring some basic knowledge of information systems in order to improve their abilities to make management decisions.

As important is the fact that end-users are becoming more involved in the process of creating IS from the beginning. By including end-users, any feeling of threat that a new system may generate is reduced, the resulting system is made more effective and end-users utilize the system more efficiently.

In fact, the whole structure of the IS department has now become a teamwork approach. Specialists in each area of IS are working closely together on various projects and consulting with each other concerning each significant step taken during the planning and implementation of an IS.

Technological advances are causing other key changes to occur. One of those changes is that microcomputers are more affordable and in widespread use in organizations. Technology advances have made it possible to decentralize those portions of businesses which are distanced from the main organization while maintaining contact. One of the effects of this ability is a trend toward downsizing. Advantages to downsizing can be considerable. It allows the IS to be more flexible, creates the ability for employees working in the field to access information throughout the organization if necessary, and can reduce the cost of expanding the IS system as the organization grows. However,

the cost of downsizing to an organization can put a major dent in the IS budget.

The development of high level languages has had a tremendous impact on the IS industry which, coupled with the availability of commercial application software packages, has reduced the need for programmers. These fourth-generation languages require a fraction of the code traditionally necessary to write programs and are much easier to learn and to use.

Massive developments in and increased use of data communications and telecommunications are evident throughout the business community. This is another area which is creating incredible changes in the manner organizations are doing business.

These are only a few of the key emerging trends in the IS industry. Any one of these can tremendously affect the specific knowledge and skills students need to learn. It is extremely important for IS educators to identify these and other trends as they develop to enable them to analyze and revise IS courses.

#### Summary

The review of literature revealed the dynamic environment in which IS educators participate. It is therefore not surprising that they have been slow and reactive in their responses to industry's needs. Their

ability to be proactive is hampered by industry demands that are often conflicting, the growth and development of the IS professional manager's role, and a shortage of resources at most four-year colleges and universities. However, IS educators must understand the importance of identifying key trends in the IS industry and develop a willingness to revise courses to meet the needs of industry and IS students.

## CHAPTER III

## PROCEDURES

Introduction

The major purposes of this study was to identify the immediate and future needs of businesses in Montana concerning computers and related personnel. The information gathered in this study can be utilized by a cross-section of people. IS professionals can use the study findings when seeking employment in Montana. Montana educators can use the findings in the further development of IS curriculums. Montana businesses can use the study to identify those areas of their IS which are not up to the standards of the average business in Montana. The findings should also assist them in determining future IS needs and relevant planning.

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

### Sources of Data

Data used in the previous chapters was gathered from these sources.

Research articles were obtained through the Renne Library of Montana State University by conducting searches on the Education Resource Information Center (ERIC), the Infotrac periodical search system, the ABI/INFORM database designed for use by business executives which includes information concerning management and administration, the Dissertation Abstracts Online, the Harvard Business Review database, the INSPEC database which consists of science abstracts, and the Computer Database which contains information from computer, telecommunication and electronic journals.

Collection of data through use of a survey instrument which was administered to a randomly chosen sample of Montana businesses, the vast majority of which are considered small businesses.

### Construction Methodology of Survey Instrument

A survey instrument was designed by the researcher while relying on the review of literature to provide the basis for the form.

There are 28,498 businesses within the State of Montana who currently have telephone service listed with U.S. West Communications, the telephone service provider for Montana. These businesses also have deliverable addresses. The survey instrument and a cover letter were mailed to 500 of these businesses. The instrument contained questions designed to gather data concerning:

1. The typical business in Montana and their use of microcomputers, local area networks, and software.
2. Future plans regarding upgrading of microcomputers and staffing.
3. The number of microcomputer related personnel, their qualifications and job descriptions.
4. The perceptions of which microcomputers and software training should be received by Montana State University business graduates.

The first and subsequent drafts of the instrument were reviewed by Dr. Shannon Taylor and Dr. Norman Millikin, College of Business, Montana State University. Revisions were made until the instrument included questions which would elicit the data required to accomplish the purposes of this study.

A pilot consisting of ten small business owners within the city of Bozeman, Montana, was conducted to test the accuracy of the instrument. Final revisions were made at that time and the instrument was administered upon approval by Dr. Norman Millikin.

#### Administration of Survey Instrument

March 12, 1990	Pilot Survey, 10 businesses in Montana
April 23, 1990	Mail survey and cover letter to sample
May 21, 1990	Cut-off date for returns

### Analysis of Data

Data were collected by administering the previously described survey instrument to businesses located in the State of Montana. These businesses were randomly selected from the U.S. West database containing all Montana businesses which have a telephone and a deliverable address. Of the 500 instruments that were selected, 144 were returned. Of those 137 were usable for the purposes of this study.

The SAS statistical program was used to analyze the raw data. Frequency, Means and Chi-Square methods of statistical analysis were used to analyze the findings of this study.

The questions in Chapter I were answered by utilizing the findings from the statistical analysis and research conducted.

## CHAPTER IV

## PRESENTATION OF DATA

Introduction

This chapter presents graphical and statistical analyses of the questionnaire results. The chapter is divided into seven sections, presenting the following information:

Section 1	Microcomputer Hardware
Section 2	Local Area Networks and Modems
Section 3	Software and External Databases
Section 4	Computer Investment Strategies
Section 5	Information Systems Personnel
Section 6	Education Needs
Section 7	Business Demographics

Differences among proportions were tested using a chi-square procedure.

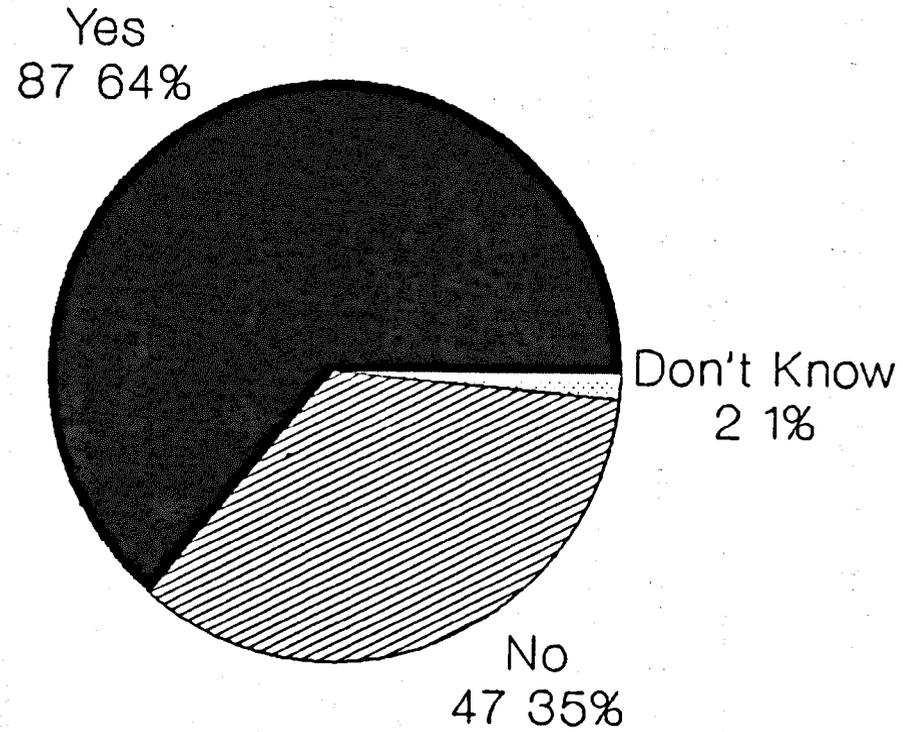
Section 1: Microcomputer Hardware

This section provides data concerning how many Montana businesses used microcomputers, the brands they used, and whether they owned or leased them.

Figure 1 illustrates that of the 137 respondents, 87 (64%) used microcomputers in their businesses. There were 47 (35%) who didn't and 2 (1%) who didn't know whether they used microcomputers or not. This table demonstrates that

Figure 1

# Computer Usage By Montana Businesses



microcomputers have become a fairly standard tool in the business community.

Figure 2 shows the most common brands of microcomputers used by Montana businesses. Ranking order of categories, they were: IBM (or compatible) PC/XT (40%), Other (21%), IBM (or compatible) AT (17%), IBM PS/2 (7%), Macintosh (10%), Apple (5%).

Figure 3 compares the usage of IBM and compatibles versus non-compatibles. The categories of IBM and compatibles PCs/XTs, ATs and PS/2s were added to compile the total IBM and compatibles used by respondents who used computers. All other categories were added as non-compatibles. Of the 123 microcomputers used, IBM and compatibles accounted for 64% while non-compatibles were 36%.

Figure 4 illustrates that 95% of those respondents who used computers owned rather than leased them.

## Section 2: Local Area Networks and Modems

This section provides data concerning the number of businesses that had a local area network (LAN), whether they used modems to communicate with other microcomputers, and how those that had a LAN were using them.

Figure 5 demonstrates that 18% (15) of the respondents who owned computers had a LAN. This finding shows that about one of five companies used local area networks. This

Figure 2

## Number of Microcomputers Used By Brand

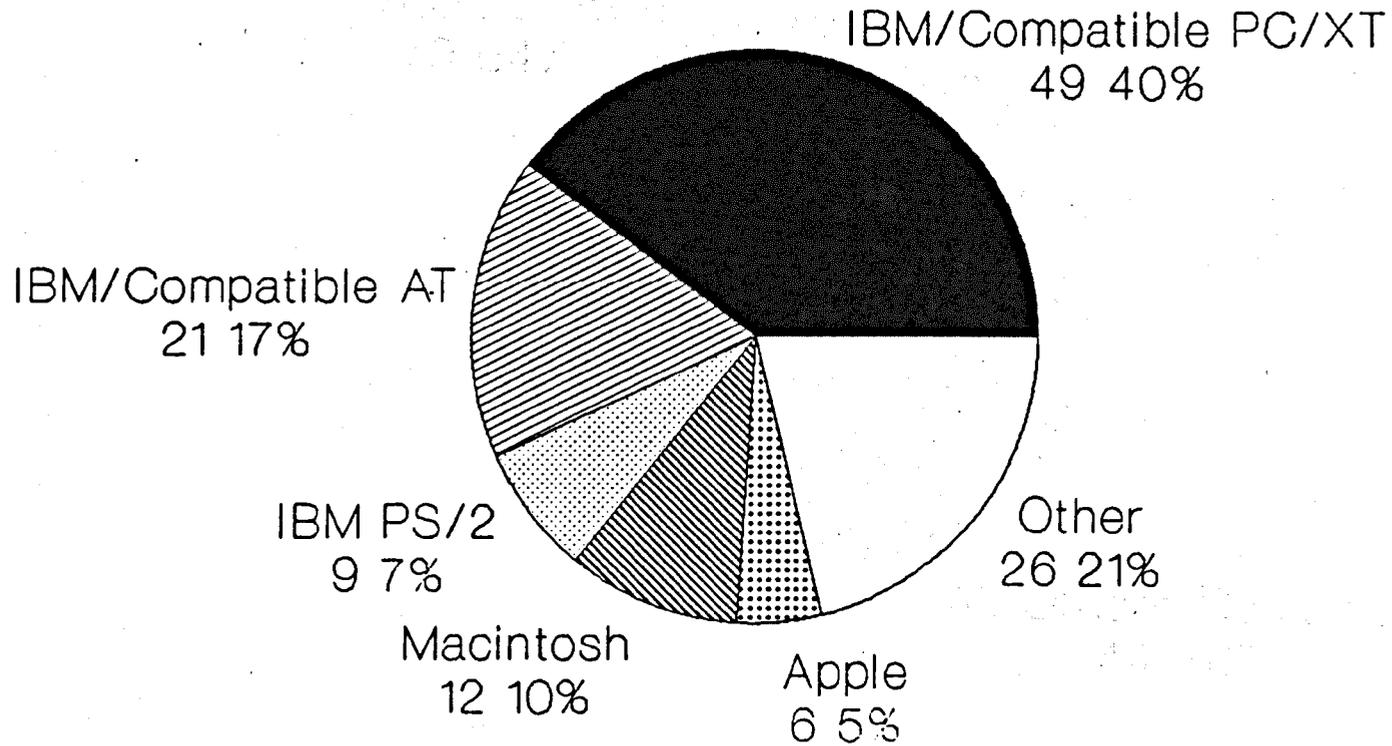
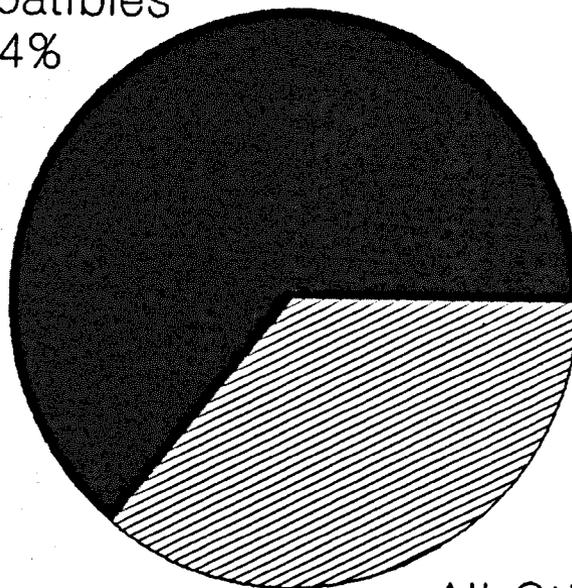


Figure 3

# Microcomputer Comparison IBM/Compatibles Versus All Others

IBM/Compatibles  
79 64%



All Others Combined  
44 36%

Figure 4

# Own or Lease Microcomputer

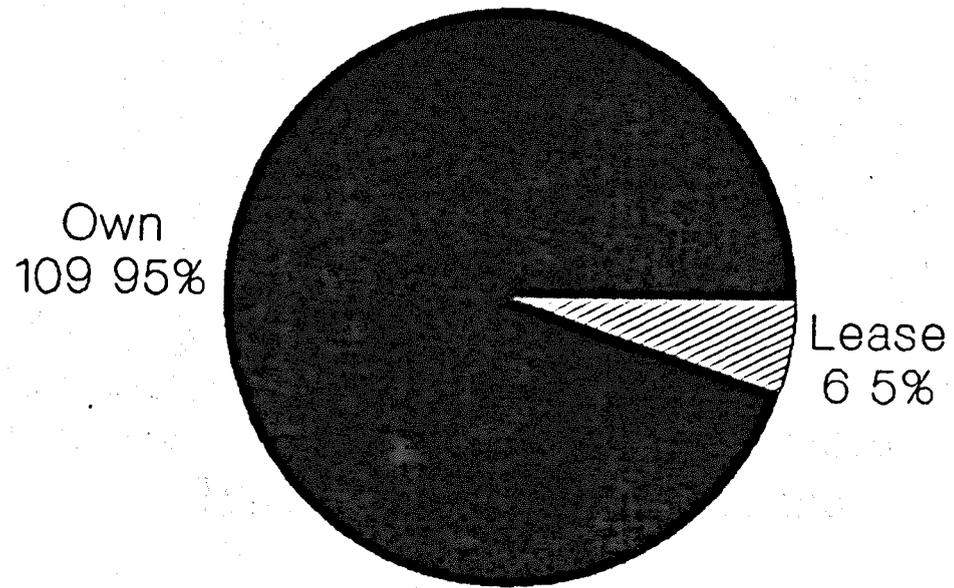


Figure 5

# Local Area Network and Modem Use

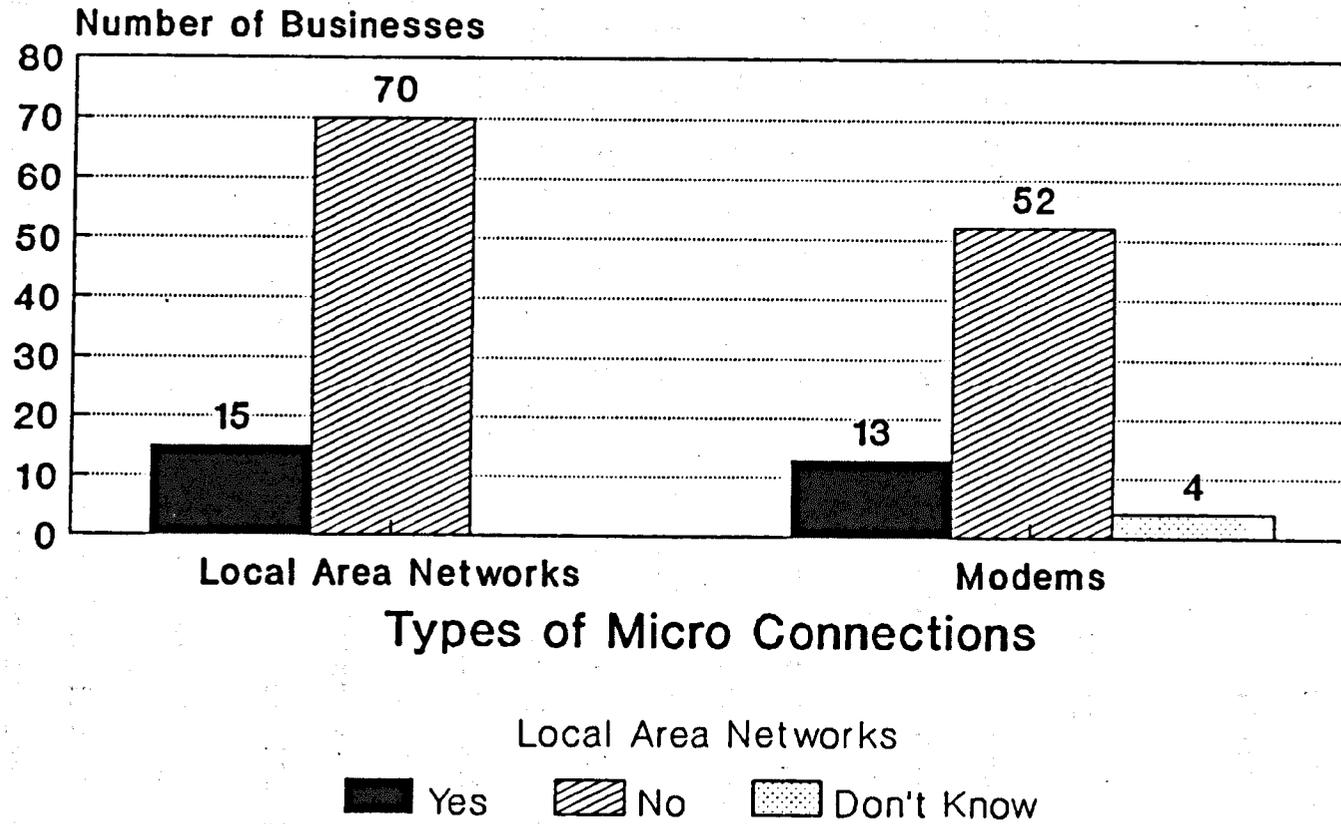


figure also shows that of those respondents who owned microcomputers 19% (13) used modems.

Figure 6 illustrates that, of the respondents (18%) who used computers and had LANs, the manner they were being used in order of prevalence was: Database (27%), electronic mail (24%), peripheral devices (20%), software sharing (18%), and other uses (11%).

### Section 3: Software and External Databases

This section identifies the use of various types of software packages by respondents who used microcomputers in their businesses.

Figure 7 illustrates the use of software packages by respondents who used microcomputers. In order of prevalence, they were: 72 (27%) word processing, 54 (21%) spreadsheet, 51 (19%) accounting, 49 (18%) database, 28 (10%) graphics, and 15 (5%) desktop publishing software. Included in this figure are those respondents who planned to install software on their systems.

Figure 8 presents data concerning respondents who used external databases 13 (17%) and those who didn't 65 (85%).

### Section 4: Computer Investment Strategies

This section addresses the average computer investment of respondents who used computers in their businesses, whether those respondents perceived their investment to

Figure 6

# Local Area Network Usage

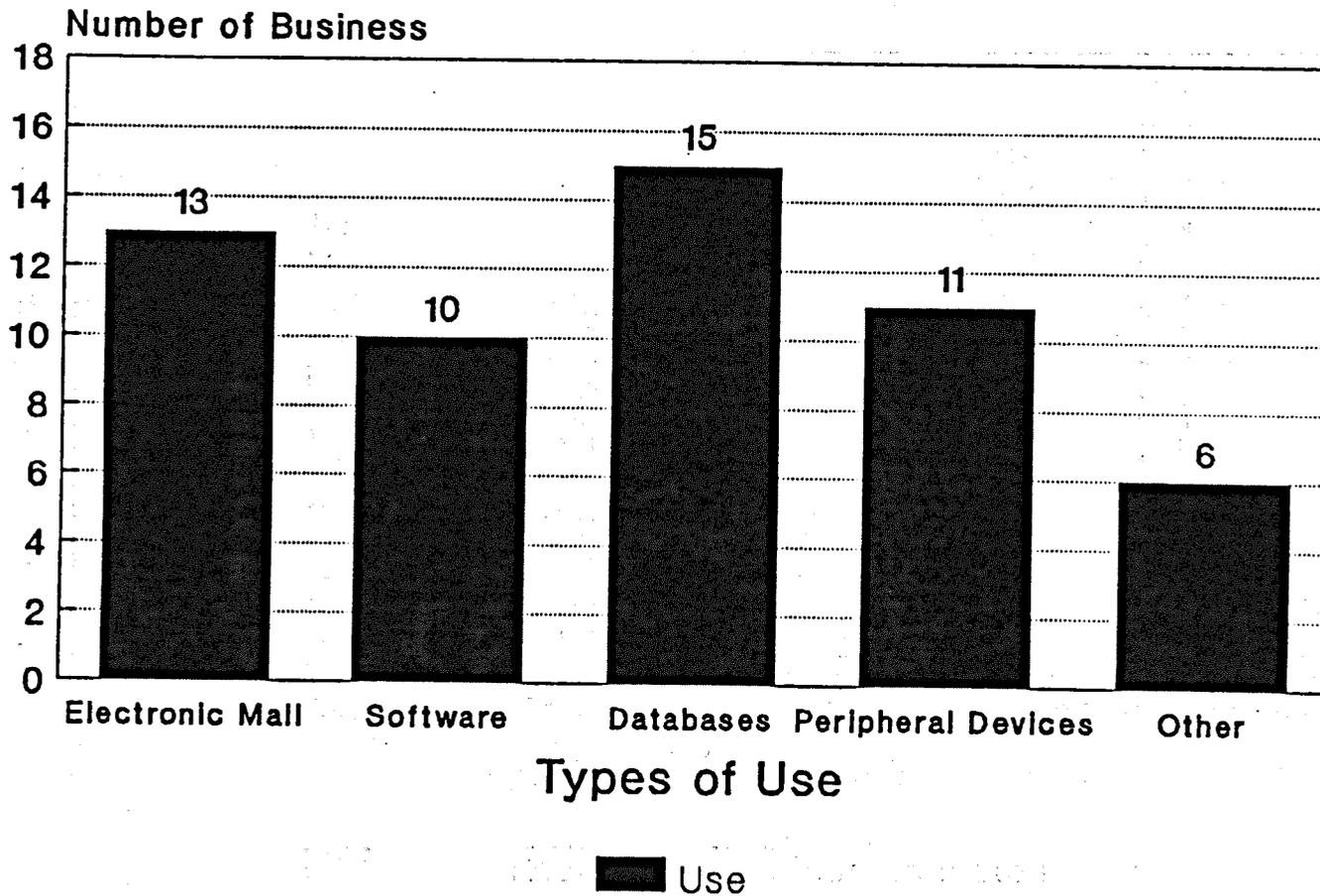


Figure 7

# Software Packages Being Used

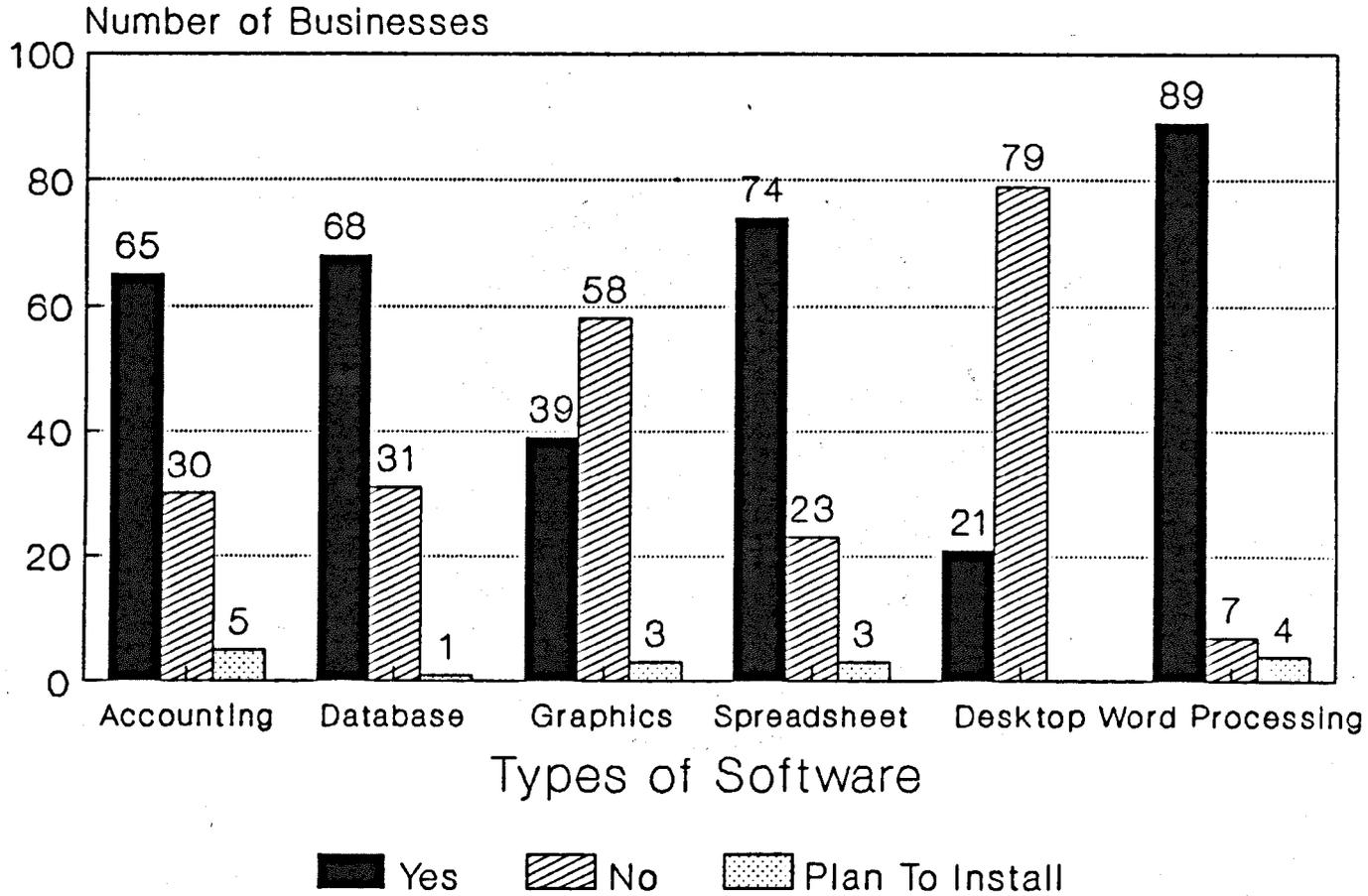
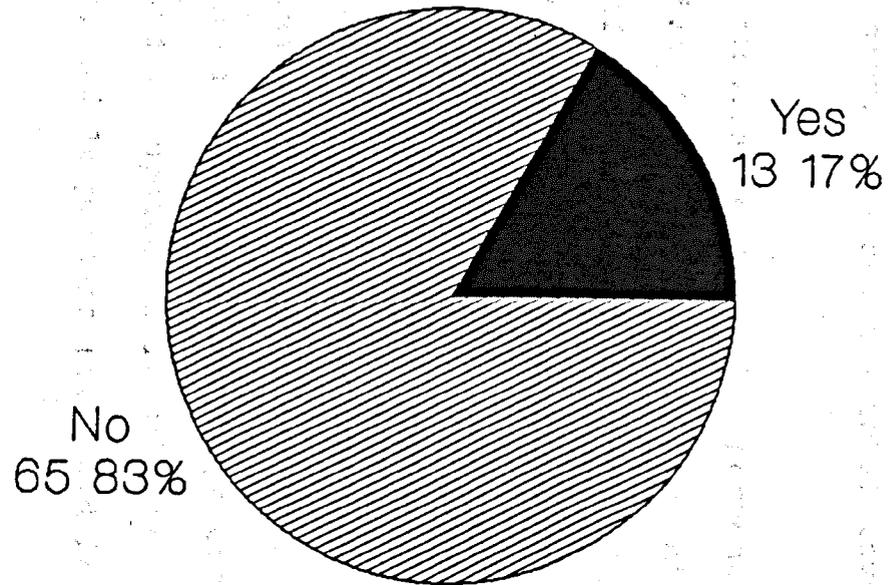


Figure 8  
External Database Usage



have been cost effective, and whether they intended to upgrade their microcomputer systems.

Figure 9 presents the average amount of microcomputer investment by respondents in four different categories. In order of expenditure amounts, those categories are: \$9805 (53%) hardware, \$4382 (26%) software, \$3190 (11%) maintenance and \$1121 (3%) training. The average total investment was \$18,498.

Figure 10 demonstrates that 84 percent (84%) of respondents perceive their investment in microcomputer systems as cost effective, seven percent (7%) did not perceive their investment to be cost effective, and nine percent (9%) didn't know if it was cost effective.

Figure 11 shows whether those respondents who used microcomputers intended to expand or update their microcomputer systems within twelve months of the date this survey was taken. The results were that 46 percent (46%) did not intend to expand or update their systems, 40 percent (40%) did intend to, and 14 percent (14%) did not know.

#### Section 5: Information Systems Personnel

This section is concerned with the Montana business community's use of IS professionals. The section covers the number of full-time and part-time employees, and the ratio of microcomputer versus non-microcomputer personnel. It also addresses IS predominant professional positions and those

Figure 9

# Average Microcomputer Investment

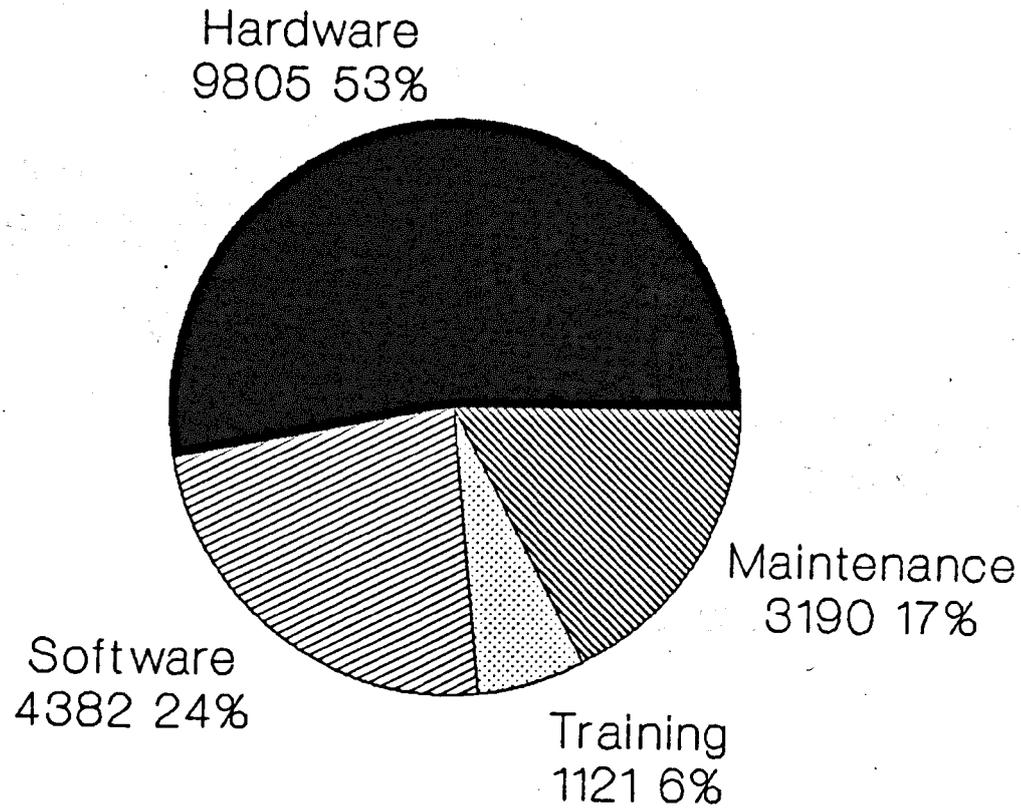
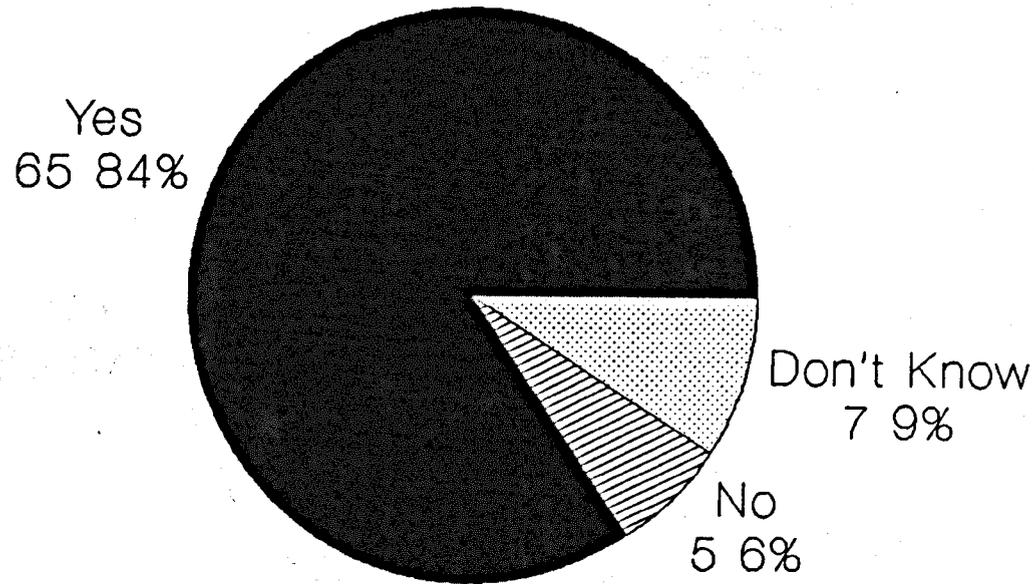
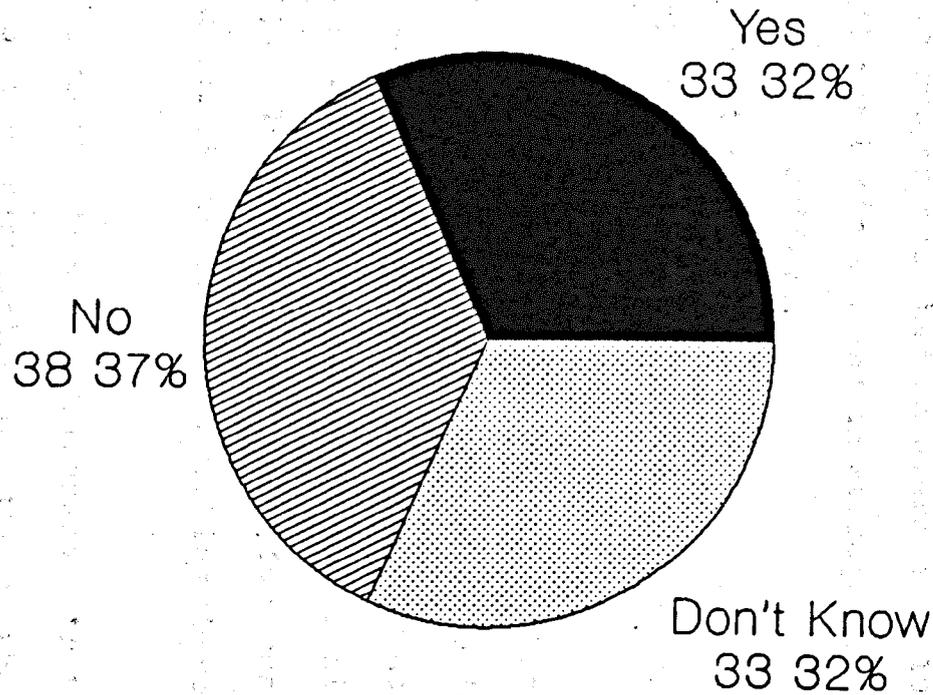


Figure 10

# Perception of Cost Effectiveness



**Figure 11**  
**Intent to Update or Expand**  
**Within Twelve Months**



positions with some microcomputer responsibilities, and the qualifications of these positions. It presents the recommended ratio of business courses for IS professionals, identifies whether there are written job descriptions for these positions, and whether respondents intended to hire additional IS professionals.

Figure 12 shows respondents had an average of 10 full-time employees (62%) per business, and an average of 6 part-time personnel (38%) per business.

Figure 13 compares the businesses that had microcomputer personnel (62%) with those having no microcomputer personnel (38%).

Figure 14 splits those businesses that had microcomputers into two categories. They were businesses that had microcomputer personnel with predominant microcomputer responsibilities (11%) and those businesses that did not (89%). There are relatively few positions available in Montana for IS professionals seeking these types of positions.

Figure 15 divides those businesses that had microcomputers into the categories of those that had positions with some microcomputer responsibilities (47%) and those that did not (53%). There is a much greater need for individuals who are able to use the IS along with other organizational duties.

Figure 12

# Full-time Versus Part-time Employees

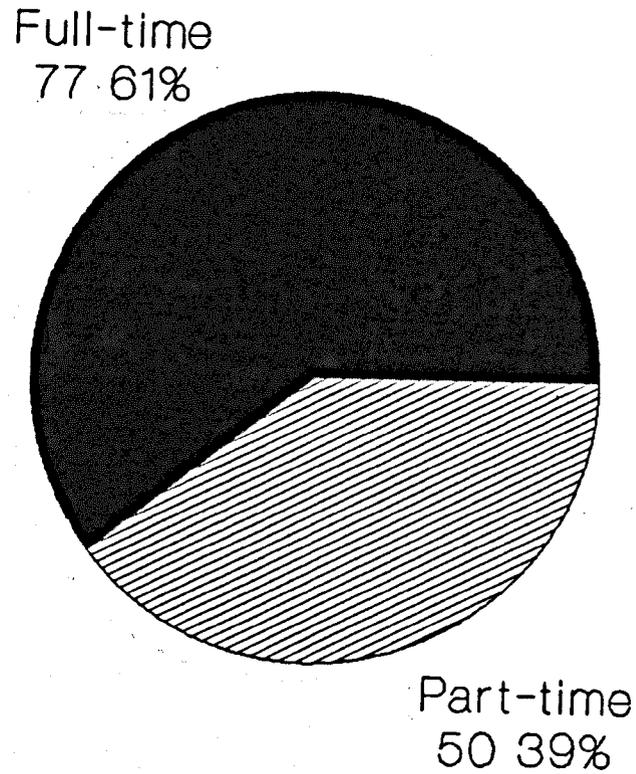


Figure 13

# Comparison of Personnel Who Use Microcomputers With Those Who Don't

