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

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

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

Chairperson, Graduate Committee

Approved for the Major Department

May 24, 1991
Date

Head, Major Department

Approved for the College of Graduate Studies

May 30, 1991
Date

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 Tracy Alexander

Date May 24, 1991

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

TABLE OF CONTENTS--Continued

LIST OF FIGURES

LIST OF FIGURES--Continued

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-quickening 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.

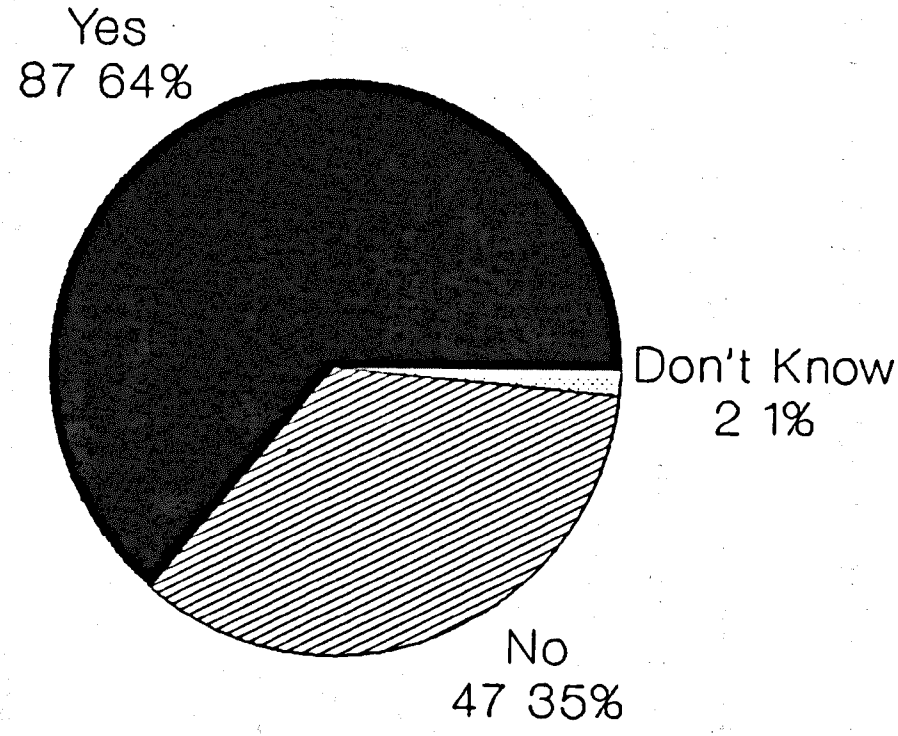
Section 1: Microcomputer Hardware

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

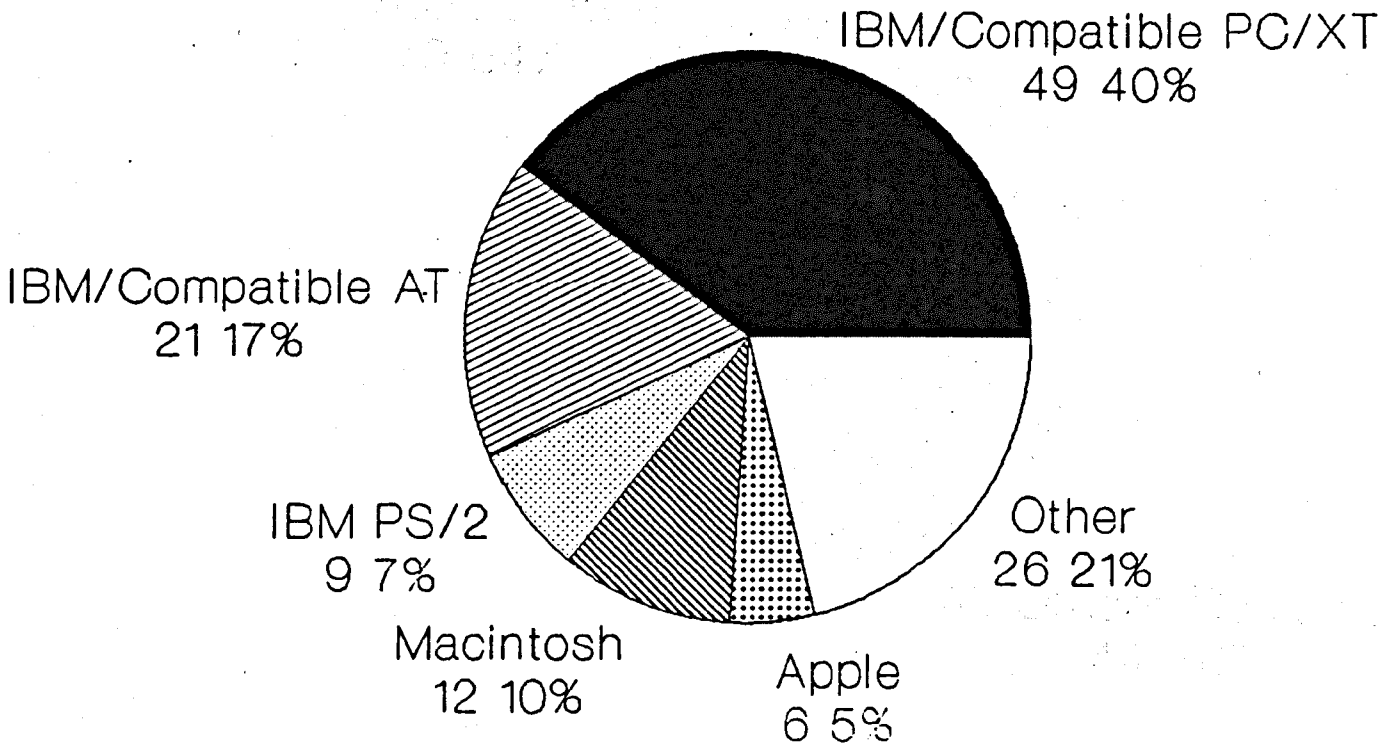


Figure 3

Microcomputer Comparison
IBM/Compatibles Versus All Others

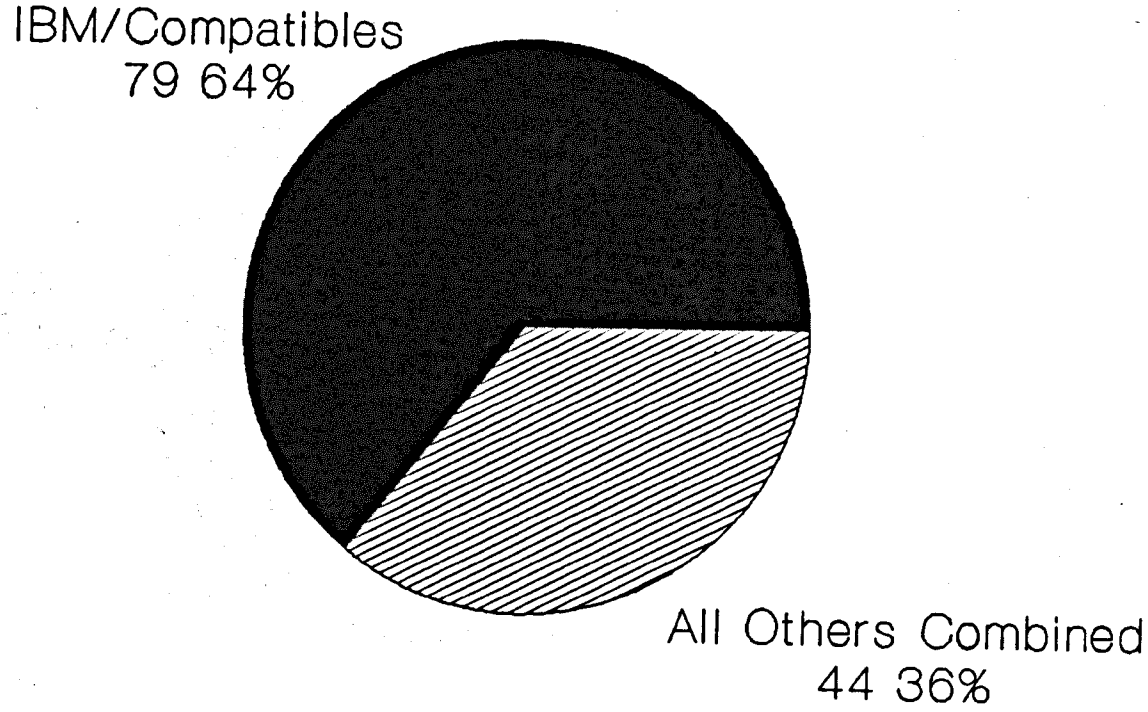


Figure 4

Own or Lease Microcomputer

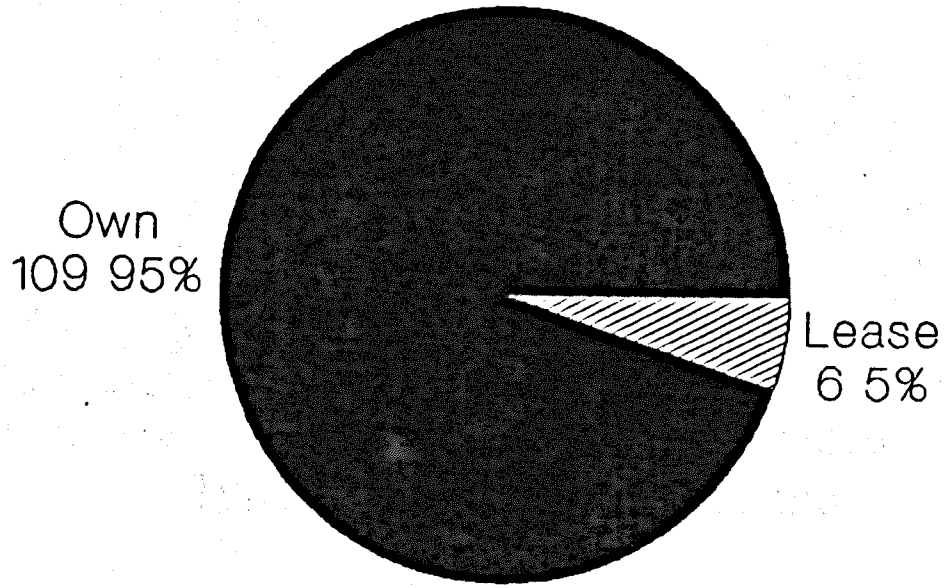


Figure 5

Local Area Network and Modem Use

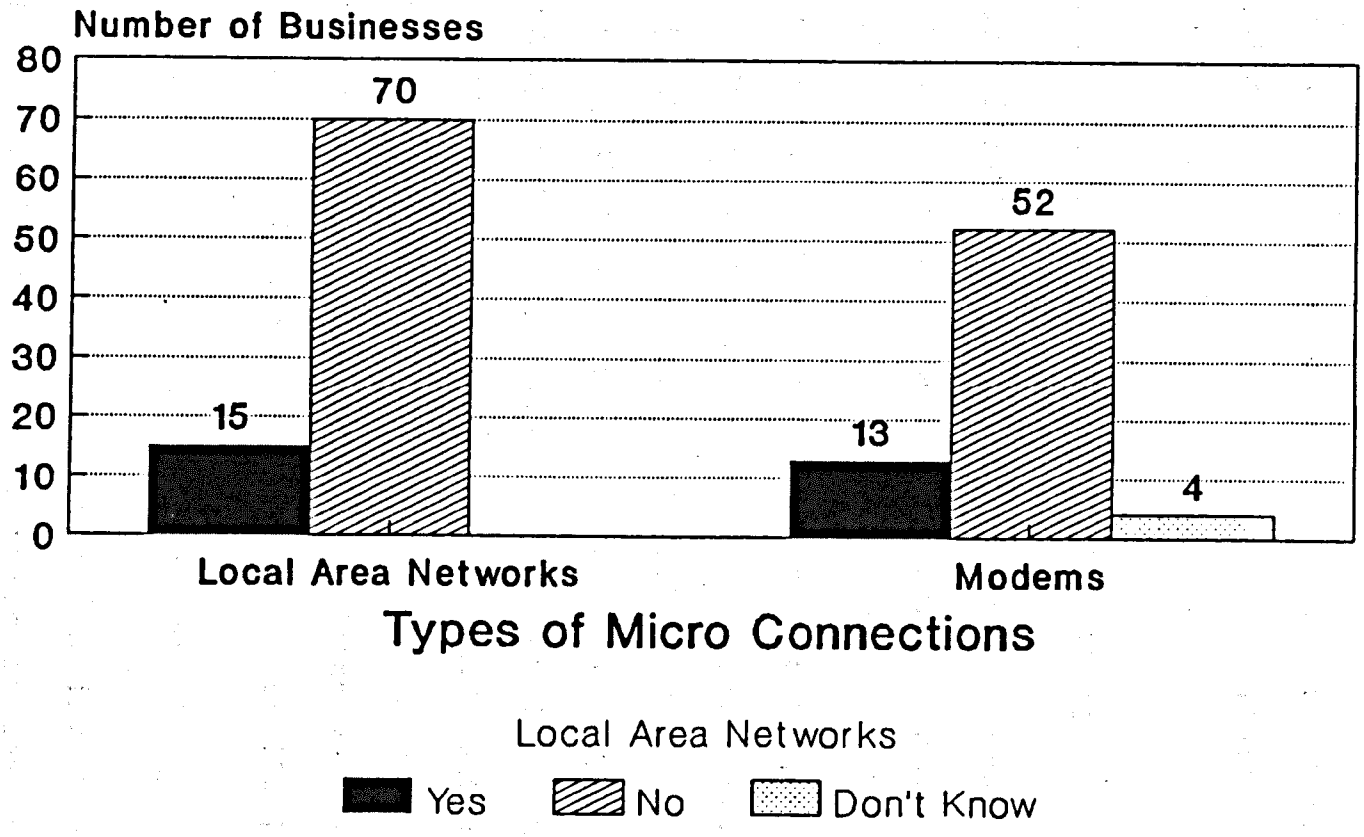


figure also shows that of those respondents who owned microcomputers 19% (13) used modems.

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

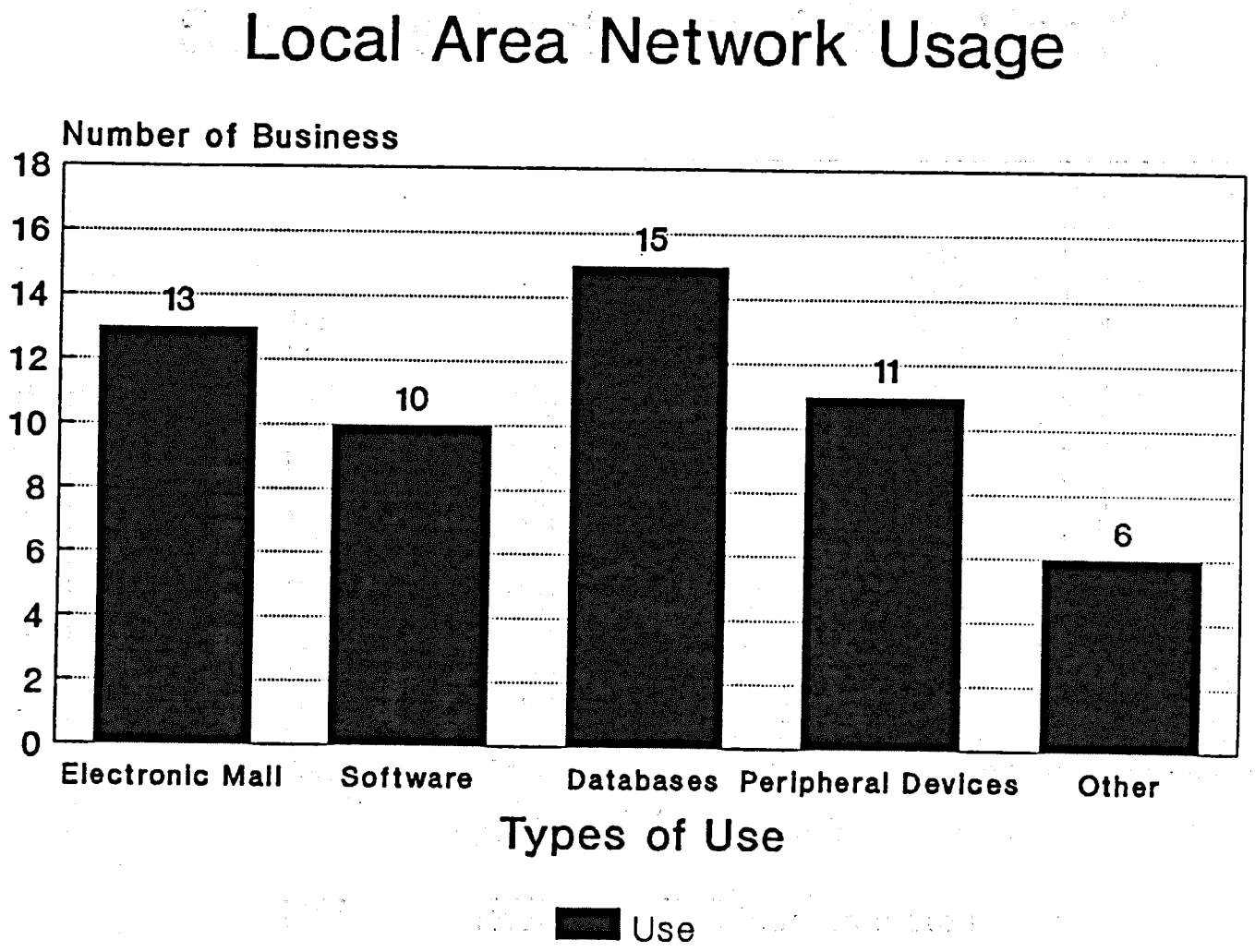

Local Area Network Usage
Number of Business
18
16
14
12
10
8
6
4
2
0
13
10
15
11
6
Electronic Mail
Software
Databases
Peripheral Devices
Other
Types of Use
Use

Figure 7

Software Packages Being Used

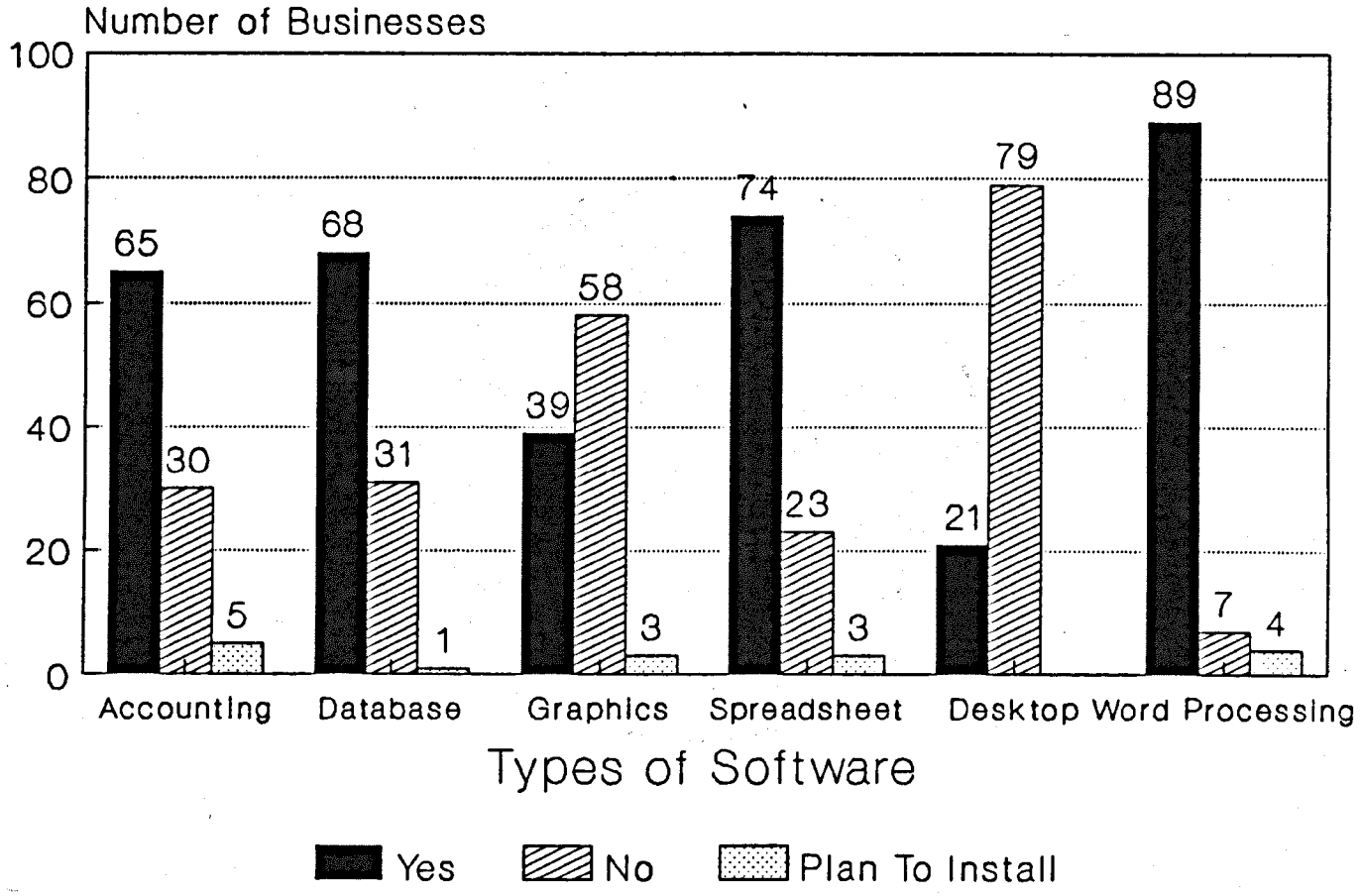
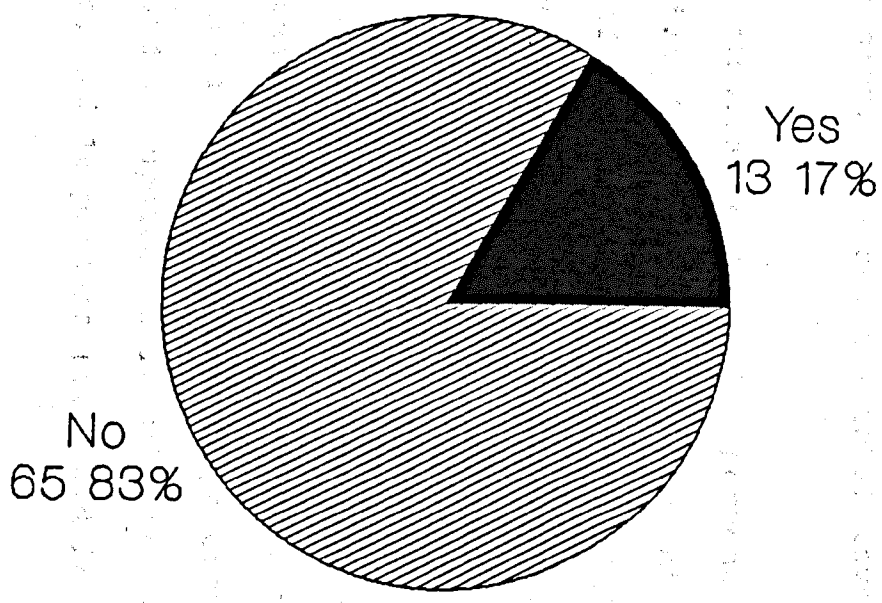


Figure 8

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

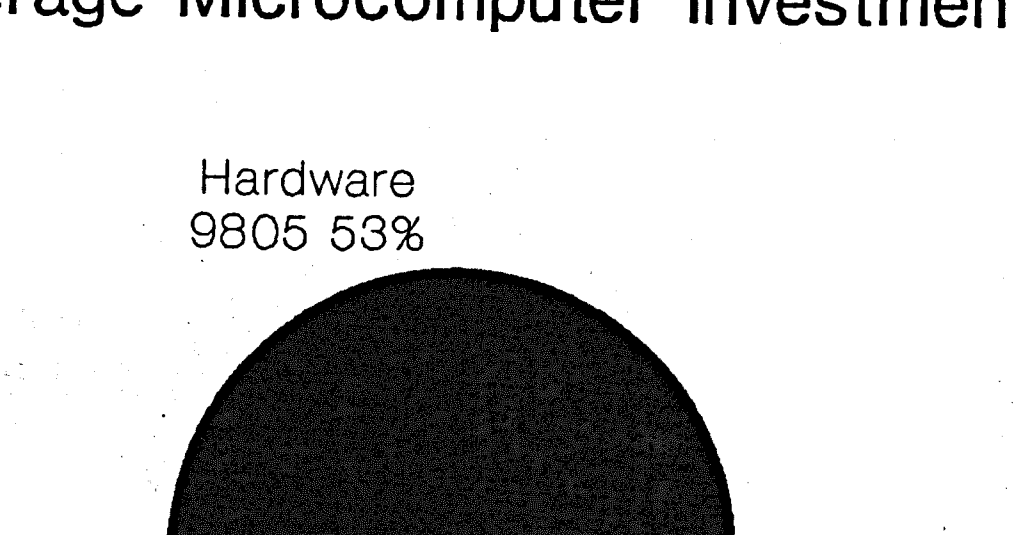


Figure 10

Perception of Cost Effectiveness

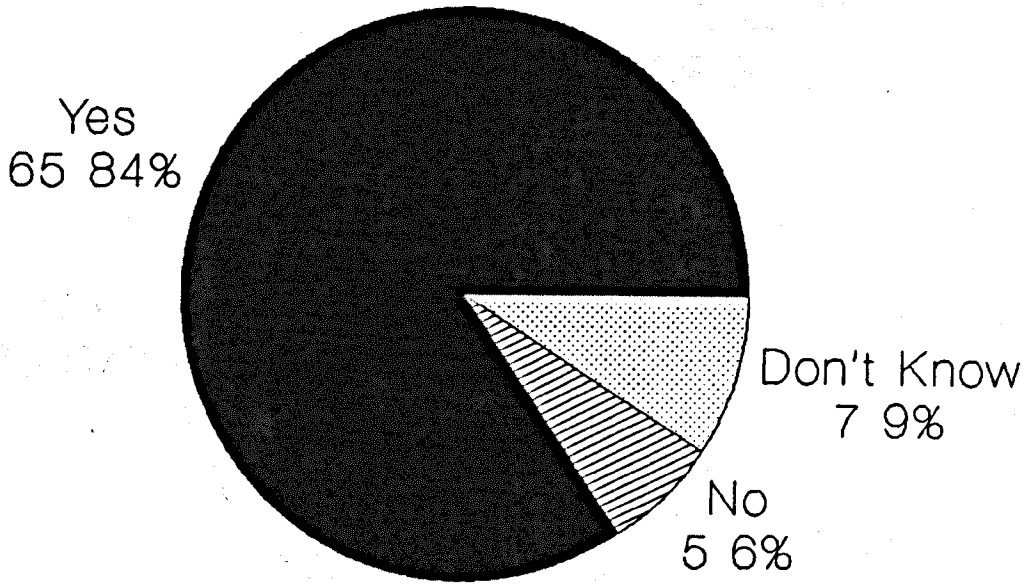
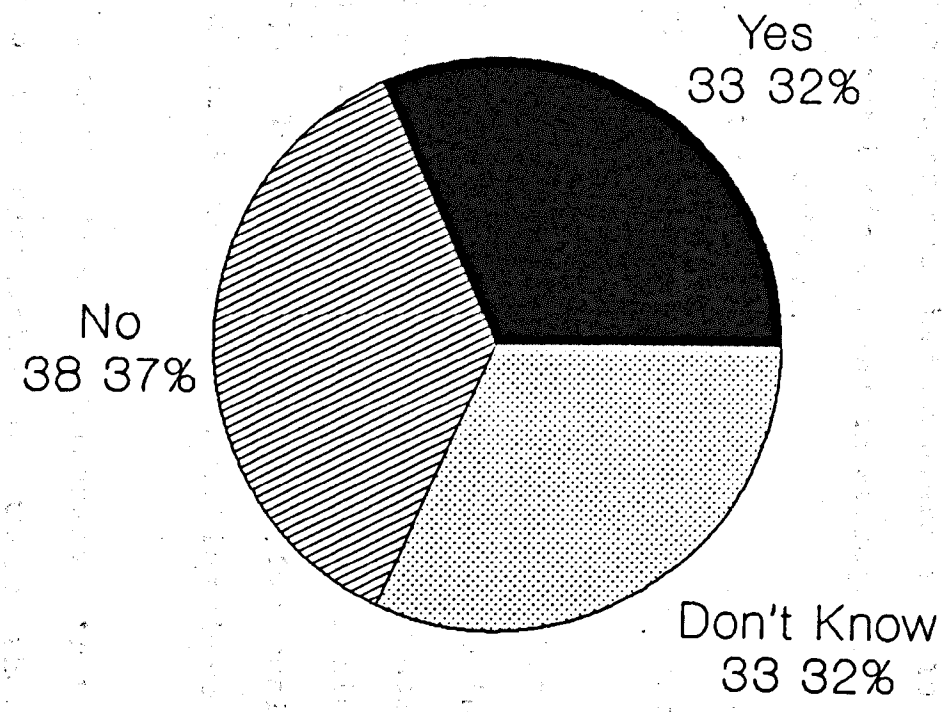


Figure 11

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

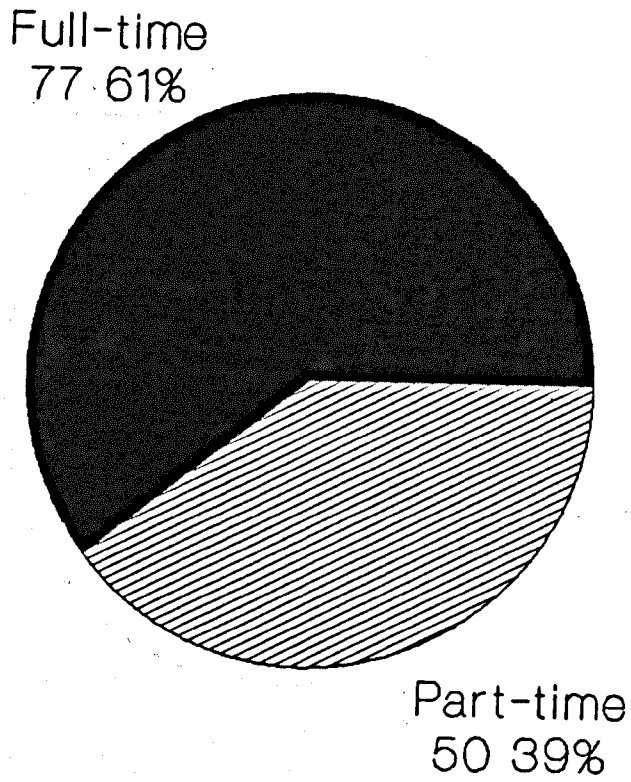


Figure 13

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

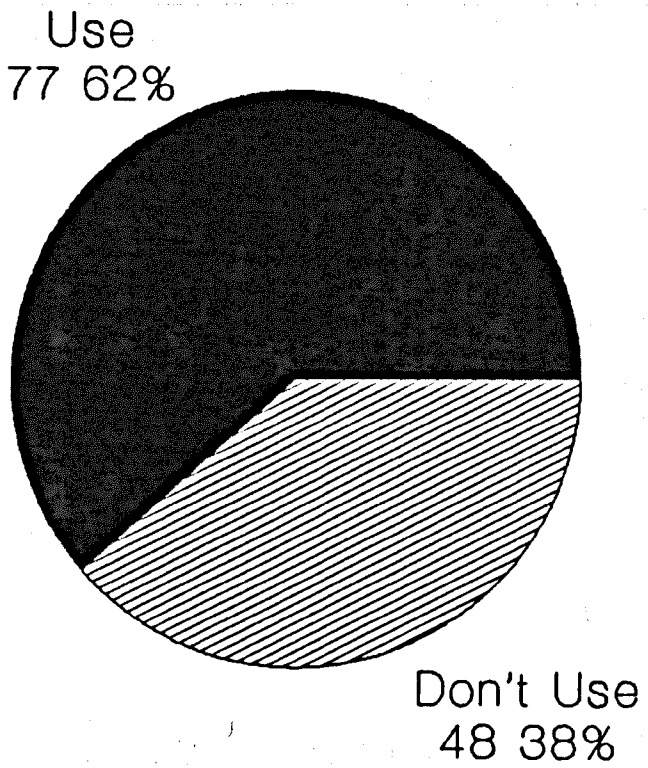


Figure 14

Comparison of Businesses With/Without Predominant Micro Responsible Position

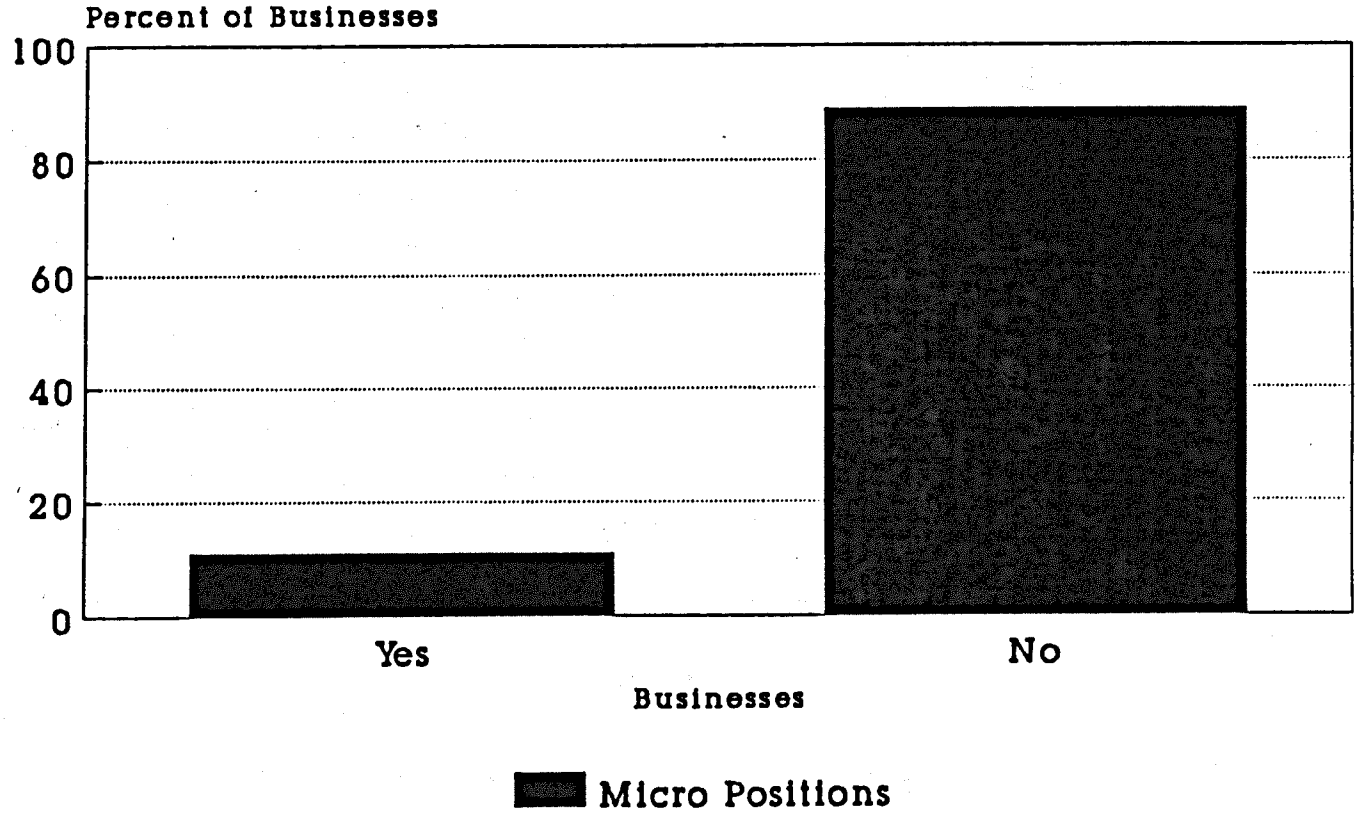


Figure 15

Comparison of Businesses With/Without Positions Involving Some Micro Duties

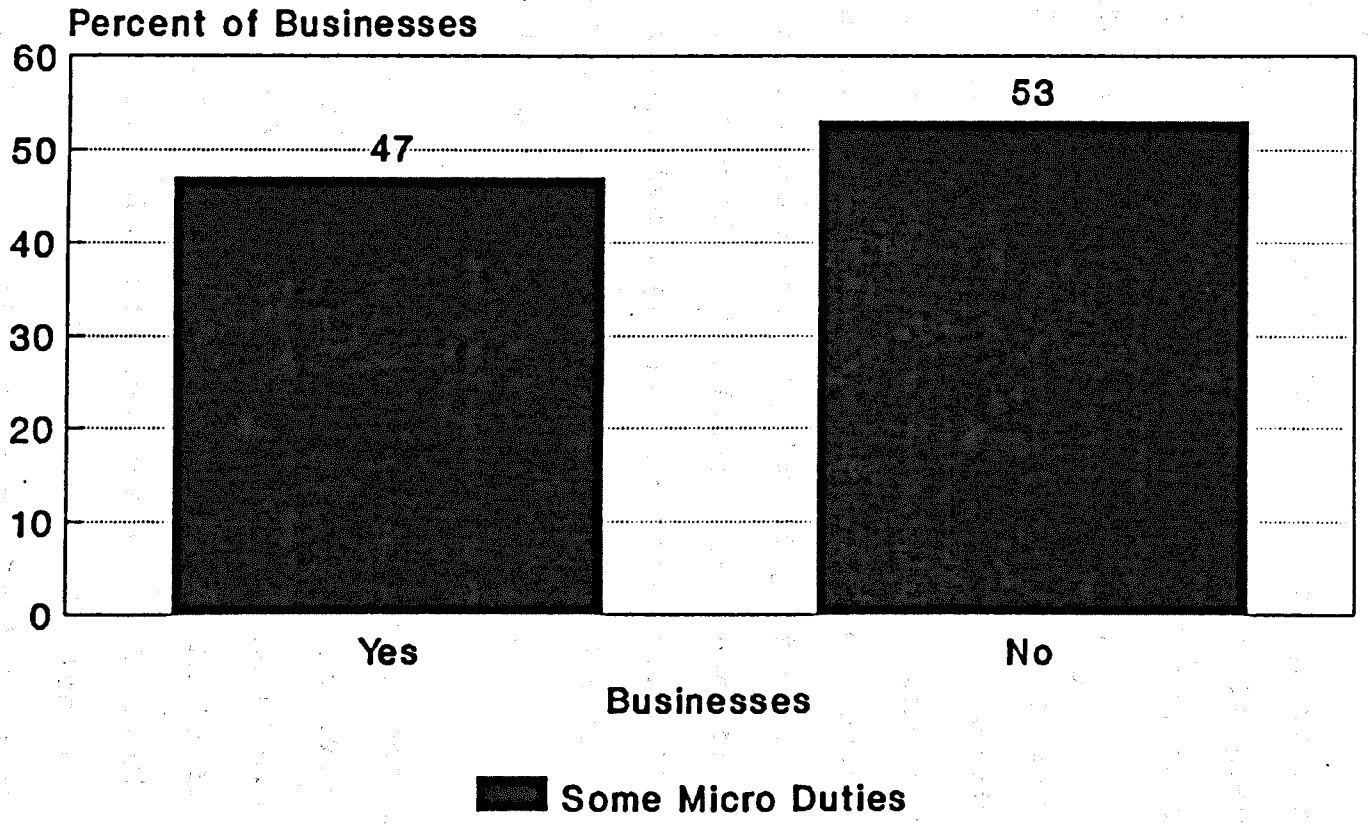


Figure 16 illustrates that of the businesses that had IS professionals with predominant microcomputer responsibilities, the availability of written job descriptions for them was 44 percent (44%).

Figure 17 shows that of businesses that had personnel with some microcomputer responsibilities, only 14 percent (14%) had written job descriptions. Data gathered in this area demonstrated a great need for improvement.

Figure 18 separately compares three categories of qualifications for positions requiring predominant microcomputer responsibility and those with some microcomputer responsibilities. For predominantly microcomputer positions, the recommended training for IS professionals to meet qualifications was education (40%), on-the-job training (40%), and prior experience (20%). For personnel with some microcomputer responsibilities, the recommendations were education (38%), on-the-job training (35%), and prior experience (27%).

Figure 19 demonstrates the respondents' intentions as to future hiring of microcomputer personnel. In 1990, 5% intended to hire, 89% did not intent to hire, and 6% did not know whether or not they intended to hire. In 1992, 10% intended to hire, 62% did not intend to hire, and 28% did not know whether they intended to hire additional microcomputer personnel. In 1995, 7% intended to hire, 60% did not intend

Figure 16

Businesses With Written Job Descriptions For Predominant Micro Positions

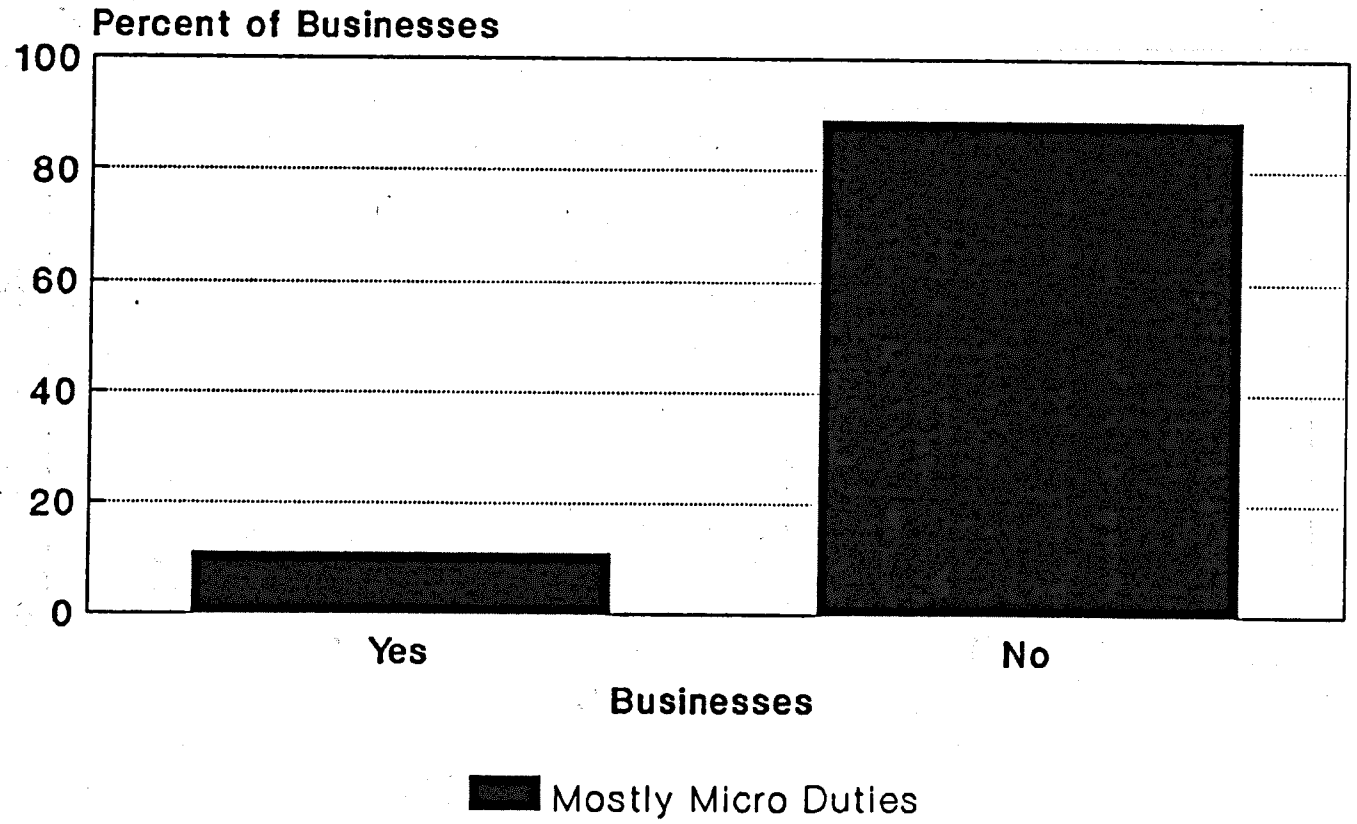


Figure 17

Businesses With Written Job Descriptions For Positions With Some Micro Duties

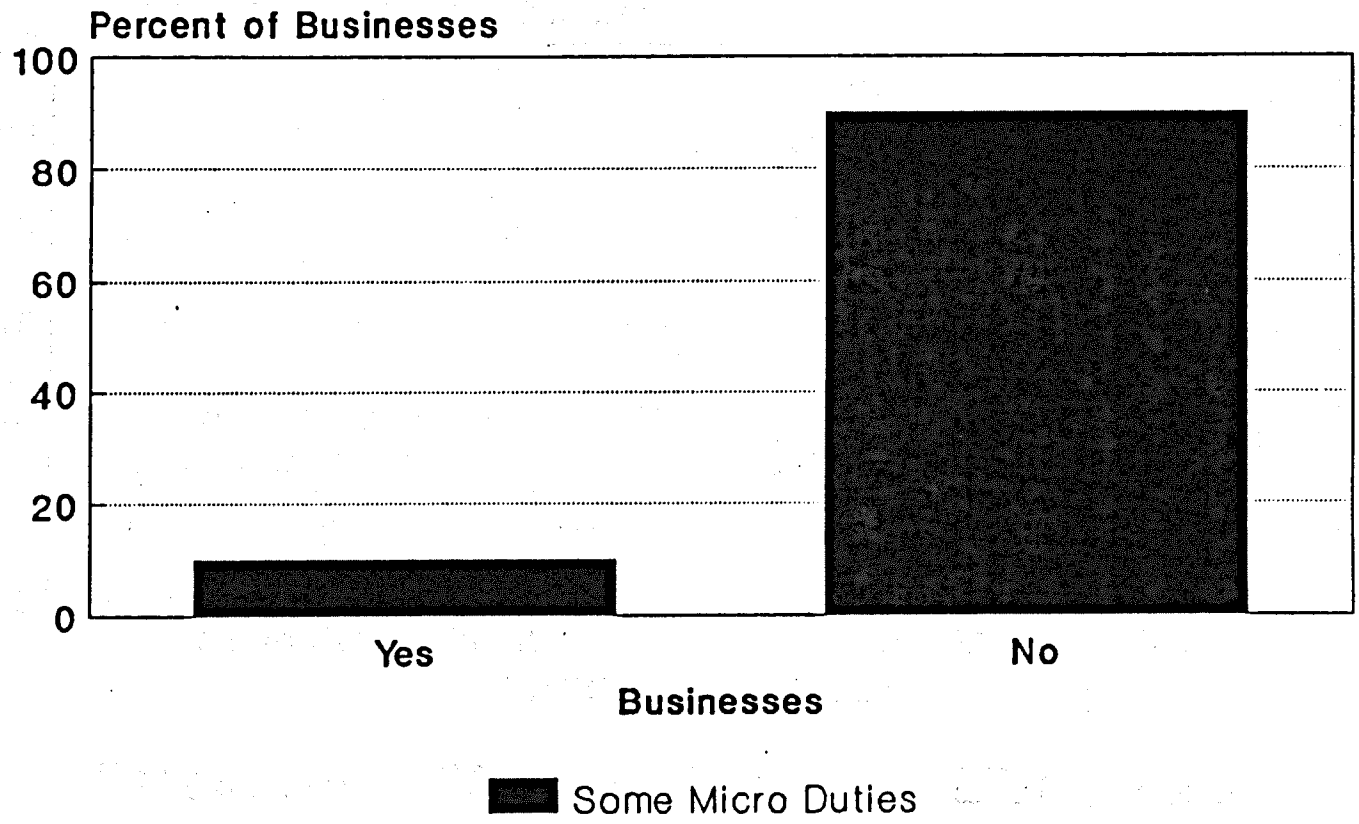


Figure 18

Microcomputer Personnel Qualification Methods

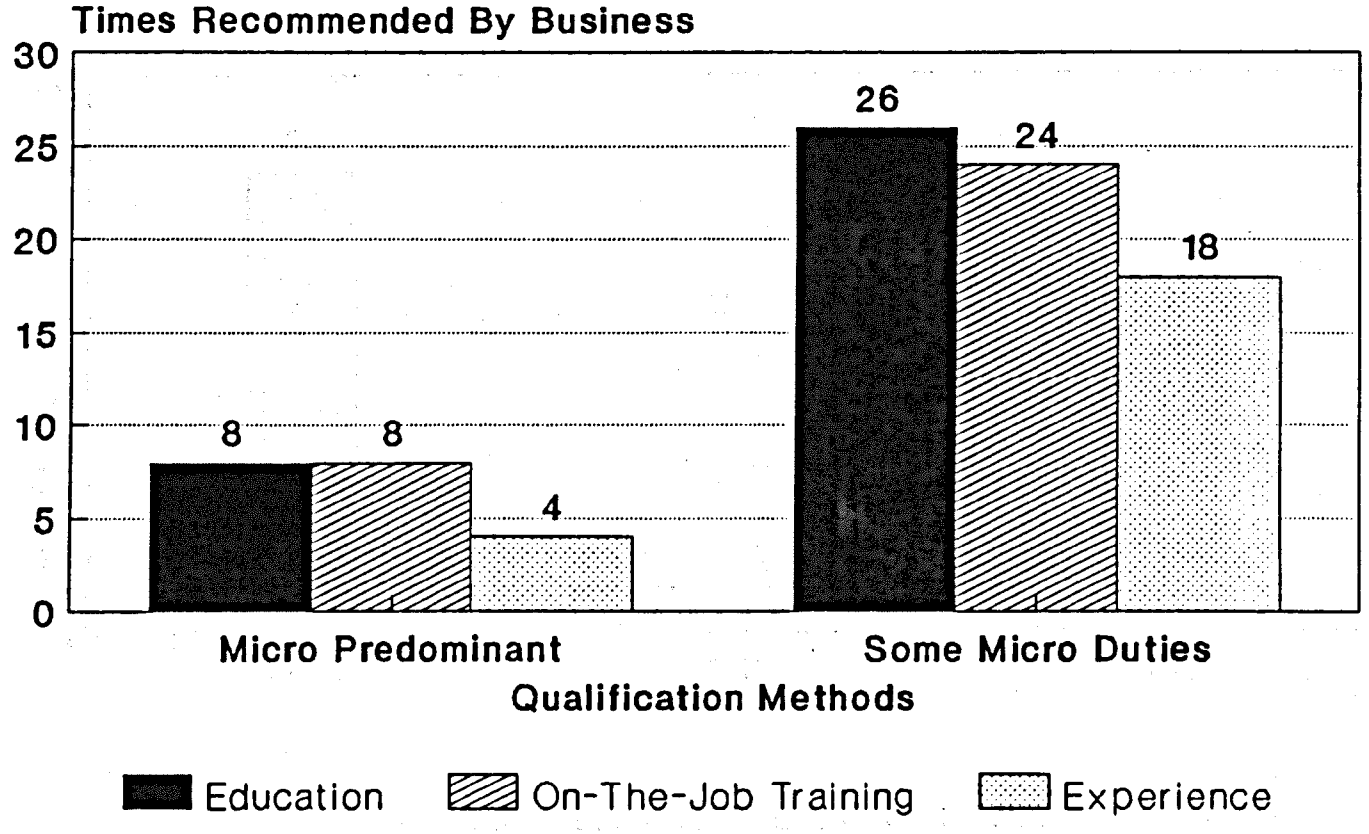
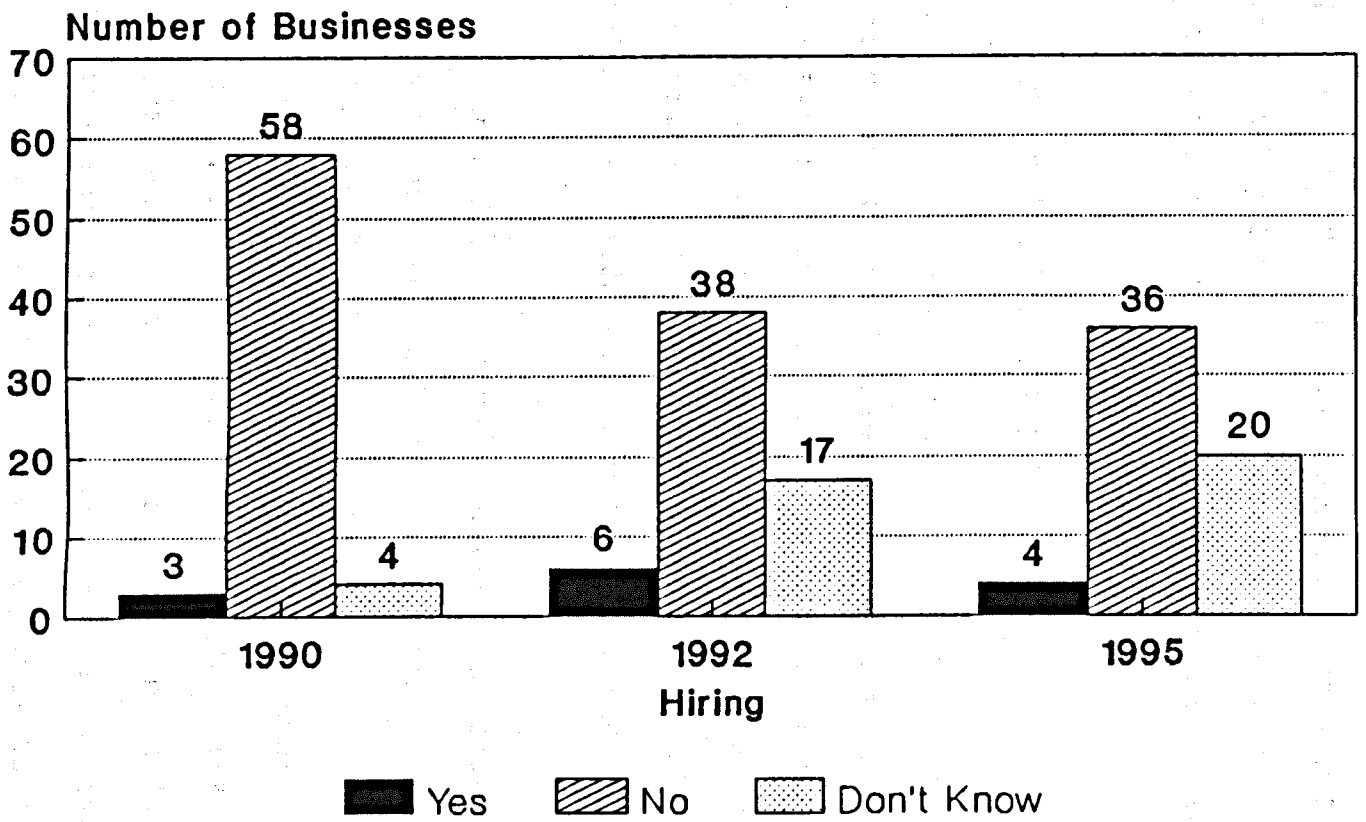


Figure 19

Intent to Hire Microcomputer Personnel



to hire, and 33% did not know whether they intended to hire additional microcomputer personnel.

There was a significant difference between "Don't Know" responses relating to the years, 1990, 1992 and 1995. ($X = 14.83$, $DF = 4$, $P<.005$) "No" responses decreased between 1990 and 1992, but practically leveled out between 1992 and 1995. The affirmative responses stayed approximately the same from 1990 to 1995.

Section 6: Education Needs

This section presents recommendations by the Montana business community on IS professionals' education. It addresses various types of software and how much familiarity they should possess, whether they should have general knowledge or experience of LANs, and what methods of education should be offered through colleges and universities.

Figure 20 presents data concerning seven categories of business course work and respondents' perception of the proportions graduates should obtain. They were: accounting (23%), information systems (21%), finance (15%), management (13%), marketing (12%), law (8%), and other courses (8%).

Figure 21 illustrates the amount of training college graduates should have with these general types of software available to businesses. Of the Montana businesses that advocated extensive software training, the software fell

Figure 20

Business Areas As Recommended For IS Professionals

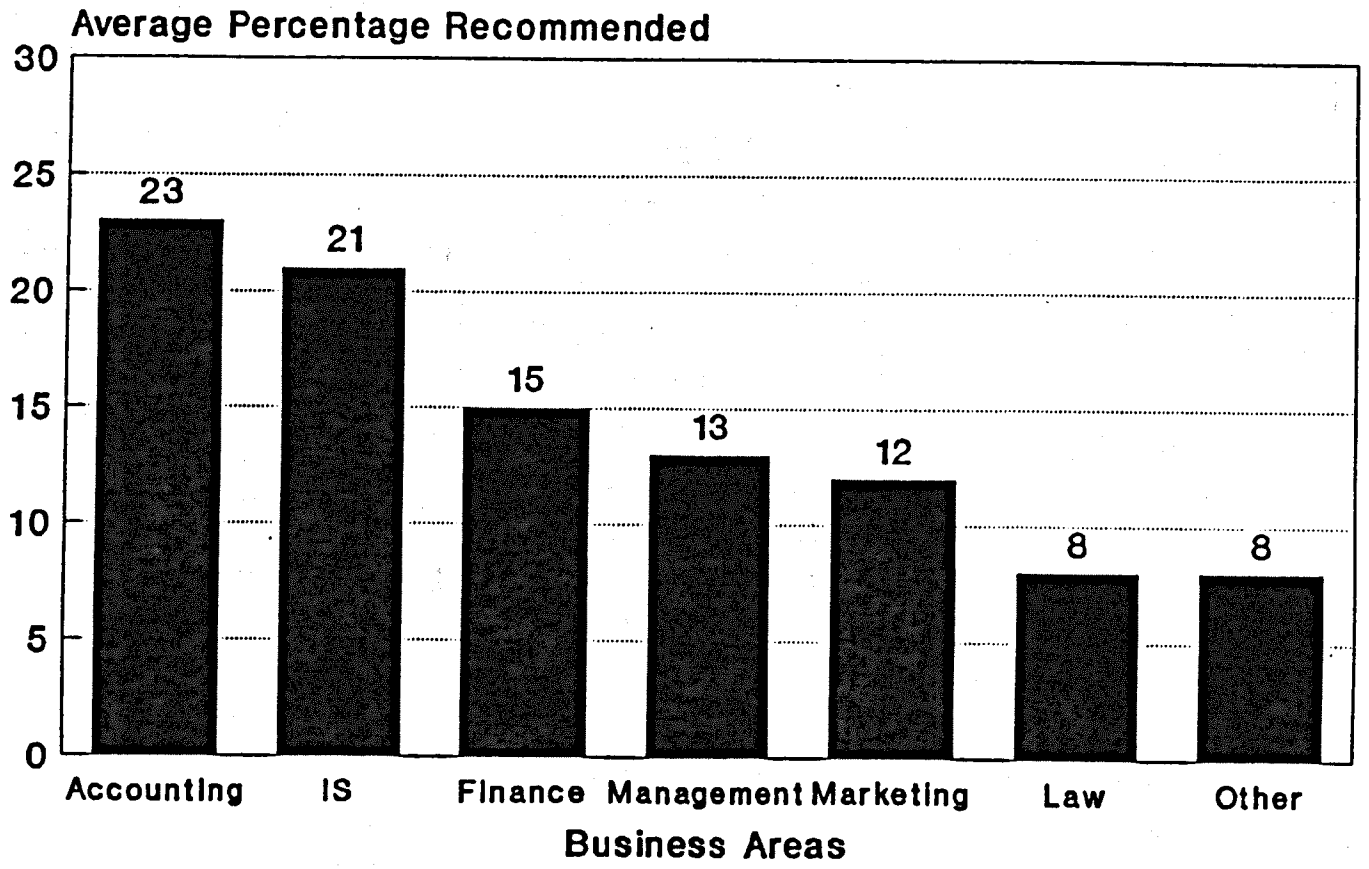
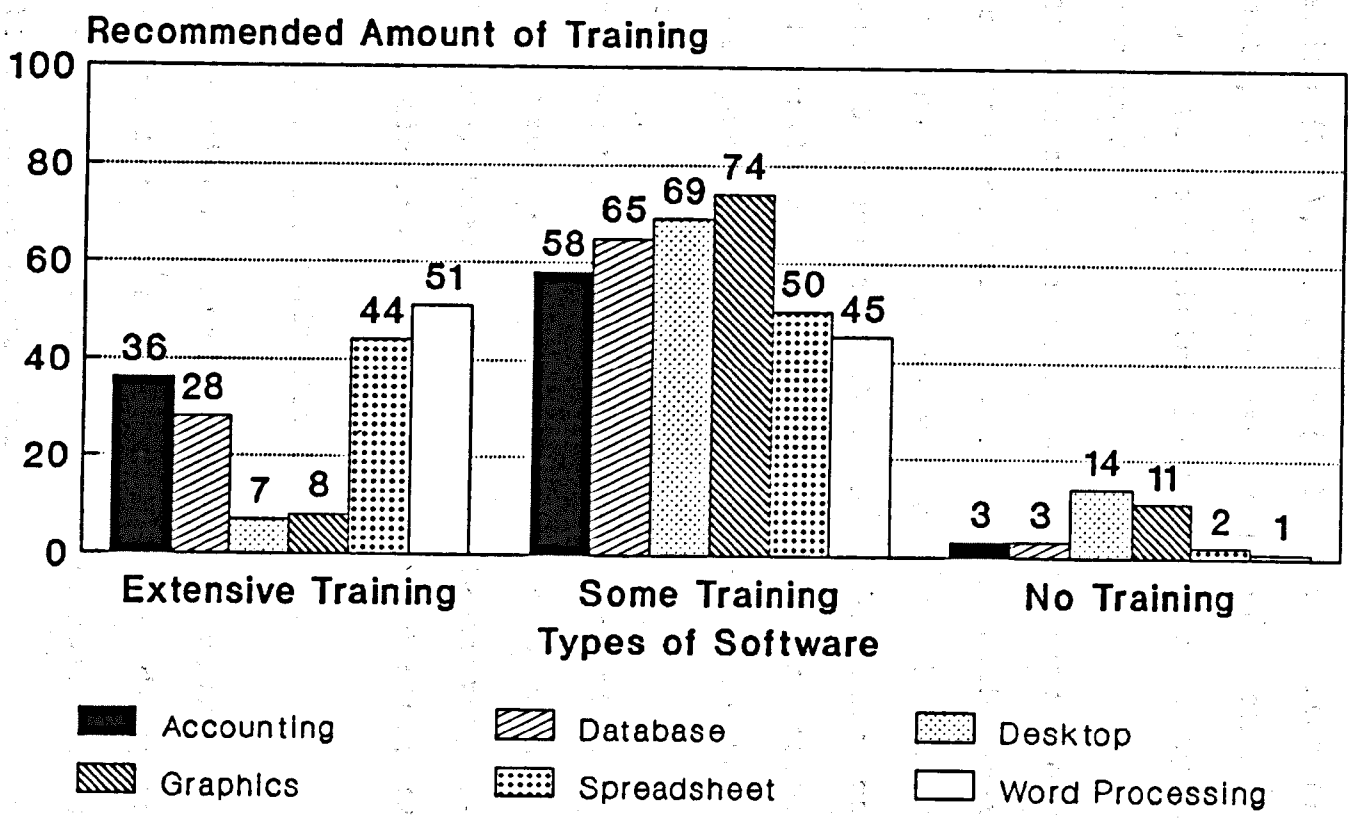


Figure 21

Software Training Recommended For Graduates



into the following order: word processing (29%), spreadsheet (25%), accounting (21%), database (16%), graphics (5%), and desktop publishing (4%). Of those that advocated some training, the software fell into this order: graphics (21%), desktop publishing (19%), database (18%), accounting (16%), spreadsheet (14%), and word processing (12%). There were respondents who felt no training in any of these types of software was necessary.

Figure 22 demonstrates respondents' recommendations for the types of training graduates should possess with regard to Local Area Networks. Of the 83 who responded concerning general knowledge, 94 percent (94%) believed graduates should possess general knowledge of LANs. Of the 73 who responded concerning experience, 67 percent (67%) perceived experience to be necessary.

Figure 23 shows the respondents' recommendations on how graduates should receive training on microcomputers. In order of preference, they were hands-on laboratory (47%), real world (46%), classroom lectures (5%), and other (2%).

Section 7: Business Demographics

This section gives certain business demographics of those who responded to the sample. Those demographics include legal status, gross revenue, and the position of the person who filled out the instrument.

Figure 22

Knowledge of Networks Recommended For Graduates

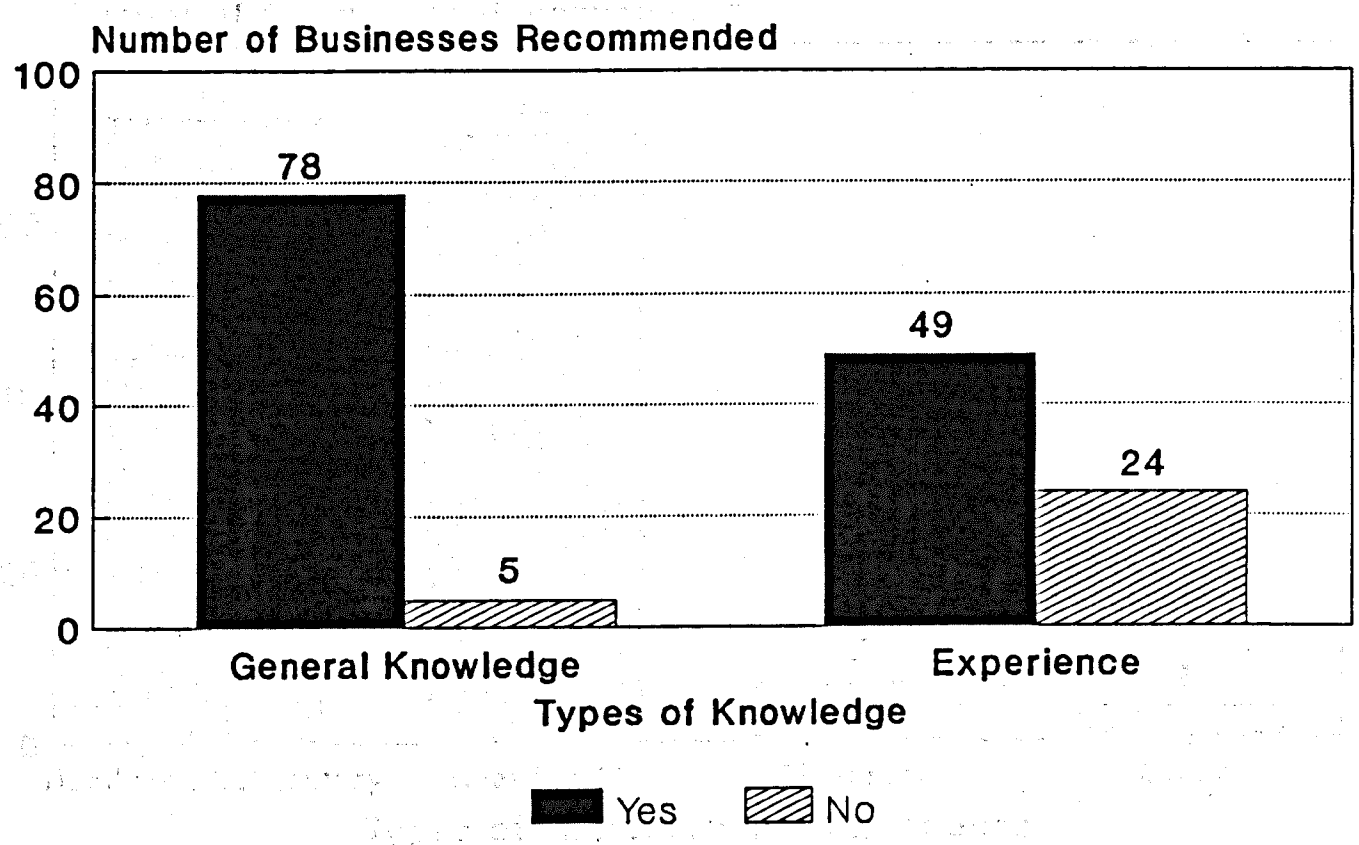


Figure 23

Types of Microcomputer Experience That Could Be Provided By Colleges

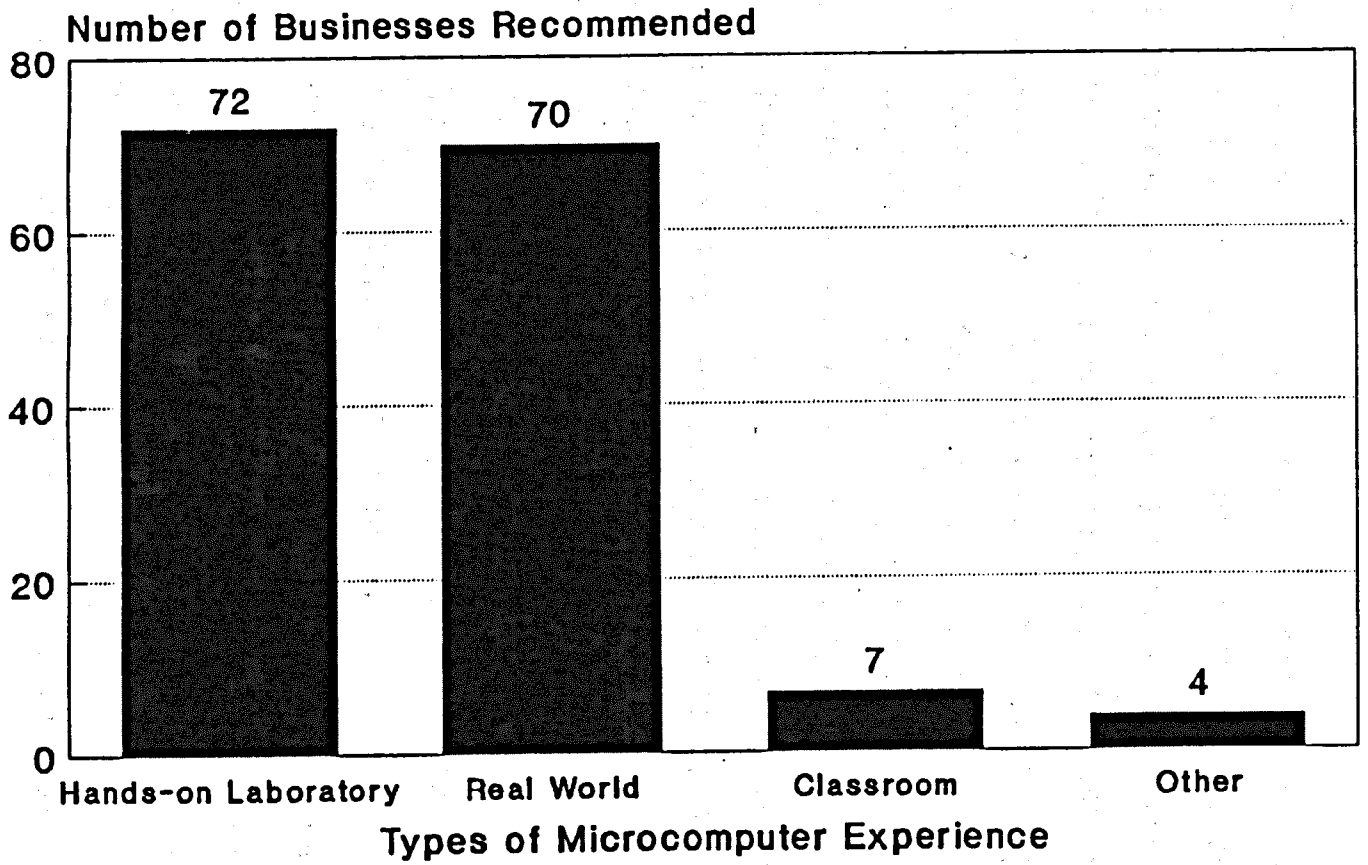


Figure 24 shows that those businesses responding to the instrument were 65 (53%) corporations, 41 (33%) sole proprietorships, 10 (8%) partnerships, and 7 (6%) government agencies.

Figure 25 presents data concerning the gross revenue in sales of the responding businesses. Of the 95 businesses that responded for 1989, 35 percent (35%) had a gross revenue of $100,000 or less, 24 percent (24%) had $100,001 to $250,000, 13 percent (13%) had $250,001 to $500,000, nine percent (9%) had $500,001 to $1,000,000, four percent (4%) had $1,000,001 to $2,000,000, six percent (6%) had $2,000,001 to $5,000,000, and nine percent (9%) had $5,000,001 or more.

Of the 76 businesses that responded for 1990, 31 percent (31%) of those businesses had a gross revenue of $100,000 or less, 19 percent (19%) had $100,001 to $250,000, 13 percent (13%) had $250,001 to $500,000, 11 percent (11%) had $500,001 to $1,000,000, five percent (5%) had $1,000,001 to $2,000,000, seven percent (7%) had $2,000,001 to $5,000,000, and 14 percent (14%) had $5,000,001 or more.

These data demonstrate that over half of Montana's businesses had a gross revenue of $250,000 or less during 1989 and 1990. They also show that approximately one third had a gross revenue of $100,000 or less.

Figure 26 illustrates the positions in the businesses of the individuals who filled out the instrument. In order of frequency, they were owner 61 (60%), manager 23 (22%), other

Figure 24

Legal Status Of Responding Businesses

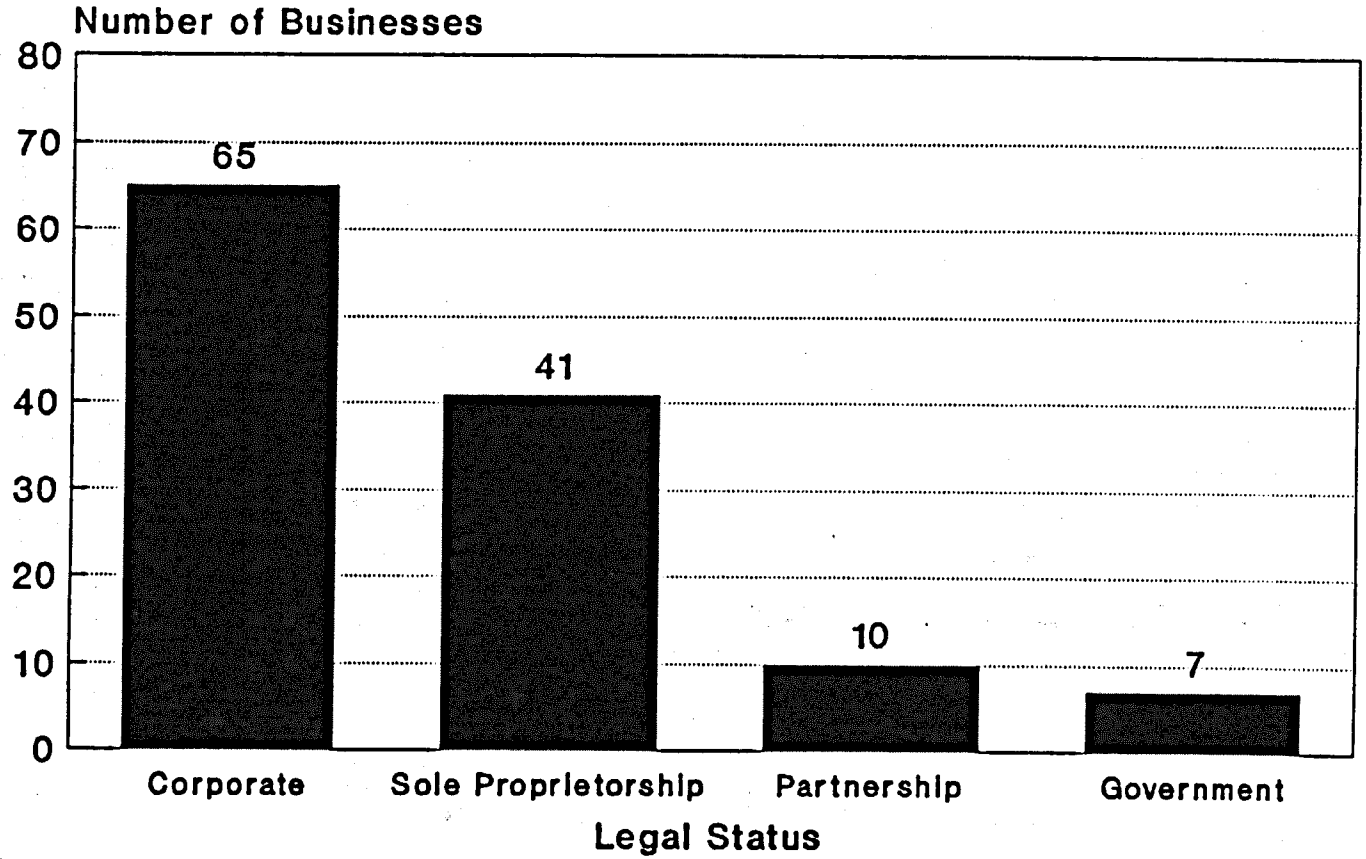


Figure 25

Gross Revenue Of Responding Businesses

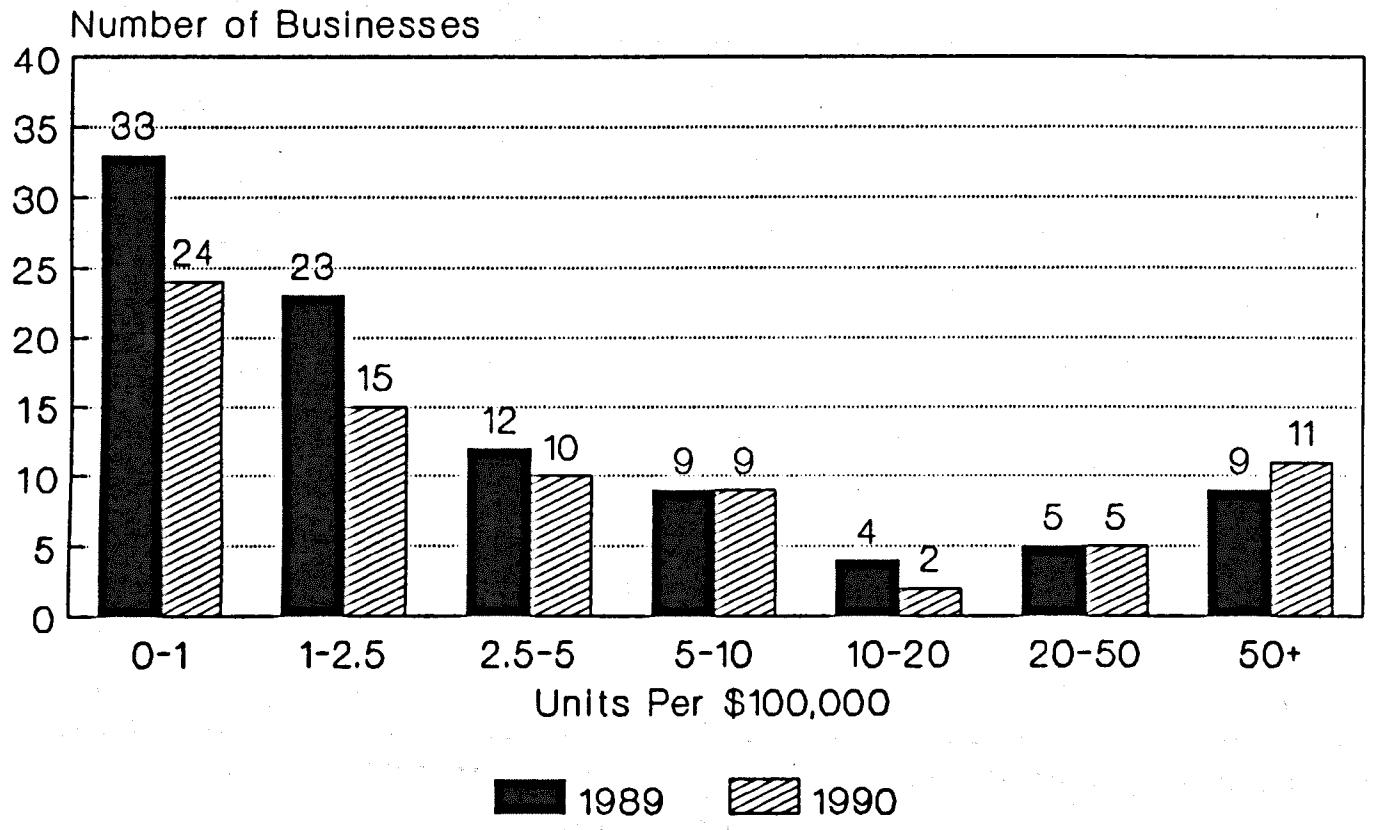
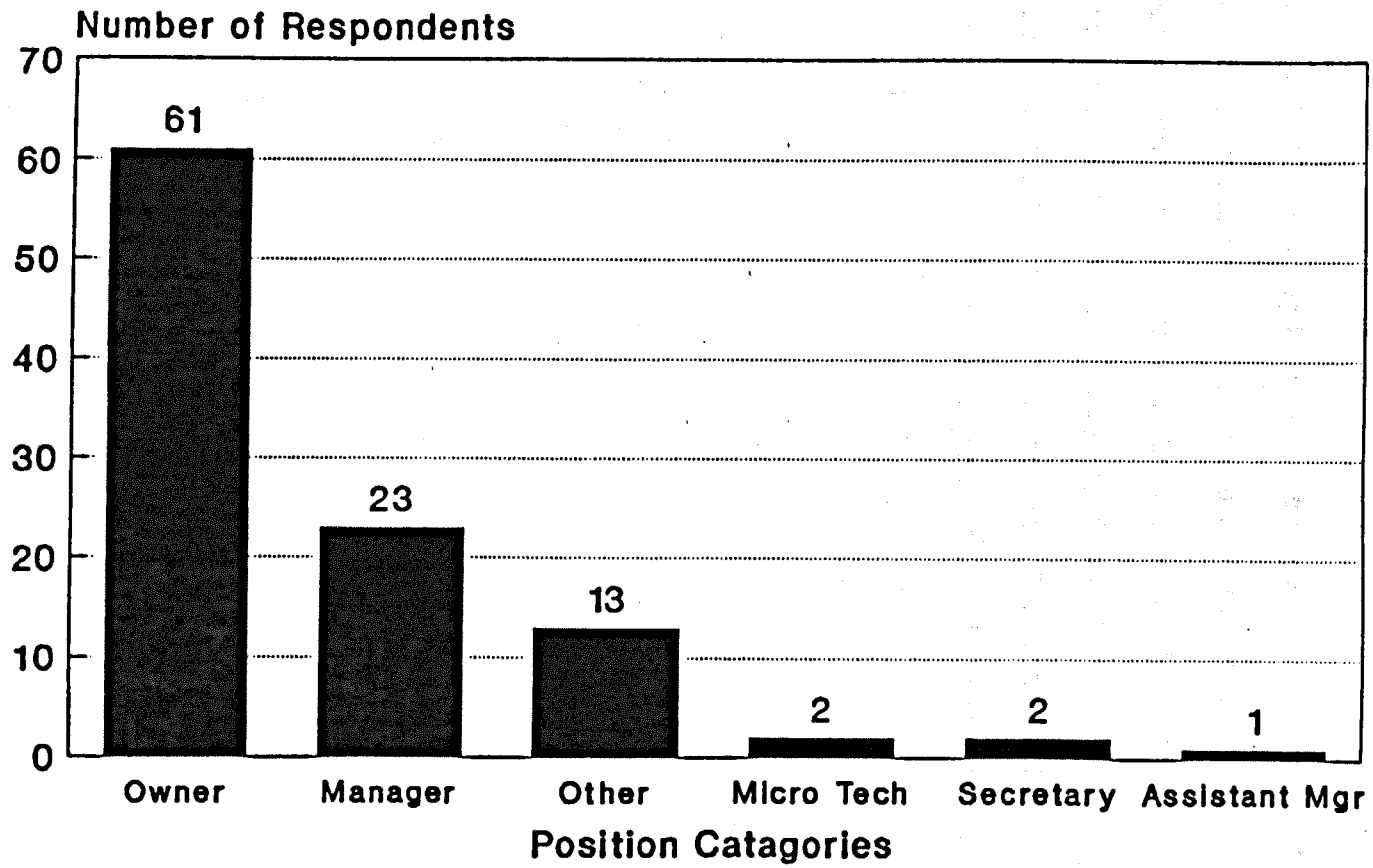


Figure 26

Position of Respondents Who Filled Out Questionnaire



13 (13%), microcomputer technician 2 (2%), secretarial staff 2 (2%), and assistant manager 1 (1%).

Summary

The purpose of this chapter was to present the data acquired through this study. The data was divided into seven sections: Microcomputer Hardware, Local Area Networks and Modems, Software and External Databases, Computer Investment Strategies, Information Systems Personnel, Education Needs, and Business Demographics. The data presented is interpreted in the next chapter.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose of this chapter provides the researcher's interpretations of the data illustrated in Chapter IV. The previous chapters are summarized, the researcher's conclusions provided, and the researcher's recommendations to IS educators and professionals, and Montana businesses are presented. Recommendations for further research are outlined and a summary of the chapter concluded this study.

Summary of the Study

The major purpose of this study was to identify the specific needs of the Montana business community in relation to information systems (IS) and related personnel.

The need for the study was the rapid changes that have taken place in the IS field over the past two decades. IS professionals and educators have focused on the technical knowledge and skills associated with the development and maintenance of information systems. IS professionals in the past have tended to be too narrow and as a consequence failed to integrate effectively with the organizations that hired

them. This study met the need for IS educators and professionals to know what the Montana business community requires of IS professionals.

The study was limited to businesses operating in Montana at the time of the study. Of the 500 businesses selected to receive questionnaires, 137 responded.

The literature review covered the following areas: needs of industry, development of the role of the IS professional manager, IS curriculum, specific needs of Montana's small to tiny businesses, and future trends of IS.

The methods and procedures of this research were organized into sub-topics, including description of the sources of data, presentation of the methodology of construction of the questionnaire, definition of the administration of the questionnaire, and explanation of the procedure for the analysis of data.

The questionnaire used in this study was derived by the researcher through careful review of literature which provided the basis for the form.

Data used in this study were collected from two sources: the literature review and responses from the questionnaire. It was compiled and presented in a statistical presentation and descriptive narrative. The major findings of the study are as follows.

Microcomputers are being used extensively by Montana's businesses. The ever increasing use of this technology has created the need for employees who understand its potential.

It was found that 64 percent of Montana's small business community use microcomputers and of those, 18 percent have them connected through a LAN and/or use of modems.

IBM and IBM compatibles still hold the lion's share of the microcomputer market at 64 percent. Macintosh, Apple, and other non-compatible microcomputers held 36 percent of the market. Of those microcomputers used, 95 percent are owned by the businesses rather than leased.

The typical Montana small business uses the following software packages: (27%) word processing, (21%) spreadsheet, (19%) accounting, (18%) database, (10%) graphics, and (5%) desktop publishing software. In addition, only (17%) used external databases.

The average total microcomputer investment was $18,498 with distribution of hardware (53%), software (26%), maintenance (11%) and training (3%). The majority of respondents (84%) perceived their investment was cost effective.

Of respondents who use microcomputers, 46 percent intended to expand or update their microcomputer systems within twelve months of the date this survey was taken.

Montana's businesses hired employees who knew how to use microcomputer systems. The average business had 16 employees

(ten full-time and six part-time), of which five used their microcomputer systems in some manner.

Data showed businesses that had positions including microcomputer responsibilities as 64 percent (64%). Of those businesses, 11 percent (11%) have positions that are predominantly microcomputer oriented. Almost half of all Montana businesses, 47 percent (47%), have positions requiring some microcomputer responsibilities.

Of the businesses that had positions requiring predominant microcomputer responsibilities, 44 percent (44%) had written job descriptions. However, only 14 percent (14%) had written job descriptions for positions with some microcomputer responsibilities. These findings identify an area that is being ignored by Montana's businesses. This leads the researcher to wonder if businesses have a lack of understanding of how job descriptions can improve their management and personnel decision making abilities. It may be an area that needs to be stressed more by consultants, business educators and IS professionals.

Businesses responded that personnel with predominant microcomputer responsibilities should have training in education (40%), on-the-job training (40%), and prior experience (20%). Personnel with positions involving some microcomputer responsibilities were recommended to have training in education (38%), on-the-job training (35%), and experience (27%).

In 1990, five percent (5%) of respondents intended to hire additional microcomputer related personnel. In 1992, 10 percent (10%) intended to hire, and in 1995, 7 percent (7%) intended to hire additional microcomputer related personnel.

Montana businesses perceived that a business graduate's course work should contain 23 percent accounting, 21 percent information systems, 15 percent finance, 13 percent management, 12 percent marketing, 8 percent law, and 8 percent other courses.

These businesses recommended extensive training in the following software: word processing (29%), spreadsheet (25%), accounting (21%), database (16%), graphics (5%), and desktop publishing (4%).

A heavy majority of respondents, 94 percent, recommended graduates possess general knowledge of local area networks while 67 percent perceived experience using LANs to be necessary.

Respondents preferred graduates receive microcomputer training by hands-on laboratory (47%), real world (46%), classroom lectures (5%), and other methods (2%).

Of the businesses responding to the instrument 53 percent (53%) were corporations, 33 percent (33%) sole proprietorships, eight percent (8%) partnerships, and six percent (6%) government agencies.

The data presented in Chapter IV concerning gross revenue shows that over half of Montana's businesses had a

gross revenue of $250,000 or less during 1989 and 1990. They also show that approximately one third had a gross revenue of $100,000 or less, which concurs with the size of the businesses identified through their average number of employees.

The positions of the individuals who filled out the instrument were owner (60%), manager (22%), microcomputer technician (2%), secretarial staff (2%), and assistant manager (1%), other (13%).

Conclusions

Upon review of the major findings of this study, the researcher formed the following conclusions.

1. The Small Business Administration defines "small business" as 20-99 employees, it defines "very small business" as less than 20 employees. Given that framework, the results of this study designate the vast majority of Montana's businesses as fitting into the SBA definition of "very small business."
2. The investment in IS is costly and small businesses expect to derive benefits from their systems. The majority of Montana's business community perceived its investment into IS as cost effective. This is supported by the data which shows that about half of the businesses intended to expand or upgrade their IS within 12 months of the questionnaire.

3. This study can be used to enhance the IS professionals' probability of finding employment in Montana. Their marketability can be increased through improvement of the skills which businesses are demanding.
4. The results of this study suggest that Montana's school systems should modify their curricula to provide the training that potential employees need. IS educators should evaluate and conform the content and methods of their business courses to match what the business community considered to be important.
5. Businesses perceived that hands-on laboratory and real world educational methods were the most effective in training microcomputer personnel.
6. The types of software most in demand by businesses are word processing, spreadsheet, accounting, and database software. Businesses also recommended that business graduates have general knowledge and experience with LANs. IBMs or compatibles, are the most commonly used in the business community and therefore should be used by IS educators in teaching their courses.
7. This project found that job descriptions were available in less than half of the businesses with positions involving predominant microcomputer responsibilities. For those with some microcomputer responsibilities, job descriptions were almost non-existent. This is an area that the Montana business community needs to attend to.

8. As can be expected because of the small size of Montana businesses, approximately one third had a gross revenue of $100,000 or less. The next largest concentration of businesses was a gross revenue of $100,001 to $250,000 with 24 percent in 1989 and 19 percent in 1990.
9. There may be bias in this study due to the number of non-responders. Possible bias could include:
   a. Business' use of information systems for statistical tools, since there was nothing on the questionnaire which addressed statistics;
   b. Since the survey used the term "small business," large firms may have tended not to respond.

Recommendations for IS Educators and Professionals

Upon review of the information provided by responses to the questionnaire and the current literature, the researcher recommends incorporation of these recommendations into the educational system.

1. Training should include word processing, spreadsheet, accounting, and database software.
2. Training should take place using IBM or compatibles, since these are still the most commonly used in the business community.
3. Training should include both general knowledge and experience of local area networks.

4. IS educators should design the courses they teach to include hands-on laboratory and real world experiences.
5. IS professionals should evaluate their knowledge and skills according to those perceived to be important by businesses. They should then strengthen those areas.
6. Training should include a well-rounded curricula which includes training in business organizations, oral and written communication, and management skills.

As IS professionals provide assistance to organizations, they should be able to streamline information systems to meet business' requirements, reduce costs, and enhance use by the end-users. In addition, IS professionals should focus on providing technical support that will reduce loss of productivity during training time.

Recommendations for the Montana Business Community

The researcher strongly recommends that Montana's businesses incorporate these recommendations into the management aspects of their business practices.

1. Businesses should develop detailed job descriptions.

Management consulting texts stress the importance of job descriptions (Bittel & Newstrom 1990), (Hitt, Middlemist & Mathis 1986). Businesses need to give this area immediate attention. IS educators and professionals may be of assistance concerning those positions which relate to IS.

The researcher suggests that job descriptions can be created through the following process. For each position:

a) Outline job responsibilities, including skills, duties, and accountability.

b) Establish standards of performance that are observable, measurable, achievable and realistic.

c) Define the levels of knowledge, experience and education which an employee must have to qualify for the position.

By creating written job descriptions, businesses will not only have a guideline with which to measure an employee's job performance, but one to rely on during the hiring process. Potential employees can use the job description to determine if they qualify for and can conform to that position's particular requirements.

2. Businesses should seek advice and assistance from several sources before purchasing or upgrading their information systems.

The purpose of putting time and effort into investigating different alternatives and opinions is to create a cost effective and successful information system. It might be beneficial to contact similar businesses to identify what systems they use, what they do and do not like about them, and the reasons why. Armed with all of this

information, the business is more likely to purchase and develop an IS that will meet its requirements.

Recommendations for Further Research

The researcher strongly recommends further research into the IS needs of Montana's small businesses to enable colleges, universities, and IS professionals to meet those needs. The researcher recommends:

1. Periodic longitudinal studies that rework and replicate this study;
2. That the study be expanded to include:
    a. Whether a small business college curricula option is needed;
    b. Whether quantitative statistical tools are being used;
    c. Whether there are any management or marketing skills lacking and, if so, identify them;
    d. Whether the recommendations for a large amount of accounting in the IS curricula means that small businesses use IS professionals and systems to primarily assist accounting applications.

It is important for IS educators and professionals to be diligent and flexible in keeping up with rapidly advancing technology. If they do not stay current on the available technology and needs of the business community they serve,

they are likely to be left behind in the race to meet the information age.

BIBLIOGRAPHY

BIBLIOGRAPHY

Appleton, Daniel S. "Information Asset Management." Datamation, February, 1986, 71-72, 74, 76.

Arnett, Kirk P. and Merle P. Martin. "Designing an Adaptive MIS Curriculum." The Journal of Computer Information Systems, Spring, 1988, 19-25.

Bettinger III, Charles O. and Claude L. Simpson. "Industry Demands for Computer Professionals and the Role of the DPMA Model Curriculum." Journal of Data Education, July, 1982, 7-8.

Bittel, Lester R. and John W. Newstrom. "What Every Supervisor Should Know." McGraw-Hill Publishing Company, 1990, 204.

Carlyle, Ralph Emmett. "Technology - Sword or Shield?" Datamation, March, 1987, 85-86.

Carper, William B. "Human Factors in MIS." Journal of Systems Management, November, 1977, 48-50.

Collins, James F., Feeney, George J. and John Gosden. "Calling a Spade a Spade...A Chat With MIS Executives. Datamation, 1979, 59-62.

Dunn, Jacquelin R., Moen, David H. and John E. Powell. "Small Business: A Study of Technology", School of Business, University of South Dakota, Vermillion, SD 57069.

Falce, Tom. "Changing Role of Management Information Systems and Office Automation." Journal Of Systems Management, May, 1985, 26-29.

Farah, Badie N. "Some Observations on Teaching MIS Project Development in Conjunction with Local Organizations." The Journal of Computer Information Systems, Fall, 1987, 10-15.

Flynn, J. Anthony. "Fitting Data Communications into the CIS/MIS Curriculum." International Academy for Information Management, December, 1987, 117-121.

Gabel, David. "Staying in Step with the Company." Computerworld, July 24, 1989, 54.

Gallagher, Michael, Johnston, Marvin A. and James P. Cook. "Industry disenchanted with DP education "fairy tale." Data Management, December, 1978, 62-66.

Grindlay, Andrew. "Redefining the Role of the Information Systems Manager." Business Quarterly, Summer, 1985, 57-59.

Gupta, Jatinder N. D. and Irmtraud S. Seeborg. "The Graduate MIS Course in the Schools and Colleges of Business." Journal of Management Information Systems, Vol. 5, No. 4, Spring, 1989, 125-136.

Gupta, Roger. "Information Manager: His Role in Corporate Management." Data Management, July, 1974, 26-29.

Hitt, Michael A., Middlemist, Dennis R. and Robert L. Mathis. "Management Concepts and Effective Practice." West Publishing Company, 1986, 279.

Hunter, James W. "What Topics Employers Think Should Be Included in CIS Courses." The Journal of Computer Information Systems, Spring, 1987, 23-26.

Khosrowpour, Medhi. "A Comparison Between MIS Education and Business Expectations." The Journal of Computer Information Systems, Summer, 1988, 24-28.

Knodel, Melvin. "Computer Education Levels Sought By Industry." The Journal of Data Education, Fall, 1982, 10-11.

Knodel, Melvin. "Computer Opportunities and Curricula Based on Newspaper Advertisemants." The Journal of Data Education, July, 1982, 10-12.

Kolodziej, Stan. "Changes that are more than CPU-deep." Computerworld, June, 1989, 71-73.

Lane, Ray and Ray Hall. "Yes, There Is a Way to Measure MIS Investments." Business Month, August, 1989, 73-74.

Ludlum, David A. "Good times roll for Kawasaki." Computerworld, August, 1989, 51, 56.

Lusa, John, Iscoff, Ron and Laton McCartney. "Industry, Colleges Speak To Each Other." Infosystems, October, 1975, 39-40, 42.

Mandt, Edward J. "The failure of business education - and what to do about it." Management Review, August, 1982, 47-52.

McAlister, M. Khris and M. Blaine McCormick. "Encouraging Interaction Between IS Executives and Academia: One Institution's Approach." The Journal of Computer Information Systems, Fall, 1988, 25-26.

McLeod, Raymond Jr. "The Undergraduate MIS Course in A.A.C.S.B. Schools." Journal of Management Information Systems, Vol. II, No. 2, Fall, 1985, 73-85.

Nolan, Richard L. "Managing Information Systems By Committee." Harvard Business Review, July-August, 1982, 72-79.

O'Brien, James A. "Introduction to Information Systems in Business Management," Sixth Edition, 1991.

Owen, Darrell E. "SMR Forum: Information Systems Organizations - Keeping Pace with the Pressures." Sloan Management Review, Spring, 1986, 59-68.

Owens, Elizabeth L. "Small Business Increase Use of Microcomputers", Data Management, April, 1987, 8, 45.

Radding, Alan. "Size is beside the point - all that really matters is fit." Computerworld, June, 1989, 69-71.

Radding, Alan. "There is more to downsizing than bargain prices." Computerworld, June, 1989, 71-73.

Reeves, Gary R. and Robert S. Bussom. "Information Systems Curriculum." Journal Of Systems Management, March, 1979, 18-21.

Rosich, Daniel. "The MIS Course In The MBA Curriculum." Journal of Data Education, July, 1982, 13-14.

Rothfeder, Jeffrey. "It's Late, Costly, Incompetent - But Try Firing a Computer System." Business Week, November, 1988, 164-165.

SAS Institute, Inc., SAS Circle, P.O. Box 8000, Cary, NC 27512-8000.

Shoor, Rita. "MicroManagers: New Skills & Problems." Infosystems, January, 1986, 50-51.

Spock, Robin E. "Break With Tradition." Datamation, May, 1985, 111-114.

Sullivan-Trainor, Michael. "Changing the fixtures in the house that IS built." Computerworld, July, 1989, 51, 54, 56, 60.

Taylor, Shannon V. and Steven Ross. "Systems Analysis for 'Tiny' Organizations." College of Business, Montana State University, Bozeman, MT 59717.

Teer, Faye P. and Robert D. Spillman. "Proactive Information Systems Curricula Planning: Incorporating Emerging Trends From Business And Industry." International Academy for Information Management, December, 1987, 135-144.

"The DPMA Model Curriculum for Undergraduate Computer Information Systems, CIS '86." A service of Data Processing Management Association, Park Ridge, Illinois, Second Edition, July, 1986.

"The State of Small Business: A Report of the President Transmitted to the Congress 1989", United States Government Printing Office, Washington, 1989.

Tomeski, Edward Alexander and Konrad E. Sadek. "Job Satisfaction and the Systems Professional." Journal of Systems Management, June, 1980, 6-10.

Weizer, Norman. "What To Do When The Integrator Comes Calling." Business Month, October 1989, 89-90.

Will, Milton M. "The Status Of Microcomputer Utilization By Selected Small Businesses." The Journal of Computer Information Systems, Fall, 1986, 9-12.

APPENDICES

APPENDIX A

COVER LETTER

April 20, 1990

I am a graduate student of the College of Business at Montana State University. I am doing a study on the use of computers by Montana's small businesses. The name of your business was randomly chosen from a U.S. West telephone listing for the state of Montana.

You can provide current and comprehensive information about the amount and type of computer usage in your business. Your input will contribute to the decisions made concerning computer related business courses and programs offered by the College of Business.

Information that you provide will be strictly confidential. Only summary statistics based on all returned questionnaires will be used. Your responses are crucial to the success of this study and will be used to assist the College of Business in effectively meeting your needs. Please take the time now to complete and return this questionnaire in the enclosed self-addressed, stamped envelope.

If computers are not used, that information is just as valuable. If that is true of your business, please fill out the small portion applicable and return the questionnaire.

Your input and cooperation is greatly appreciated.

Sincerely yours,

Tracy Alexander-Suda
Graduate Student
College of Business

Dr. Shannon Taylor
Faculty Advisor

APPENDIX B

SURVEY INSTRUMENT

Montana State University Survey of Microcomputer Use

The purpose of this survey to allow us to estimate the use of microcomputers in Montana's small businesses. The information from these surveys will be used to better design our students' curriculum and to improve our business out-reach service programs. Your returned questionnaire will be vital to the success of this survey. All answers will remain confidential. Only summary statistics based on all the returned questionnaires will be used in reports citing this research. All questions will refer to the calender year 1989, running from January 1 through December 31. Thank you for taking the 5 to 10 minutes needed to complete this questionnaire.

I. MICROCOMPUTER INFORMATION

Are microcomputers used in your company?
[ ]1 Yes [ ]2 No [ ]3 I don't know

If "No" or "I don't know", please complete the questions on Page 4, Section III. If "Yes", please continue.

Please specify the types of microcomputer equipment used in your organization.

Microcomputer Brand	Number Used	Own/Rent/Lease
IBM (or Compatible) PC, XT		
IBM (or Compatible) AT		
IBM PS/2		
Macintosh Plus		
Macintosh SE		
Macintosh II		
Apple II GS		
Apple II E		
Apple II C		
Wang		
Other		

Are any of the microcomputers on your premises networked (Local Area Network)?
[ ]1 Yes [ ]2 No [ ]3 I don't know

If "No", do you have plans to implement a network?
[ ]1 Yes, Within _____ years. [ ]2 No [ ]3 I don't know

If "Yes", how many machines are in the network? _____

How do you use the network?
_____ Electronic mail
_____ Sharing software
_____ Sharing databases
_____ Sharing peripheral devices (printers, storage disks or other components.)
_____ Other (Please specify) _____

What software packages are you using?

Accounting: [ ]1 Yes [ ]2 No [ ]3 Plan to install
If "Yes" or "Plan to install", please specify the name of the package._____

Database: [ ]1 Yes [ ]2 No [ ]3 Plan to install
If "Yes" or "Plan to install", please specify the name of the package._____

Desktop Publishing: [ ]1 Yes [ ]2 No [ ]3 Plan to install
If "Yes" or "Plan to install", please specify the name of the package._____

Graphics: [ ]1 Yes [ ]2 No [ ]3 Plan to install
If "Yes" or "Plan to install", please specify the name of the package._____

Spreadsheets: [ ]1 Yes [ ]2 No [ ]3 Plan to install
If "Yes" or "Plan to install", please specify the name of the package._____

Word Processing: [ ]1 Yes [ ]2 No [ ]3 Plan to install
If "Yes" or "Plan to install", please specify the name of the package._____

Do you use external databases? [ ]1 Yes [ ]2 No
Which ones? (For example: CompuServ, Westlaw, Dialog)
_____
_____

Approximately how much capital have you invested in your microcomputer system (including peripherals) within the past five years?
Hardware? $_____ Software? $_____
Training? $_____ Maintenance? $_____

Do you believe the investment has been cost effective?
[ ]1 Yes [ ]2 No [ ]3 I don't know
Why? _____
_____
_____

Do you intend to expand or update your microcomputer system within the next twelve months?
[ ]1 Yes [ ]2 No [ ]3 I don't know

What changes would you like to see in your microcomputer system?
_____
_____

Where are you getting the information to make microcomputer buying decisions? _____
_____

II. PERSONNEL

How many employees do you have? _____Full-time _____Part-time

Of these, how many use your microcomputer system in some manner? _____

Do you have full-time personnel whose job description is primarily microcomputer system development and use?
[ ]1 Yes [ ]2 No

If "Yes", how many personnel? _____

What are their qualifications?
Education: _____

On-the-job training: _____

Experience: _____

Do you have written job descriptions for these positions?
[ ]1 Yes [ ]2 No

If "Yes", would you please share them with us by sending copies of all those that apply.

How long have these positions been in existence in your business? _____

If you could choose the course work for these employees, what percentage of their business courses should be in the following areas:

Area	Percent
Accounting	____%
Law	____%
Marketing	____%
Management	____%
Finance	____%
Microcomputers	____%
Total	100%

Do you have personnel whose job descriptions have some microcomputer component?
[ ]1 Yes [ ]2 No

If "Yes", how many personnel? _____

What are their qualifications?
Education: _____

On-the-job training: _____

Experience: _____

Do you have a written job description for this position?
[ ]1 Yes [ ]2 No

If "Yes", would you please share them with us by sending copies of all those that apply.

How long has this position been in existence in your business?

_____

Do you intend to hire additional microcomputer personnel by the end of this year? [ ]1 Yes [ ]2 No [ ]3 I don't know
Within 2 years? [ ]1 Yes [ ]2 No [ ]3 I don't know
Within 5 years? [ ]1 Yes [ ]2 No [ ]3 I don't know

III. BUSINESS GRADUATES OF MONTANA STATE UNIVERSITY

What microcomputer software training and experience should our business graduates have in each of the following areas?:

	Extensive training	Some training	No training
Accounting:	[ ]1	[ ]2	[ ]3

If training is desired, which accounting package should we use?

_____

	Extensive training	Some training	No training
Database:	[ ]1	[ ]2	[ ]3

If training is desired, which database package should we use?

_____

	Extensive training	Some training	No training
Desktop Publishing:	[ ]1	[ ]2	[ ]3

If training is desired, which desktop publishing package should we use? _____

	Extensive training	Some training	No training
Graphics:	[ ]1	[ ]2	[ ]3

If training is desired, which graphics package should we use?

_____

	Extensive training	Some training	No training
Spreadsheet:	[ ]1	[ ]2	[ ]3

If training is desired, which spreadsheet package should we use? _____

	Extensive training	Some training	No training
Word Processing:	[ ]1	[ ]2	[ ]3

If training is desired, which word processing package should we use?

_____

Should graduates have general knowledge of or experience using networks? General knowledge: [ ]1 Yes [ ]2 No
Experience: [ ]1 Yes [ ]2 No

Among the types of microcomputer related experiences that could be provided by our College, which would be the most beneficial to your business and to business graduates?

_____Classroom lectures
_____Hands-on laboratory experience
_____Real world (cooperative training through internships)
_____Other (Please specify_____)

IV. INFORMATION ABOUT YOUR BUSINESS

What is the name of your business?_____

What type of legal status does your business hold?
_____Sole Proprietorship _____Partnership _____Corporation

How long has your firm been in business? _____ Years

What types of services or products does your business provide?
_____

Please check the range of your firm's gross revenue

In 1989:	In 1990:
_____ $100,000/yr or Less	_____ $100,000/year or Less
_____ $100,001 - 250,000/yr	_____ $100,001 - 250,000/year
_____ $250,001 - 500,000/yr	_____ $250,001 - 500,000/year
_____ $500,001 - 1,000,000/yr	_____ $500,001 - 1,000,000/year
_____ $1,000,001 - 2,000,000/yr	_____ $1,000,001 - 2,000,000/year
_____ $2,000,001 - 5,000,000/yr	_____ $2,000,001 - 5,000,000/year
_____ $5,000,001/yr or More	_____ $5,000,001/year or More

Please give the name, position and job title of the person filling out this questionnaire.
Name:_____
Position: _____ Owner
_____ Manager
_____ Assistant Manager
_____ Microcomputer Technician
_____ Secretarial Staff
_____ Other (Please specify_____)
Job Title:_____

If you would like to receive a copy of the survey results, please provide your name and address below.
Name:_____
Address: _____
_____

THANK YOU FOR TAKING THE TIME TO COMPLETE AND RETURN THIS QUESTIONNAIRE. YOUR EFFORTS ARE DEEPLY APPRECIATED BY THE RESEARCHERS AT MONTANA STATE UNIVERSITY, COLLEGE OF BUSINESS.