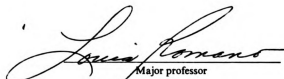This is to certify that the

dissertation entitled

COMPUTER-BASED OFFICE AUTOMATION
AND THE DYNAMICS OF SOCIOTECHNICAL CHANGE:
SIX CASE STUDIES

presented by

SUZETTE S. LEE

has been accepted towards fulfillment
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Louis Romano
Major professor

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COMPUTER-BASED OFFICE AUTOMATION

AND THE DYNAMICS OF SOCIOTECHNICAL CHANGE:

SIX CASE STUDIES

By

Suzette S. Lee

ABSTRACT

COMPUTER-BASED OFFICE AUTOMATION
AND THE DYNAMICS OF SOCIOTECHNICAL CHANGE:
SIX CASE STUDIES

By

Suzette S. Lee

This research, designed to examine the implementation
of computer-based office equipment, emphasized the role
of training as an intervention tool in planned change as
reported by staff, department managers, and trainers. The
intent was to present preliminary research unraveling the
effects of sociotechnical change on today's offices. The
literature reviewed delineated effects of technical change
on social structure in the work setting, job satisfaction,
and productivity.

The population included staff, managers, and trainers
from six computerized offices in the area of Lansing, Michigan.
Three of the sites with formal training were selected as
exemplary. The other three sites had no formal training.

The instruments used were the Short Form Minnesota
Satisfaction Questionnaire and four office automation question-
naires/interviews which were developed for this study.

Descriptive statistics were used as the primary analytical tool. T-tests with a .05 significance level were applied in some cases.

The central findings of the study were:

1. There was no significant difference in job satisfaction between managers from sites with or without formal training.

2. The degree of job satisfaction was significantly higher for staff that received formal training.

3. The degree of automation satisfaction was significantly higher for staff and managers from sites which provided formal training.

4. The staff who received formal training felt more confident and became productive on the computerized equipment sooner than those without formal training.

5. Staff and management from sites which provided formal training had a higher degree of satisfaction with the quality of work produced.

6. Personnel from the sites where there was formal training consistantly reported higher satisfaction with all elements of the training process. The key issue in training was the presence of a supportive trainer and adequate learning time without production pressures.

ACKNOWLEDGMENTS

It is with deep appreciation that I acknowledge those who have contributed to the completion of this thesis. I have drawn upon the wisdom and expertise of many colleagues and friends.

I am especially grateful for the support and guidance provided by the members of my committee: Gloria Kielbaso, Keith Groth, Larry Lezotte, and my mentor and committee chair, Louis Romano. The impetus for this study came from Mark Mulias, manager of the Office Systems Department at Libby Owen Ford. The willing participation of the management and staff at the six sites was invaluable.

Numerous friends and family members aided in the tasks of compiling the data and tables, as well as providing encouragement. The many hours of editing through several drafts were provided by Jack Brahlek, Betty Foster and Lynn Lewis. I am indebted to those who gave of their time and energy in support of this research.

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...in the journey through the unknown, the most valuable asset is one's acquired knowledge.

CHAPTER I

INTRODUCTION

The computer-based technology that has brought auto-
mation to the doorstep of today's offices is in and of
itself not a significant phenomenon. The crucial factor
in computerization is the <u>need</u> for this technology. We
have become an information-oriented society. Smith states:

> Most of us no longer produce tangible goods.
> Instead our output consists of ideas, letters,
> reports, proposals, and other "information
> products." The office has become an information
> clearinghouse in which data is gathered, pro-
> cessed, edited, copied, stored and distributed.[1]

The new computerized equipment is needed to help people
find their way through the maze of information which is
being produced at an astonishing rate.

Shane quotes Bell as estimating that the rate of in-
formation production will soon be doubling every two years
giving added meaning to the newly coined term "infoglut"
(information overload).[2] Martin also addresses this issue

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[1] Melborn Smith, "The High-Tech Baedeker: A Concise
Guide to Office Automation," Office Today, Supplement to
<u>The New York Times</u>, October 1983, p. 28.

[2] Harold Shane, "The Silicon Age II: Living and Learning
in an Information Epoch," <u>Phi Delta Kappan</u>, October 1983,
p. 127.

in The Wired Society. He states that the production of

scientific journals alone has increased approximately ten-

fold every fifty years.

> 10 scientific journals in 1750
> 100 scientific journals in 1800
> 1,000 scientific journals in 1850
> 10,000 scientific journals in 1900
> 100,000 scientific journals in 1950

> The new technology of information processing and
> transmission has turned up just in time for the
> needs of scientific progress.

> The number of scientific papers is increasing at
> a greater rate than the number of journals. The
> sum total of human knowledge was estimated to be
> doubling every ten years by 1950 and doubling every
> five years by 1970. In most fields of research,
> even one as old as medicine, more papers have been
> published since World War II than in all prior
> human history. Computers in 1960 had one instruction
> manual; by 1965 they had ten; by the 1970's more
> than one hundred. The total engineers' drawings
> of a jet plane weigh more than the plane.[1]

This hand in glove growth of information and comput-

erized technology is changing and challenging the work force

as never before. There has been an explosive evolution

in the job market. Emerging are jobs which did not exist

five years ago, while traditional jobs are becoming obsolete

or changing; requiring further specialization of job function

and skills.[2] Steinberger predicts that the average American

worker will need thorough retraining every five years, and

those in the professional fields cannot escape the need

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[1] James Martin, The Wired Society, (Englewood Cliffs,
NJ: Prentice-Hall Inc., 1978), pp. 116-117.

[2] Randy Goldfield, "Office Today," Supplement to The
New York Times, October 1983, p. 18.

for continual upgrading. One can no longer rely on the assumption "once-competent/always competent".[1]

An era of change, brought about by the prolific production of information requires that the field of education be taken beyond the walls of the classroom and extended into the work setting where it can aid the adults in today's work force as they strive to aquire the necessary skills and adjust to the ever changing technologies that are affecting the work place.

SIGNIFICANCE OF THE PROBLEM

The identification of a new era in American Society is clearly announced in John Naisbitt's Megatrends.

> None is more subtle, yet more explosive, I think, than this first, the megashift from an industrial to an information society.
>
> In 1956, for the first time in American history, white-collar workers in technical, managerial, and clerical positions outnumbered blue-collar workers. The following year - 1957 - marked the beginning of the globalization of the information revolution; The Russians launched Sputnik, the missing catalyst in a growing information society. The real importance of Sputnik is not that it began the space age, but that it introduced the era of global satellite communication.[2]

The technical tools to aid in the processing and communication of information are here and available with

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[1] William Steinberger, "Measuring Professional Competence-????" Training Liaison, Fall 1983, p.2.

[2] John Naisbitt, Megatrends, (New York, NY: Warner Books, Inc., 1982) pp. 11-12.

the potential of increasing knowledge-worker's (management's) productivity an average of at least 15%, and that of the clerical staff many times 15%.[1] The cost of office operations is rising faster than any other segment of business - at least 12% to 15% a year.[2] One effective way for business to address this cost problem is improving the productivity of office workers. The goal of automating the office can be accomplished through a holistic implementation approach supported by a training program for all managers and employees.[3]

PURPOSE OF THE STUDY

The advancement in computer technology now offers a whole new realm of office and personal computing devices. These have appeared on the market so quickly and in such a vast array that users are confused, overwhelmed, and lack the skills necessary to operate this new equipment in an effective/efficient manner.

The purpose of this study is to describe the implementation of computer-based automated office equipment as viewed by the staff, department managers, and trainers, with

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[1] Harvey Poppel, "Who Needs the Office of the Future?" Harvard Business Review, November - December 1982, p. 150.

[2] John Connell, "IRM vs the Office of the Future," Journal of Systems Management, May 1981, p. 9.

[3] Thomas Conroy and Jacque Bieber, "Are Your Computers Paying Off?" Personal Computing, December 1983, pp. 40-41.

special emphasis on the training which accompanied the implementation. This in-depth analysis of six offices is intended to serve as a vehicle for understanding the socio-technical change occurring in today's offices, and the role that training plays in the transition from manual to computer-based processing of information.

DEFINITION OF TERMS

The definition of terms which follow are presented to aid in the interpretation and clarification of this study, and to facilitate any future replications of this study that may be initiated.

Automated Office Systems: Computer-based office systems that aid in the processing or transmitting of information, such as: telecommunications systems, electronic message systems, computer assisted information retrieval, personal computing, electronic files, and word processing.

Implementation: The process of change associated with a new system, including but not limited to: job re-design, work flow, office design, and training.

Manager: The executive in the firm who makes key decisions and allocates resources. Managers may also be users of the computerized system and are referred to as knowledge-workers.

Operators: Staff that have daily contact with information systems and work with input, output, and/or the design of the system.

Vendor: Organizations that sell computerized equipment and/or software.

Sociotechnical Systems: The production of goods or services that require both a technology of machinery and a work relationship that relates the workers both to the technology and to each other.[1]

Formal Training: A well defined, structured instructional program conducted by a professional trainer.

Informal Training: Instruction that is casual, unstructured and not conducted by a professional trainer. Self-instruction is an example of informal training.

Ergonomics: The scientific study and planning of the work place and the work place environment in order to adapt them as much as possible to the physical and mental needs of the worker.

ASSUMPTIONS AND LIMITATIONS

The validity of this study is affected by the following: Assumptions:

1. Computer-based office systems continue to reflect technical advances in office equipment.

2. Computerized equipment is becoming an accepted, integral part of office operations.

3. Job satisfaction and decision making are significant factors in job performance.

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[1] Robert Cooper and Michael Foster, "Sociotechnical Systems," American Psychologist, (1971), p. 457.

4. Organizations will train staff and management in
   the use of computer-based equipment.

Limitations:

1. This study is limited to six offices located in
   Lansing, Michigan. There is no attempt to general-
   ize the results to other populations.

2. The collection of data regarding past events is
   dependent upon the ability of participants to ob-
   jectively recall their experiences.

RESEARCH HYPOTHESES

To determine the relationship that may exist among
formal training, job satisfaction and satisfaction with the
automated system for management and staff, the following
null hypotheses are included:

Hypothesis 1: There is no statistically significant
difference in job satisfaction between managers
at sites where formal training took place and managers
at sites where informal training took place.

Hypothesis 2: There is no statistically significant
difference in job satisfaction between staff at
sites where formal training took place and staff
at sites where informal training took place.

Hypothesis 3: There is no statistically significant
difference in automation satisfaction between mana-
gers at sites where formal training took place and
managers at sites where informal training took place.

Hypothesis 4: There is no statistically significant
difference in automation satisfaction between staff
at sites where formal training took place and staff
at sites where informal training took place.

RESEARCH QUESTIONS

This study is designed to answer the following research questions:

1. How did implementation of computer-based equipment affect office operation?

2. In what way(s) is automation compatible with the rewarding aspects of staff and management jobs?

3. To what extent was staff involved in the decision making process regarding the automation of the office?

4. What methods and materials were used in the training of staff and management?

5. Did staff, management, and trainers perceive training as efficient/effective?

6. What impact, if any, did training have on the implementation of computer-based office equipment?

OVERVIEW OF THE STUDY

This dissertation consists of five chapters, a selected bibliography, and appendices. Chapter I included the significance of the problem, purpose of the study, research questions, assumptions and limitations, and definition of terms. Chapter II contains the theoretical background which is derived from several interrelated fields of study: communications, organizational training, adult learning, motivation - reward structure, and social change. A review of research in sociotechnical change is also presented in

Chapter II. Methods and procedures of the study are de-
scribed and explained in Chapter III. An analysis of the
data is presented in Chapter IV. Chapter V contains the
conclusions and findings of the study and recommendations
for further research.

CHAPTER II

THEORY AND SUPPORTIVE RESEARCH

INTRODUCTION

The field of computer-based office automation has virtually blossomed overnight. Although there have been many articles written about it, very few research studies have been done. Subsequently, the theoretical basis for this study draws heavily on the field of sociotechnical research. Sociotechnical research origanated with a study done by Trist and Bamforth (1951) of the Tavistock Institute of Human Relations when they investigated the effect of technological change on the social structure of British coal miners. This study focuses on a similar phenomenon, the effect of the new technologies on the operation of today's offices.

Further support is derived from theories of communication and organizational culture, the psychology of motivation and reward, adult learning, organizational training, and the dynamics of planned social change. This interweaving of disciplines will provide a more complete framework for analyzing the intricacies of how people adapt to and learn the necessary skills required in the transition to

automated equipment. These theories from various disciplines are presented below. The review of sociotechnical research will be presented last since it applies directly to the approach of this study.

COMMUNICATION AND ORGANIZATIONAL CULTURES

The communication process is a means of exchanging information. This requires a set of mutually understood symbols that are associated with "real-world" referents, which are shared by the participants. This "message-exchange" which occurs between two or more people serves as a "linking-system" that forms the basis of all organizations.[1] It is this process that the new technologies are designed to broaden and expedite.

Pacanowsky and O'Donnel-Trujillo are proponents of the organizational-culture approach for researching organizational communications. Their methodology is qualitative, prescientific and descriptive. They stress that traditional survey methods cannot match the richness of detail that can be achieved via case study methods. This approach focuses on the culture which emerges from the specialized vocabulary, metaphors, stories, relevant constructs, practices, facts, and also includes the rites and rituals

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[1] Richard Farace, Peter Monge and Hamish Russell, Communicating and Organizing, (Reading, MA: Addison-Wesley Publishing Company, 1977), pp. 25, 43.

found in any organization be it a family, the Friday night poker party, or IBM. It is through these elements that people identify with and make sense from their surroundings. The authors use this quote from Clifford Geertz's The Interpretation of Cultures, as a guide for their approach: "...man is an animal suspended in webs of significance he himself has spun...culture [is] those webs, and the analysis of it [is] therefore not an experimental science in search of law but an interpretive one in search of meaning".[1]

The importance of an organization's culture is also discussed throughout Peters and Waterman's book, In Search of Excellence.

> The excellent companies seem to have developed cultures that have incorporated the values and practices of the great leaders and thus those shared values can be seen to survive for decades after the passing of the original guru.
>
> In a piece of research that preceded this work, we found that companies whose only articulated goals were financial did not do nearly as well financially as companies that had broader sets of values.[2]

Several examples of these culturally derived values are listed throughout their book: Delta Airlines lives its "Family Feeling", the reliability of Maytag washers owes

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[1] Michael Pacanowsky and Nick O'Donnell-Trujillo, "Communication and Organizational Cultures," The Western Journal of Speech Communication 46 (1982), pp. 121-127.

[2] Thomas Peters and Robert Waterman, In Search of Excellence: Lessons from America's Best-Run Companies, (New York, NY: Harper and Row, 1982), pp. 26, 103.

a great deal to the Iowa work ethic, "IBM Means Service," Levi Strauss's "no layoff" policy following the 1906 San Francisco earthquake. Peters and Waterman quote Pettigrew who discusses the importance of management's role in the process of shaping culture: "The [leader] not only creates the rational and tangible aspects of organizations, such as structure and technology, but also is the creator of symbols, ideologies, language, beliefs, rituals and myths."[1]

Excellent companies build on these elements of culture and use them as motivators. Nonmonetary incentives and much hoopla are used to reinforce employees' successes.[1]

MOTIVATION AND REWARD

If the communication process, and thus organizations, are to continue, human interaction must take place. Thibaut and Kelly discuss rewards versus costs as a significant guide post to the measurement of human interactions. Their basic premise is that most socially significant behavior will not be repeated unless it is reinforced in some way. The essence of any interpersonal relationship is the interaction, which is defined as emitted behavior that creates products in the form of communication. A reward is defined as pleasurable, satisfying, or gratifying. Whereas cost

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[1] Peters and Waterman, pp. 103-105.

[2] Peters and Waterman, p. 58.

is any factor which inhibits or deters performance.[1]

The authors discuss the fact that there are costs in any relationship, the continuation of a relationship is determined by the amount of the cost. The comparison level (CL) is the standard by which satisfaction is measured. The comparison level alternative (CLa) is the standard used to determine whether to remain in or leave the relationship. Thus, as long as the relationship remains above the comparison level alternative (CLa) people will chose to remain in the relationship. The closer it comes to or surpasses the comparison level (CL) the higher the satisfaction. The comparison level (CL) is based on previous experiences and fluctuates accordingly, continually adjusting to the expected norms.[2]

Extending the theory beyond the dyad to small groups, Thibaut and Kelly found that group cohesiveness is based on the degree to which rewards are experienced as belonging to the group.[3]

Csikszentmihalyi's study of human motivation uses an unusual approach: people at play. The preface to his findings states:

Most theories of human motivation depend on a

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[1] John Thibaut and Harold Kelly, The Social Psychology of Groups, (New York, NY: John Wiley and Sons, Inc,, 1959), pp. 5,10,12.

[2] Thibaut and Kelly, pp. 22-24.

[3] Thibaut and Kelly, p. 114.

"deficit model," which assumes that only a limited number of pleasurable physiological states exist; according to this model, behavior is simply a set of innate and learned responses directed toward satisfying basic needs. ...Therefore, life must be inherently painful because scarce resources of enjoyment lead to competition and only a few can get more than intermittent satisfaction. ...All theories of behavior that reduce enjoyment to the satisfaction of needs, whether they are held by economists or behaviorists, come to the same conclusion: the needs can never be fully satisfied.

But the study of play leads to a different picture of motivation. One sees people involved in a great variety of activities which provide none of the rewards that a closed model predicts must be there. One soon begins to realize that almost any object or any experience is potentially enjoyable. The task is to find out how this potential can be translated into actuality. If it is true that enjoyment does not depend on scarce resources, the quality of life can be greatly improved.[1]

In this study Csikszentmihalyi looks beyond the observable actions to the inner experiences.

It is not so much what people do but how they perceive and interpret what they are doing that makes the activity enjoyable.[2]

Management has typically held the belief that people are primarily motivated by external factors: rewards and the fear of punishment (the stick and the carrot). As a result children and adults learn that what they do is worthless in itself; its only justification is the paycheck or grade they get in the end, thus the distinction between work and leisure.

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[1] Mihaly Csikszentmihalyi, Beyond Boredom and Anxiety, (San Francisco, CA: Jossey-Bass Publishers, 1975), p. x.

[2] Csikszentmihalyi, p. x.

Yet, man at play is not a new concept, many great thinkers viewed play as the peak of man's freedom and dignity. A quote from Plato's work summarizes this theory: "live life as play". Thus, Csikszentmihalyi has studied play so that the rewards found in these activities might be applied outside the games.[1]

The activities choosen for study were defined as autotelic (from the Greek "auto", meaning self and "telos", meaning goal, purpose), they require formal and extensive energy output but provide few if any conventional rewards. Participants in this study were rock climbers, chess players, composers of modern music, basketball players, modern dancers, and surgeons.[2]

Those who were surveyed and interviewed, consistently rated intrinsic rewards higher than extrinsic rewards as reasons for participating in their given activity. Many described flow, the sensation of total involvement, as the primary motivator. From these data Csikszentmihalyi defined an autotelic experience as not boring, yet one which does not produce anxiety. The activity represents constant challenges, complete involvement, makes full use of required skills, and receives clear feedback. He also proposed the theory of the autotelic personality: those

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[1] Csikszentmihalyi, pp. xi, 3.

[2] Csikszentmihalyi, p. 10.

who are drawn to autotelic activities.[1]

These findings were then used to evaluate normal day activities, from which the concept of microflow developed. These microflow activities, such as, stretching one's muscles, watching T.V., taking a coffee break, or doodling, serve to fill the gaps in the daily routine, thus giving order to periods of boredom. The research in this area found that when people are deprived of these microflow activities, they feel more tired, less healthy, less creative, depressed and more negative about themselves.[2]

In conclusion the author states:

> ...work is not necessarily more important than play,and play is not necessarily more enjoyable than work. What is both important and enjoyable is that a person act with the fullness of his or her abilities in a setting where the challenges stimulate growth of new abilities. Whether the setting is work or play, productive or recreational, does not matter. Both are equally productive if they make a person experience flow.[3]

Job enrichment programs have been undertaken as a means of motivating employees. Proponents of job enrichment link variety and challenge with improved job satisfaction which leads to improved productivity. This is perhaps too simple an explanation. Research in this area points to the fact that although there is a relationship, it is not one of direct cause and effect: job enrichment →

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[1] Csikszentmihalyi, pp. 22, 23, 158.

[2] Csikszentmihalyi, pp. 159, 176-177.

[3] Csikszenmihalyi, p. 202.

job satisfaction -> increased productivity. There are many
other variables which affect both job satisfaction and
productivity.

Orpen investigated the effects of job enrichment on
employee satisfaction, motivation, involvement, and per-
formance among federal clerical employees. The clerical
staff was randomly assigned to either an enriched or unen-
riched condition. In the unenriched condition, the employees
performed their orginal duties and tasks. In the enriched
condition, a systematic attempt was made to increase skill
variety, task identity, task significance, autonomy, and
feedback. At the end of the six month experiment Orpen
found the following effects in the group assigned to the
enriched condition: employees in the enriched group per-
ceived their job as more enriched than before, there was
a significant increase in job satisfaction, absenteeism
and turnover decreased, with minimal impact on perform-
ance.

In the discussion of the results, Orpen points out
that performance levels may not have improved due to several
factors. The trying-out period is typically uneconomical,
and the study may not have run long enough to determine
future improvements. There may have been too much variety
and confusion over who did what task. Also, employees
were viewed as trying out more new things, even those with
a high risk factor. Orpen also discusses the fact that
some people have low growth needs and an enriched job has

very little, if any motivating power for those people.[1]

In a study done by Locke, Sirota, and Wolfson the findings were contrary to Orpen's. Job enrichment did not equal job satisfaction. The employees in this study expected that promotions and increased salaries would come with enrichment. When they didn't, job satisfaction decreased. Other factors which must be considered when interpreting results are the morale of employees prior to the study and the level of participants' growth needs.[2]

Alber delineates the benefits and costs of job enrichment. Benefits are found in improved work quality, more effective resource utilization, improved operating conditions, reduced absenteeism and a reduced work force. The cost is in wages, training, and implementation. Alber also stresses that productivity is not always an outcome, particularily in the beginning.[3]

Hackman and Oldham have developed a formula which depicts the relationship of factors influencing motivation. Their theory is that positive personal and work results (high internal motivation, high quality work performance, high satisfaction with the work, low absenteeism and

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[1] Christopher Orpen, "The Effects of Job Enrichment on Employee Satisfaction, Motivation, Involvement, and Performance: A Field Experiment," Human Relations 32, (1979), 189-193.

[2] Orpen, p. 211.

[3] Antone Alber, "Job Enrichment Programs Seen Improving Employee Performance, But Benefits Not Without Cost," World of Work Report, (January 1978), pp. 8-11.

turnover) are obtained only when three crucial psychological states are present: experienced meaningfulness of the work (skill variety, task identity, task significance), experienced responsibility for results of the work (autonomy), and knowledge of the actual results of the work activities (feedback). The following formula was designed to show the relationship of the factors that yield a "motivating potential score" (MPS).

$$MPS = \frac{\frac{skill}{variety} + \frac{task}{identity} + \frac{task}{significance}}{3} \times autonomy \times feedback \quad [1]$$

As the preceding authors have pointed out, the issue of motivation and job satisfaction is influenced by the complexity of human nature. What is rewarding, that is motivating, to one person will not necessarily be perceived as such by another.

ADULT LEARNING

The accelerated growth of human knowledge, addition of technological tools, and changes in the work place have a direct impact on the direction of education. The newly emerging theories of adult learning speak to this issue. Adult motivation is different from that of children. The majority of adult learners freely chose to enter (or leave) a learning situation based on specific expectations of

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[1] Orpen, p. 192.

the needs or learnings that will be met. Adults also bring
with them their vast background of experiences.

Knowles stresses that adult learning theory can no
longer continue on the archaic premise that education is
merely the transmittance of knowledge. Although this theory
sufficed when major cultural change was greater than the
life-span of individuals, today this is no longer true.
Knowles emphasizes this need when he states:

> ...knowledge gained by the time a person is twenty-
> one is largly obsolete by the time he is forty; and
> skills that made him productive in his twenties are
> becoming out of date during his thirties.[1]

This is vividly depicted in the following diagram from
Knowles' text.

THE RELATIONSHIP OF THE TIME-SPAN OF SOCIAL CHANGE [2] TO INDIVIDUAL LIFE-SPAN
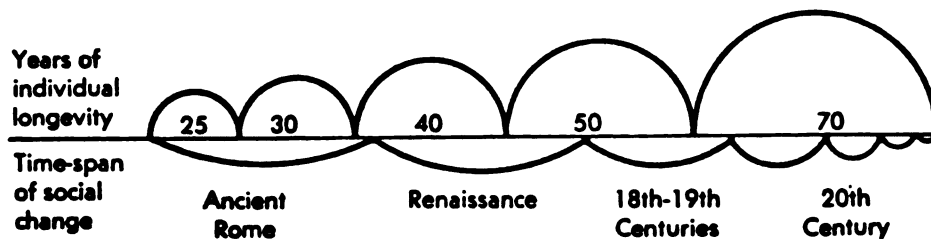
Education must move away from the theory and practice
of pedagogy (the art and science of teaching children),
which views learning as the process of transmitting culture,
what is known; to andragogy (the art and science of helping
adults learn) which is based on the premise that learning

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[1] Malcolm Knowles, The Modern Practice of Adult Educa-
tion, (New York, NY: Association Press, 1970), pp. 37-38.

[2] Knowles, p. 38.

is a life long process of discovering what is not known.

Knowles has identified the following characteristics

of the adult learner:

1. [The student's] self-concept moves from one of being a dependent personality toward one of being a self-directing human being.

2. [The student] accumulates a growing reservoir of experience that becomes an increasing resource for learning.

3. [The student's] readiness to learn becomes oriented increasingly to the developmental tasks of [their] social roles.

4. [The student's] time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly [their] orientation toward learning shifts from one of subject-centeredness to one of problem-centeredness.[1]

ORGANIZATIONAL TRAINING

Training, when broadly viewed, is described as a social-

ization process or as an intervention tool in planned change.

Goldstein defines training more specifically as:

...the acquisition of skills, concepts, or attitudes that results in improved performance in an on-the-job environment.[2]

This review will focus on four core aspects of training

as presented by Wexley, as well as Goldstein: needs assess-

ment, maximizing trainees' learning, training methods,

and evaluation.

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[1] Knowles, p. 39.

[2] Irwin Goldstein, "Training in Work Organizations," Annual Review of Psychology 31 (1980), 230.

Needs Assessment

According to Wexley, needs assessment is designed
to answer three basic questions: where in the organization
can and should training be placed, what should be the content,
and who needs the training. In his review of training
literature he divides needs assessment into three areas
of analysis: organizational analysis, task analysis, and
person analysis.[1]

Organizational analysis focuses on how an organi-
zation's climate, and thus the environment, affects training
needs. This should answer the question of where and when
training could be utilized in the organization.[2] Several
authors stress that a common cause of training ineffective-
ness or failure is due to organizational constraints.

Huszczo, Blanchard and Camp discuss the need for an
organizational development perspective as a remedy for
this problem. Training must be an integral aspect of an
organization's long-term efforts at planned change. These
authors refer to trainers as "...front line soldiers in
an organization's battle to keep up with change". Thus,
it is necessary that trainers act as strategy planners
and look not only to the short-term individual goals, such
as increased productivity, but incorporate the long-range

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[1] Kenneth Wexley, "Personnel Training," Annual Review
of Psychology 35 (1984), 521-527.

[2] Goldstein, p. 233.

goals of organizational change. Training, a major element in organizational development, needs to be viewed as an on-going process, not simply a program with a beginning and an end.[1]

Task analysis should provide the trainer with relevant information regarding what tasks are performed, what needs to be learned to perform these tasks (knowledge, skills, and abilities or other characteristics required to perform the task), what ways these tasks should be performed, what should be taught in training, and what should be learned on the job.

Task analysis has received little attention in the past, however there has been a very definite movement in this direction within the last five years. This has revolved around the use of subject matter experts (SME) who rate the importance of knowledge, skills, abilities, and other personal characteristics (KSAOs) as they relate to training for job performance. The degree of consensus among the experts is tested for statistical significance and reported as a content validity ratio (CVR) for each KSAO. This allows the trainer to focus content and training time on the high need - job relevant KSAOs.

Linking task analysis to the design of training programs still remains elusive and problematic, particularly for

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[1] Gregory Huszczo, P. Nich Blanchard and Richaurd Camp, "Using OD Concepts to Improve Training Effectiveness," Midwest Academy of Management (1983), 381-383.

supervisory, managerial, sales, and other occupations where effective performance is contingent on varied situations.[1]

Person analysis is a measurement of the discrepancy between "actual" and "ideal" behavior. When a discrepancy occurs where the actual behavior is less than the ideal behavior, additional training may be indicated. Self-assessments as well as assessments by management, subordinates and peers have also been used as a means of determining training needs. Self-evaluation of ability and performance notoriously suffer from low validity; they are prone to errors of overestimation. Validity is maximized when employees expect that self-evaluation will be compared with criterion measures, have previous experience with self-evaluation, are guaranteed anonymity in the self-evaluation, and are asked to make relative as opposed to absolute judgments.[2]

Maximizing Trainees' Learning

Wexley discusses three aspects of learning: trainability, training environment, and transfer of learning. Bahn's study of counter training and Allen, Silverweig's work on group norms will also be presented in this section as they have a direct effect on the utilization of training.

The high cost of most training programs requires the establishment of criteria to determine the trainability

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[1] Wexley, p. 523.

[2] Wexley, pp. 525-526.

of present or prospective employees.

> Trainability refers to a person's ability to acquire the skills, knowledge, or behavior necessary to perform a job at a given level and to achieve these outcomes in a given time.[1]

Organizations have developed various methods for determining trainability: performance on a standardized test (such as those used to determine intelligence levels), miniature training and evaluation testing, and sampling of trainee's ability level by measuring time spent early in a self-paced training course. Wexley points out that the majority of the studies focus on the "can do" (ability) factors and neglect the "will do" (motivational) factors; a third factor must also be considered - the situational (interaction) aspect if high predictability is to be achieved.[2]

The trainer's position as learning facilitator requires the effective management of external/environmental conditions of training. These include: amount of practice, task sequencing, overlearning, feedback and providing for individual differences (such as learning style and entry level skills), as well as their own influence on a trainee's learning. The degree of application of each of these areas varies with the task, the learner, and the individual trainer's approach.

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[1] Wexley, p. 527.

[2] Wexley, pp. 527-528.

If a training program is to be effective it must provide for a positive transfer of learning to the work setting. Research findings indicate that people in favorable organizational climates (e.g. freedom to set personal performance goals, risk taking encouraged, growth-oriented) and those with innovative personalities (e.g. high need achievement, high activity level) are more likly to adopt new practices.[1]

Bahn has found that although final session evaluations and short term measured effects of training are good, the long term effects are disappointing. He states that this is due to a number of complex factors such as: individual motives, differences in environment, rigid supervisory attitudes, and functional non-applicability of training. Bahn has coined the term counter training as a means of identifying those elements which nullify the effects of training.[2]

The psychological basis of counter training is found in resistance to change due to fear of the unknown, ego involvement (not invented here syndrome), and the established reward system of past behaviors, as well as the built-in inertia of all social systems.

> The working group is really a delicately balanced
> social system. Changes of individual behaviors are
> not only individual, but may upset the delicate
> balance of the group structure.

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[1] Wexley, pp. 528-533.

[2] Charles Bahn, "The Counter Training Problem," Personnel Journal 52 (1973), 1068.

> The new social interactions that will emerge...will
> have to be worked out by the people as they enter
> the new situation. Inertia against such change and
> reworking is strong.

Other social factors which work against transfer occur

when only one particular level of workers is involved

in training, a supervisor's real (underlying) attitudes

are resistant to change, and in the difference between

the training environment and the work environment.[1]

Counter training messages are communicated informally

and are largely non-verbal. Merely "beefing up" a training

program will only be met with stronger resistance. Bahn

presents several factors that will augment training, yet

minimize counter training.

1. Train at all relevant levels. Counter training
   often comes from the next adjacent affected level.

2. Bring the impact of the training right to the work
   situation in every feasible way. The training mater-
   ials should not be abstract, general or "canned",
   but should contain many specific references to the
   work situation.

3. There should be some physical blending of training
   and work environments. One way to accomplish this
   is to hold a final work session at the work site,
   or if this is impossible, the trainer can make in-
   dividual follow up visits to the work site.

4. The composition of the training group should reflect
   an awareness of the work situation. What this implies
   is that in most situations, it is advantageous to
   have a homogeneous group that comes from relatively
   similar backgrounds.

5. The trainer should be someone who has had the chance
   to spend some time in the work situation and who
   knows and understands not only the job itself, but
   also work conditions.

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[1] Bahn, pp. 1069-1070.

6. Clearly explain the reasons for or benefits of a change. This means that the trainees must know the specific benefits to the company and the benefits, if any, to themselves.

7. A simple and easily accessible way of overcoming counter training pressures is to come right out and identify them.

Bahn concludes with the following statement:

Coping with counter training not only heightens the efficiency of training, but it also helps significantly to improve the organizational climate.[1]

Group norms also influence training effectiveness. These norms are often elusive and unrecognized, yet they have tremendous power. Norms are the product of the organizational culture, many training programs have been rendered ineffectual because they have come into conflict with the _real_ training being done within the particular culture. If a training program is going to be effective it must be supported in the day-to-day experience of people on the job. A good training program can help seed new norms and refine old ones.[2]

The normative system approach is useful when: introducing new organizational programs, strengthening existing programs, solving perplexing human factor problems, launching new work groups or work teams, or planning a total system of organizational intervention and change. Allen and Silverweig speak to this issue of normative change as a

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[1] Bahn, pp. 1071-1072.

[2] Robert Allen and Stanley Silverweig, _Handbook of Training and Development_, (Morristown, NJ: SRI Press, 1975), pp. 17-1 - 17-10.

three step process. The first step is to develop an understanding among the people in the organization regarding the immense influence that norms have upon their own effectiveness and the effectiveness of the organization. The second step is to identify the specific norms of the culture and determine the distance between these norms and the end goals. Once this has been determined, priorities and change strategies can be established. In order to bring about change, the third step requires that people examine and modify each of the various norm influences.[1]

Finally, Allen and Silverweig suggest that trainers see themselves as change agents. The primary influences within organizations are the cultural differences which shape behavior. It is important that these influences work to the mutual benefit of the individual and the organization.[2]

Training Methods

In the review of training literature by Goldstein (1980) and Wexley (1984) they lament the fact that rigorous research studies of various instructional strategies have produced many questions but few answers. The following discussion will focus on the four training methods as presented in Wexley's review.

Behavioral role modeling appears to be an effective

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[1] Allen and Silverweig, pp. 17-7 - 17-10.

[2] Allen and Silverweig, p. 17-11.

technique in both industrial and nonindustrial contexts.
Overall the studies suggest that behavior-modeling programs
influence behavior and resulting improvement.

Present research of computer-based instruction has
shown that it requires less time than more conventional
methods do to teach the same amount of material, and there
is usually no significant difference in achievement scores
between trainees taught by the two methods.

Simulation techniques are frequently used in manage-
ment development and sales training programs, yet there
is little empirical evidence that they can change attitudes
and behaviors that transfer to the work situation.

Research of behavior modification techniques showed
that partial schedules (trainees do not know when rein-
forcement will be given or how large it will be) improved
both effort and performance. Employees also perceived
their jobs as including more environmental variables such
as recognition and feedback with a partial schedule of
reinforcement than with a continuous schedule.

Behavioral self-management is a new technique on the
training scene. This method involves teaching trainees
to manipulate stimuli and rewards to help themselves make
changes in any direction that they desire.[1]

Evaluating Training Programs

Evaluation is a value judgment, thus the criteria

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[1] Wexley, pp. 533-538.

that will be used to evaluate training programs should
be agreed upon by all concerned parties before the research
begins. Goldstein discusses the need to establish multiple
criteria that reflects the various instructional objectives
as well as the organizational goals that the training is
designed to meet.[1]

Program evaluation, as it is currently practiced,
is reported to be quite poor in both the private and public
sectors. Organizations and their members tend to react
negatively to evaluation as a concept.

Several models have been designed by various researchers
to overcome this resistance. Evaluative research should
avoid an either/or approach, working instead to instill
a "spirit of inquiry" or "scientific attitude". Organ-
izations will make great strides in this direction when
they evaluate programs rather than people, reduce the tie
between evaluation outcomes and resource allocation, and
establish neutral in-house evaluation consultants.[2]

PLANNED CHANGE

Change is indigenous to human culture. Although it
is resisted in an effort to maintain social equilibrium,
the boundaries of the social system are continually

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[1] Goldstein, p. 240.

[2] Wexley, p. 539.

bombarded by the production of material inventions such as tools, weapons, and technical processes. As this technical aspect of the culture grows, it forces changes upon the social structure which is resistant and much slower to change. Thus, the social structure lags behind the technical changes, creating a state of maladjustment.[1] Change is a vital part of man's cultural development, yet the word change often produces emotional reactions that many find threatening. Words that refer to the process of changing people are more readily accepted: education, training, orientation, guidance, indoctrination, therapy.[2]

Given that change will occur, and is in fact necessary, it has been the focus of intense research in an effort to understand the dynamics of change so that it might be managed. Kaufman defines directed social change as:

> ...a planned attempt to modify the attitudes and behavior of target individuals or groups by agencies of change seeking to introduce ideas or innovations into a social system in order to achieve the goals of the agency or constituency.[3]

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[1] Don Martindale, "The Crisis in the Contemporary Theory of Social and Cultural Change," in Creating Social Change, ed. Gerald Zaltman, Philip Kotler, and Ira Kaufman (New York, NY: Holt, Rinehart and Winston, Inc., 1972), p. 17.

[2] Dorwin Cartwright, "Achieving Change in People: Some Applications of Group Dynamics Theory," in Creating Social Change, ed. Gerald Zaltman, Philip Kotler, and Ira Kaufman (New York, NY: Holt, Rinehart and Winston, Inc., 1972), p. 74.

[3] Ira Kaufman, "Change Management: The Process and the System," in Creating Social Change, ed. Gerald Zaltman, Philip Kotler, and Ira Kaufman (New York, NY: Holt Rinehart and Winston, Inc., 1972), p. 22.

Zaltman, Florio and Sikorski's thesis on organizational change is that it takes place when there are performance gaps. Some of the elements which influence the degree of these gaps are: unrealistic or changed expectations, new personnel or new treatment of existing personnel, technological change, power structure changes, and perceived change in a reference group. The barriers to change arise from dynamics within the social structure, the organizational structure, individuals' psychological make-up, competing forces, or from the very nature of the innovation. Resistance is an ever present phenomenon, and one that the authors see as being necessary and healthy. They say:

> ...it provides useful information about organizational resources, constraints, attitudes, values, norms, and external relationships which can help the change planner in selecting strategies.[1]

House discusses the influence of rewards and costs on the probability of adoption of an industrial innovation. He uses a mathematical model developed by Slevin (1971, 1973) to show the relationship.

> An individual will try new things if the probability of success of the new thing (Pn) minus the probability of success of current strategies (Ps) is greater than the ration of cost (C) to rewards (R).

$$Pn - Ps > C / R$$

By manipulating costs, rewards, current success levels, or aspiration levels a person may be moved into an innovation

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[1] Geral Zaltmen, David Floris, and Linda Sikorski, _Dynamic Educational Change_, (New York, NY: The Free Press, 1977), p. 47.

zone.[1]

The primary focus in much of the change literature
is on affecting organizational or cultural change through
changes in individuals. Cartwright, however, discusses
individual change from a different perspective; individual
change as influenced by group dynamics. The group to which
one belongs sets standards for one's behavior. Therefore,
when instituting change a new level of influence can be
achieved should the group forces be brought into the situa-
tion.

In support of his theory, Cartwright cites studies
where productivity was greatly increased by focusing on
the organization of the work group rather than the individual.
This has implications for training as well. When individuals
participate in workshops as team members, rather than
isolates more enduring changes are produced because the
team provides continuous support and reinforcement for
its members.[2]

Groups enter the change process in three ways: as a
medium of change, the target of change, or as an agent of
change. When a group is a major source of influence it
functions as a medium of change. Group norms are a powerful
influence on individual members behavior. The group itself
may also become the target of change. To change individuals

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[1] Ernest House, The Politics of Educational Innovation,
(Berkeley, CA: McCutcham Publishing Corp., 1974), p. 91.

[2] Cartwright, pp. 75-78.

it may be necessary to change the standards of the group, its style of leadership, its emotional atmosphere, or its stratification into cliques and hierarchies. The group functions as an <u>agent of change</u> when organized efforts are brought to bare on issues crucial to the group, such as labor unions, employee associations, citizen groups, committees, or any action group.[1]

Cartwright lists eight principles regarding groups as a medium of change or a target of change.

The Group as a Medium of Change

Principle No. 1

If the group is to be used effectively as a medium of change, those people who are to be changed and those who are to exert influence for change must have a strong sense of belonging to the same group.

Principle No. 2

The more attractive the group is to its members the greater is the influence that the group can exert on its members.

Principle No. 3

In attempts to change attitudes, values, or behavior, the more relevant they are to the basis of attraction to the group, the greater will be the influence that the group can exert upon them.

Principle No. 4

The greater the prestige of a group member in the eyes of the other members, the greater the influence he can exert.

Principle No. 5

Efforts to change individuals or subparts of a group which, if successful, would have the result of making

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[1] Cartwright, pp. 77-79.

them deviate from the norms of the group will encounter strong resistance.

The Group as a Target of Change

Principle No. 6

Strong pressure for changes in the group can be established by creating a shared perception by members of the need for change, thus making the source of pressure for change lie within the group.

Principle No. 7

Information relating to the need for change, plans for change, and consequences of change must be shared by all relevant people in the group.

Principle No. 8

Changes in one part of a group produces strain in other related parts which can be reduced only by eliminating the change or by bringing about readjustments in the related parts.[1]

Change strategies can be divided into three categories: empirical-rational, normative- reeducative, and power-coercive. Each of these will be discussed briefly.

The underlying assumption in the empirical-rational strategy is that man is rational and will follow his rational self-interest when it is revealed to him. Some of the typical approaches found in this category are basic research and dissemination of knowledge through general education, personnel selection and replacement, systems analysis as staff and consultants, applied research and linkage systems for diffusion of research results, utopian thinking, or perceptual and conceptual reorganization through the clarification of language.

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[1] Cartwright, pp. 79-81.

The normative-reeducative strategies go one step beyond the empirical-rational approach. The intellectual changes must be supported by the sociocultural norms. Individual attitudes and value systems must be considered as an integral part of the change strategies. The Tavistock Clinic in England applies this approach by using therapeutic approaches to problems of change in industrial organizations and communities. It is this institute that originated the sociotechnical studies discussed in the next section of this chapter.

Improving the problem solving capabilities of a system, and the releasing and fostering of growth in the persons who make up the system to be changed are two change strategies which fit into this classification.

The third group of strategies is based on the application of power, generally in the form of applied legitimate power, or authority requiring compliance of those with less power. These change efforts involve strategies of nonviolence, use of political institutions to achieve change, and change through the recomposition and the manipulation of power elites.[1]

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[1] Robert Chin, and Kenneth Benne, "General Strategies for Effecting Changes in Human Systems," in Creating Social Change, ed. Gerald Zaltman, Philip Kotler, and Ira Kaufman, (New York, NY: Holt Rinehart and Winston, Inc., 1972), pp. 234-251.

SOCIOTECHNICAL RESEARCH

Three studies which focus on the effects of technology on workers' social structure (sociotechnical change) will be discussed in this section. These studies form the basis from which this research stems.

The classical study by Trist and Bamforth (1951) was the result of relatively continuous contact over a two year period with approximately twenty workers in various coal-face (mining) occupations. In addition, many discussions and interviews were held with various levels of management and three psychiatrists who had wide experience in miners' problems.

Prior to mechanization, the social-work pattern was independent working pairs to which one or two individuals might be attached (occasionally the work group grew to seven or eight). Many of the small groups were reinforced by kinship ties. Over the years, stable relationships resulted and were often extended beyond the work setting. It was not uncommon in the case of death or injury for the victim's work mate to care for the other's family.

A group was responsible for the complete coal-getting task, generally working the small face that they had contracted for, experiencing the entire cycle of operations and the full range of coal-face skills. Production was adjusted by the team to fit the individual workers' age and stamina. The authors use the term "responsible

autonomy" to define this mode of work where the leadership
and supervision are internal to the group. Trist and
Bamforth summarize the main attributes of responsible auto-
nomy in hand-got mining as wholeness of the work task,
multiplicity of individual skills, and self-selection of
the group. This is an ideal situation in mining conditions
where there is no possibility of continuous supervision
due to the darkness and separation. It is this responsi-
bility and skill range that fosters craft pride and artisan
independence.[1]

The new technologies (coal-cutters and mechanical
conveyors) made it possible to work more economically by
mining a single long face rather than a series of short
faces. This required a work relationship radically different
from the artisan type of pair. The unit became a cycle
group of 40-50 men who functioned in only one role (of
a possible seven) and spent most of their underground life
in this one occupation. Role segregation was intensified
by the five different methods of payment.

The Longwall method required close interdependence
of tasks, yet the shifts were staggered in such a way that
workers from the three shifts never met. Mistakes and
difficulties made or encountered at one stage were carried

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[1] Eric Trist and Kenneth Bamforth, "Some Social and
Psychological Consequences of the Longwall Method of Coal-
getting," Human Relations, 4 (1951), 3-7.

forward, producing yet other difficulties in the next,
threatening a breakdown of the system and creating tension
and anxiety in the workers. The accumulated stress of
bad conditions and bad work left by others contributed
to wide spread psychosomatic and kindred neurotic disorders
among the workers.[1]

Trist and Bamforth discuss four types of defenses
which arose to counter the isolation and unequal odds.
A norm of low productivity existed when miners were faced
with disturbances that were beyond their control.

Informal, small groups arose, through private arrange-
ments, to help each other out. These groups resemble cliques
whose loyalities were oriented toward the small group rather
than the cycle system as a whole, and lacked the responsible
autonomy enjoyed by the more formal groups in the original
hand-got system. These groups did not get support from
the system and many individuals were left on their own.

The isolation and loss of control fostered a fear
of victimization which triggered reactive individualism.
Workers became secretive and often bribed members of the
other shifts in hope of getting a "good deal" in their
own coal length. The deputy in charge was seen as a per-
secutor and much energy was drained into the intrigue and
deception that the men practiced against him as well as

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[1] Trist and Bamforth, pp. 9-10, 19-29.

against each other. When problems arose on the shift, "buck passing" was the typical response. The deputy was not immune from the brunt of this irresponsible scapegoating.

The fourth form of defense was withdrawal. When workers experienced ongoing difficulties due to previous preparations of the coal surface, they would often take a day off in defiance of the system. When conditions on the face deteriorated and absenteeism piled up, the others would have to work extra hours to clear the face. If this continued for more than a day or two, all workers would return home. Absenteeism was also a respite from the wearing conditions. Days off were seen as a means of prolonging one's work-life at the coal-face. [1]

The concluding recommendations presented by the authors stress the need to restore responsible autonomy to primary groups throughout the system, creating a social whole as well as a technological whole. The training of face workers for more than one role and allowing flexibility in the work pace would increase the tolerance for each other's situation and begin the rebuilding of work teams.[2]

Billings, Klimoski and Braugh's study examined the effect of a technological change in a hospital's meal assembly as it related to job characteristics, worker satisfaction and absenteeism. The new technology centered

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[1] Trist and Bamforth, pp. 30-36.

[2] Trist and Bamforth, pp. 37-38

on the use of a fifty foot-long conveyer belt which literally
overnight replaced the steam tables and elaborate delivery
carts which frequently broke down. The workers knew of
the change and participated in a committee that planned
and coordinated events. Three weeks before the installation,
workers became acquainted with the machinery and their
new roles by practicing on the new equipment in a nearby
gymnasium. Knowledge and raw materials remained the same,
only the operations and the rigidity of the work flow were
affected. This had the effect of reducing task variety
and task identity, in addition, the feedback from direct
contact with patients was lost. It also increased task
interdependency, time pressure, and closeness of supervision.[1]

The reported results were contrary to many of the
predicted results, and surprisingly, many of the changes
that did occur actually took place before the actual imple-
mentation. Seven work structure variables were measured
in this study: job importance, task variety, mobility, task
interdependence, time pressure, task effort, and feedback.
Job importance, task variety and mobility declined somewhat.
Task interdependence increased slightly, while time pressure
and task effort lessened. Feedback remained the same.
The three social structure variables that were measured:
closeness of supervision, satisfaction, and absenteeism

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[1] Robert Billings, Richard Klimoski and James Breaugh,
"The Impact of a Change in Technology on Job Characteristics:
A Quasi-Experiment," Administrative Science Quarterly, 22
(1977), 320-321.

showed no change over the course of this study.

In the discussion of their findings the researchers pointed out several factors which may have affected the results: (1) the change was well managed, (2) employees were informed and involved in the planning and timing of the change, (3) employees also felt that the new equipment was desperately needed. This early involvement no doubt triggered the changes that took place prior to implementation. The authors also discussed the "growth need strength" and its effects on the outcome of job satisfaction measures and absenteeism. In summary, Billings, Klimoski and Brough state that:

> Effects may begin with the identification of the need for change and the knowledge of the impending change, continue through the preparations and the actual change, and end only after a period of adjustment.[1]

"Psychotechnical units" is a term used by Cooper and Foster to describe the individual's work relationship structure rather than the social group's work structure which "sociotechnical units" refer to. These authors apply recent psychological research to their discussion of man's interaction with machines.

> Man [is pictured] as a proacting, self-realizing organism capable of considerable achievements given the right environmental conditions, but who becomes refractory when placed in a dependency relationship and when forced to function at a fraction of his capacity. Therefore, in considering

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[1] Billings, Klimoski and Breaugh, pp. 331-337.

the "fit" between man and machine, it is more
constructive to think of how they can complement
each other.

Man performs optimally when he knows he can control
environmental contingencies; when he lacks such
control, his performance becomes correspondingly
degraded. ...but no matter how well we relate
man to machine, unless he is properly motivated
he will not function very effectively as a com-
plement to it. This motivation must derive from
the task itself.[1]

When designing man-machine systems, one must clarify what

makes a job challenging, and build in those challenges

and responsibility that are to be assigned to the human

operator, otherwise man will not complement the machine,

but will begin to function like a machine.

There are three critical dimensions of the work

structure that must be considered when viewing the man-

machine system.

1. Role differentiation, which is the degree of task

variety in a given job. Jobs of limited complexity

offer little challenge and thus affect individual motiva-

tion.

2. Task dependence, which is the degree to which two

or more people work together or share a limited common

pool of services, materials or tools. Convergent versus

divergent dependence is far more vulnerable to disruption.

3. Goal dependence, which is the existence of mutual

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[1] Robert Cooper and Michael Foster, "Sociotechnical
Systems," _American Psychologist_, (1971), 468

or common goals that increase the likelihood of reciprocal, supporting behaviors. This is particularly valuable in work regions that are susceptible to disruption.[1]

In their examination of sociotechnical research, Cooper and Foster found that improved worker attitude and productivity resulted when there was an element of choice in redesigning work systems. In the composite method of coal mining (a cross between the traditional hand-got method and the mechanized longwall method), greater individual satisfaction resulted when teams were self-selected and the group task allowed for a greater variety of skills.

The reorganization of an Indian textile mill that brought together all workers whose tasks were independent resulted in increased productivity with less loss due to damage.

In conclusion, they recommended that the work unit, whether an individual or a group, be given "responsible autonomy" so that it becomes capable of self-regulation. Once the minimal conditions have been identified, the non-critical variables are left free in order to allow the system some degree of potential variability.[2]

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[1] Cooper and Foster, pp. 469-470.

[2] Cooper and Foster, pp. 471-473.

SUMMARY

Research and theoretical models from the fields of
communication, psychology, adult education, organizational
training, and planned change have been discussed in this
chapter as supportive elements in sociotechnical change.
Sociotechnical research is a relatively new field, thus
there are few studies to draw upon. The founding study
in sociotechnical systems by Trist and Bamforth (1951)
was reviewed in detail and supported by studies from other
researchers. This literature formed the basis of this
thesis and guided its direction. The design of this thesis
is presented in the next chapter.

CHAPTER III

DESIGN OF THE STUDY

INTRODUCTION

This research is designed to examine the effect of formal and informal approaches to training on computer-based office equipment as perceived by staff, managers, and trainers at six sites. The sites are representative of offices existing in educational, governmental, and small business settings. The intent of this study is to serve as preliminary research in unraveling the effects of socio-technical change on today's offices.

The literature reviewed for this study delineated the effects of technical change in the work setting on employee social structure, job satisfaction, and productivity. Training and its role as an intervention tool in planned change was also discussed.

Presented in this chapter are the processes used to conduct this study. The population, sample, pertinent geographical data, and sampling techniques are presented first. The development and selection of instruments and overview of the data-gathering procedures follows. Finally, the statistical treatment is discussed.

POPULATION AND SAMPLING METHODS

The sample was drawn from a population of offices that have implemented computerized office systems prior to March 1984. The organizations are geographically located in the greater Lansing, Michigan area.

Lansing is the state capital. Consequently there are numerous governmental offices and private businesses that regulate, coordinate and maintain operations throughout the state. In addition, there are more than two hundred regional or state trade and professional organizations that maintain offices in the Lansing area.

Education holds a prominent position in the Lansing area. There are seventy-two elementary schools, seventeen junior high and twelve high schools. There are also five institutions of higher education located within this region: Michigan State University, Lansing Community College, Thomas M. Cooley Law School, Lansing Business Institute and the Great Lakes Bible College.[1]

The many governmental offices, private businesses, and educational institutions in the greater Lansing area provided a rich source of offices from which sites were selected for this study.

Six sites were selected, and of them three were selected as exemplary in their implementation which included a formal

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[1] Lansing Regional Chamber of Commerce, Michigan's Capital Area Map and Statistical Review, 1984.

training program. The other three that were selected included no formal training. To reduce the organizational variables, two sites were selected from each of the three organizations which participated in this study. Each organization provided one site where formal training took place and one site where informal training took place. The three participating organizations were selected according to their availability and their diversity. Two of the sites were departments in a major university, two were from the state department, and two were departments in the national headquarters of a major insurance company. The selected sites are identified by the type of training: formal training or informal training.

The work of Glasser and Strauss on theoretical sampling was the basis for the sampling method used in this study. These authors state that:

> Theoretical sampling is done in order to discover categories and their properties, and to suggest the interrelationships into a theory.

> The adequate theoretical sample is judged on the basis of how widely and diversely the analyst chose his groups for saturating categories according to the type of theory he wished to develop.

Thus, theoretical sampling is used when the research is based on a general subject or problem area.[1]

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[1] Barney Glasser and Anslem Strauss, <u>The Discovery of Grounded Theory</u>, (Chicago, IL: Aldine <u>Publishing Co.</u>, 1967), pp. 105-106.

DESCRIPTION OF SITES

A brief description of each site is presented as background for the forthcoming data. A detailed summary of each site is presented in Chapter IV.

Site I: State Department With Formal Training

This office was created as an automated resource center which processes work and designs systems for other departments. The staff was specifically hired as computer operators, thus they did not experience the transition from a manual to an automated system as did the other staffs. They were provided formal vendor training as well as being trained by their manager who was a leader in the field of office automation.

The three staff members and their manager/trainer participated in this study.

Site II: State Department Without Formal Training

The function of this department was the scheduling of hearings and the maintenance of case files. Automation resulted in the division of the staff into two units, those who worked on the automated equipment and those who did not. This division of staff, as well as the trial and error approach to implementation with inefficient equipment and an inexperienced programmer/trainer, resulted in many difficulties. The instruction that the staff received was rushed, highly pressured, and subject to change as their system continued to be de-bugged.

Managers and staff from both units of this department were participants in this study. Although one unit was not automated, the work was restructured around the automated system. The participants from this site consisted of the department manager, the two unit managers, the lead worker in the automated unit, the programmer/trainer, four of the five staff in the automated unit, and six of the eight staff in the nonautomated unit.

Site III: Insurance Company With Formal Training

This department was a word processing center in a major insurance company. The major function was the production of documents for various departments throughout the organization. The vendor provided formal training at an off site training lab, as well as follow-up sessions and ongoing support.

The participants from this site were the manager, the lead worker, four of the six staff, and the vendor's trainer.

Site IV: Insurance Company Without Formal Training

This department provided analytical and procedural support by means of improving the methods that were applied in the field. Personal computers were provided to aid the staff in this task. The staff was self-taught using the tutorial program that was purchased from the vendor.

There was full participation by the three staff members and one manager.

Site V: University Department With Formal Training

This department provides clerical services for one of
the colleges in a major university. It is responsible
for preparing and publishing a variety of documents. A
computerized word processing system was installed to increase
staff productivity. The vendor provided formal training
at an off site lab. There were follow-up sessions as well
as ongoing support.

The participants from this site included the following:
the department manager, four of the five staff, and the
vendor's trainer.

Site VI: University Department Without Formal Training

This small, specialized department within a major un-
versity is responsible for the production of various pub-
lications which are written by the faculty. Personal com-
puters were purchased to increase the staff's productivity.
A self-paced tutorial manual was also purchased from the
vendor for staff training.

The manager and all three of the staff participated
in this study.

INSTRUMENTATION

The instruments used to gather data for this study
are the Short Form Minnesota Satisfaction Questionnaire,
the Automation Satisfaction Questionnaire, an Open-ended
Questionnaire, a Patterned Interview, and a Trainer Survey.

Minnesota Satisfaction Questionnaire

The Short Form Minnesota Satisfaction Questionnaire is an outgrowth of the Minnesota Studies in Vocational Rehabilitation, better known as the Work Adjustment Project, which began in 1957. These were developed as diagnostic tools for assessing the work adjustment potential of applicants for vocational rehabilitation and the evaluation of work adjustment outcomes. The Short Form Minnesota Satisfaction Questionnaire consists of the twenty items listed below. Each item refers to a reinforcer in the work environment. The respondents indicate how satisfied they are with the reinforcer on their present job. Five response alternatives are presented for each item: Very Dissatisfied, Dissatisfied, Neither (dissatisfied nor satisfied), Satisfied, Very Satisfied. The categories are listed below.

1. <u>Ability utilization</u>. The chance to do something that makes use of my abilities.

2. <u>Achievement</u>. The feeling of accomplishment I get from the job.

3. <u>Activity</u>. Being able to keep busy all the time.

4. <u>Advancement</u>. The chance for advancement on this job.

5. <u>Authority</u>. The chance to tell other people what to do.

6. <u>Company policies and practices</u>. The way company policies are put into practice.

7. <u>Compensation</u>. My pay and the amount of work I do.

8. <u>Co-workers</u>. The way my co-workers get along with each other.

9. <u>Creativity</u>. The chance to try my own methods of doing the job.

10. <u>Independence</u>. The chance to work alone on the job.

11. <u>Moral values</u>. Being able to do things that don't go against my conscience.

12. <u>Recognition</u>. The praise I get for doing a good job.

13. <u>Responsibility</u>. The freedom to use my own judgment.

14. <u>Security</u>. The way my job provides for steady employment.

15. <u>Social service</u>. The chance to do things for other people.

16. <u>Social status</u>. The chance to be "somebody" in the community.

17. <u>Supervision -- human relations</u>. The way my boss handles workers.

18. <u>Supervision -- technical</u>. The competence of my supervisor in making decisions.

19. <u>Variety</u>. The chance to do different things from time to time.

20. <u>Working conditions</u>. The working conditions.[1]

Automation Satisfaction Questionnaire, Open-ended Questionnaire, Patterned Interview, and Trainer Survey

The Automation Satisfaction Questionnaire, Open-ended Questionnaire, Patterned Interview, and Trainer Survey were developed after consultation with professionals in the field and users of automated equipment, as well as extensive reading of the latest reports regarding implementation and

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[1] David Weiss, Rene Dawis, George England, and Lloyd Lofquist, <u>Manual for the Minnesota Satisfaction Questionnaire,</u> (Minnesota Studies in Vocational Rehabilitation: XXII, Industrial Relations Center, University of Minnesota, 1967), pp. X, 1-4.

worker adjustment. The Art of Asking Questions by Stanley
Payne provided technical guidance in the construction of
the questions and the format of the questionnaires.

Automation Satisfaction Questionnaire: The Automation
Satisfaction Questionnaire (ASQ) was developed as a tool
to measure the degree of staff and management's satisfaction
with their automated system.   The Automation Satisfaction
Questionnaire consisted of seventeen items. Each item referred
to some aspect of office automation. The respondents indi-
cated their degree of satisfaction with each item. Five
response alternatives were presented for each item: Very
dissatisfied, Dissatisfied, Neither (dissatisfied nor
satisfied), Satisfied, Very Satisfied.

Open-ended Questionnaire: The Open-ended Questionnaire
was designed for staff and management. Its purpose was to
provide indepth investigation of the various aspects and
ramifications of automated office systems, as well as to
support the responses on the Minnesota Satisfaction Question-
naire and the Automation Satisfaction Questionnaire.

Alternative forms of the Open-ended Questionnare
were developed for staff and management. Many of the
questions were the same with slight modifications in wording
to fit the role of the respondent. In addition, each form
included some unique questions pertaining to the specific
position for which it was designed. The following issues
were addressed in the questionnaire: job satisfaction, imple-
mentation, training, concerns prior to automation, stress

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related to automation, productivity, and changes resulting from automation.

Patterned Interview: The interview technique was used in conjunction with the Open-ended Questionnaire to verify the data obtained on the Minnesota Satisfaction Questionnaire and the Automation Satisfaction Questionniare, as well as adding depth to the study. This combination of two methods was based on the rationale that people react differently to the spoken word than the written word. The written word is easier to follow due to the fact that the meaning can be inferred from the context. People also express themselves differently in written as compared to oral communications, yet the interviewer will influence both the quality and quantity of the responses.[1] Thus, the interview technique was used to allow participants to openly express their thoughts without the constraints of paper and pencil, as well as providing them and the interviewer the opportunity to ask clarifying questions, giving added meaning to the written responses.

The Patterned Interview addressed the issues of equipment selection, training, and degree of participant involvement in decision making. The effects on staff and office operations were also explored.

Trainer Survey: This survey focused on trainer

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[1] Stanley Payne, The Art of Asking Questions, (Princeton, NJ: Princeton University Press, 1951), pp. 51-52, 137.

qualifications, job satisfaction, training satisfaction, and training specifics (sites, hours, materials used, methods, evaluation).

These questionnaires and interviews were piloted at a seventh site for the purpose of validating and refining the questions. This site was separate from those used in the study. A copy of each instrument appears in Appendix A (Minnesota Satisfaction Questionnaire) and Appendix B (Automation Satisfaction Questionnaire, Open-ended Question- naire, Patterned Interview, and Trainer Survey).

Demographic Data

Data regarding the covariates of sex, age, and tenure was requested of all participants. This was used in the detailed analysis of the descriptive data.

DATA GATHERING PROCEDURES

The Minnesota Satisfaction Questionnaire, Automation Satisfaction Questionnaire, Open-ended Questionnaire, and the Patterned Interview were administered at the work site by the researcher. Staff participation was voluntary, resulting in an overall loss of six cases (82% participation). There was full participation by all department managers, one from each of the six sites. Site II had two unit managers (one from the automated unit and one from the nonautomated unit) in addition to the lead worker from the automated unit. Site III also had a lead worker who participated in a managerial capacity. The lead workers

functioned in a quasi-supervisory role. They participated as managers in the study as they were more knowledgeable in some of the aspects of automation than the department manager. It was their responsibility to provide peer tutoring and trouble shooting for the automated system. Additionally, the lead worker from Site III trained all incoming staff.

Table 3.1--Summary of Participants.

	State Department		Insurance Company		University	
Group	Site I	Site II	Site III	Site IV	Site V	Site VI
Managers	1	4*	2*	1	1	1
Staff	3	10	4	3	4	3

* Includes lead worker.

There was also full participation of the trainers. Questionnaires were mailed to the off site trainers after telephone communication described the study and requested their participation.

An introductory cover letter was attached to all questionnaires. This briefly discussed the purpose of the study, guaranteed confidentiality and defined the term "automated." A copy of this letter appears in Appendix B.

STATISTICAL TREATMENT

This research was designed as a descriptive analysis of the effects of computer-based office equipment in six

offices. The data obtained from the six sites through the
questionnaires and interviews were analyzed in four sec-
tions: Questionnaire Analysis, Open-ended Questionnaire
and Patterned Interview Analysis, Trainer Survey Analysis,
and Individual Case Summaries. The interview and question-
naire analysis compared the response patterns in the sites
that had formal training with those that did not have formal
training.

Minnesota Satisfaction Questionnaire and Automation Satis-
faction Questionnaire Data Analysis Procedures

The Minnesota Satisfaction Questionnaire and the Auto-
mation Satisfaction Questionnaire used identical formats.
The respondents indicated their degree of satisfaction with
each item on a Likert-type scale. The response choices
for both questionnaires were weighted in the following
manner.

| | Scoring |
Response Choice	Weight
Very Dissatisfied (VDS) 1	
Dissatisfied (DS) 2	
Neither (N) 3	
Satisfied (S) 4	
Very Satisfied (VS) 5	

Responses were scored from 1 through 5 proceeding from
left to right in the answer spaces. Scale scores were deter-
mined by summing the weights for the responses chosen for the
items in each scale. The Minnesota Satisfaction Question-
naire (MSQ) used 20 items (one from each of the 20 scales)

yielding a score ranging from 20 to 100.[1] The Automation

Satisfaction Questionnaire (ASQ) used 17 items, giving a

range of 17 to 100. The resulting scores were subsequently

converted to percentiles. A percentile score of 75 or

higher is ordinarily taken to represent a high degree of

satisfaction; a percentile score of 25 or lower would

represent a low level of satisfaction; and, scores in the

middle range of percentiles (26-74) would indicate average

satisfaction.[2]

A t-test was used to establish whether or not a sig-

nificant difference exists between the group means on the

Minnesota Satisfaction Questionnaire and the Automation

Satisfaction questionnaire for the managers and the staff

who had formal training and those who had informal training.

The level of rejection of the null hypothesis for this study

was set at .05.

Open-ended Questionnaire and Patterned Interview Data

Analysis Procedures

The first task in analyzing the Open-ended Question-

naire and the Patterned Interview data consisted of develop-

ing response categories for each of the questions. For

this task, the distinction between responses from partici-

pants at the sites that had formal training and those who

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[1] Weiss, Dawiss, England and Lofquist, p. 3.

[2] Weiss, Dawiss, Englang and Lofquist, p. 5.

did not have formal training was ignored. Care was taken
to develop response categories which were as general and
inclusive as possible without misrepresenting or distorting
the individual responses. The responses were computer pro-
cessed using the Statistical Package for the Social Sciences
(SPSS). The responses are reported as relative frequencies
($\frac{\text{frequency of response}}{\text{number of cases}}$) unless otherwise indicated.

Trainer Survey Data Analysis Procedures

The analysis of the Trainer Survey followed the
same procedures as those listed for the Open-ended
Questionnaire and Patterned Interview.

Case Summary Procedures

The individual case summaries respresent an attempt
to synthesize and integrate all the available information
gathered from a single site. These case summaries were
based on anecdotal information gathered by researcher
observations, the questionnaires and interview responses.

Each site presentation followed a similar format:
1. needs assessment--impetus for change
2. staff involvement in the decision making process
3. data of implementation
4. training and support systems
5. productivity
6. degree of job and automation satisfaction

SUMMARY

The samples for the present study were drawn from
automated offices located in the greater Lansing area.

Six sites were selected, two from each of the three partici-
pating organizations, based on their use of formal training.

The instruments used in this study were the Short
Form Minnesota Satisfaction Questionnaire, the Automation
Satisfaction Questionnaire, an Open-ended Questionnaire,
a Patterned Interview, and a Trainer Survey. The data
were collected on-site by the researcher and subjected
to calculations of descriptive statistics as well as
t-tests. The scores for the Minnesota Satisfaction Ques-
tionnaire were reported as percentiles. The responses for
the Open-ended Questionnaire, Patterned Interview, and
Trained Survey were reported as relative frequencies
unless otherwise noted.

CHAPTER IV

ANALYSIS OF THE DATA

INTRODUCTION

The data are analyzed in two sections. The first section includes the data from each of the instruments used in this study: Demographic Data, Minnesota Satisfaction Questionnaire, Automation Satisfaction Questionnaire, Open-ended Questionnaire, Patterned Interveiw, and the Trainer Survey. The second section is a case summary of each site.

INSTRUMENT ANALYSIS

Demographic Data

The demographic data were reported as relative frequencies in Table 4.1. The majority of the participants were females (managers 80%, staff 89%) between the ages of 25-45 (managers 90%, staff 82%).

The data also indicated stable work patterns, particularly for managers. Seventy percent of the managers and 30% of the staff had been with their organization seven or more years. This may reflect the tight job market that was frequently discussed by both management and staff. Conversely,

the majority of the trainers (67%) were tenured fewer than 4 years. This fact may be due to the relative newness of office automation.

Table 4.1.--Frequency Distribution of Demographic Data for Management, Staff, and Trainers.

	Management	Staff	Trainers
Sex			
Male	20	11	33
Female	80	89	67
Age			
< 25	--	11	--
25-35	50	52	67
36-45	40	30	33
46-55	10	7	--
> 55	--	--	--
Number of Years in Occupation			
< 1	10	12	--
1-3	10	19	67
4-7	30	27	33
> 7	50	42	--
Number of Years with Organization			
< 1	--	7	--
1-3	10	23	67
4-7	20	31	33
> 7	70	39	--
Number of Years in Present Job			
< 1	10	23	--
1-3	--	35	67
4-7	70	27	33
> 7	20	15	--

Minnesota Satisfaction Questionnaire

The Minnesota Satisfaction Questionnaire (MSQ) indicated degree of job satisfaction. The short form, which consists of twenty items, was used in this study. The frequency of responses, group means, and percentiles are presented in Tables 4.2 through 4.5. Scores were tabulated for each of these four groups: (1) managers from sites where there was formal training, (2) managers from sites where there was informal training, (3) staff from sites where there was formal training, (4) staff from sites where there was informal training.

Manager and Staff Response - Formal and Informal

Training: The percentiles for the managers from the two groups were nearly identical: formal training 70th percentile, informal training 71st percentile. These were in the range identified as average satisfaction, although they were only a few points away from the high satisfaction indicator (75-100).

The percentiles for the staff from the two groups showed a very distinct difference; formal training 73rd percentile, informal training 58th percentile. Both of these scores were within the range of average satisfaction; however, the staffs from the group that had formal training were only two points below the high satisfaction range.

Table 4.2.--Frequency of Response on the Short Form
         Minnesota Satisfaction Questionnaire of
         Managers at Sites Where Formal Training
         Took Place.

On my present job, this is how I feel about . . .	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Being able to keep busy all the time	--	--	25	50	25
2. The chance to work alone on the job	--	--	25	25	50
3. The chance to do different things from time to time	--	25	--	25	50
4. The chance to be "somebody" in the community	--	--	25	75	--
5. The way my boss handles his/her workers	--	--	50	25	25
6. The competence of my supervisor in making decisions	--	--	25	50	25
7. Being able to do things that don't go against my conscience	--	--	25	75	--
8. The way my job provides for steady employment	--	--	--	75	25
9. The chance to do things for other people	--	--	--	50	50
10. The chance to tell people what to do	--	--	--	100	--
11. The chance to do something that makes use of my abilities	--	--	25	50	25
12. The way company policies are put into practice	--	--	100	--	--
13. My pay and the amount of work I do	--	--	25	75	--
14. The chances for advancement on this job	--	50	50	--	--
15. The freedom to use my own judgment	--	--	50	25	25
16. The chance to try my own methods of doing the job	--	--	--	75	25
17. The working conditions	--	25	25	25	25
18. The way my co-workers get along with each other	--	--	25	75	--
19. The praise I get for doing a good job	--	--	25	75	--
20. The feeling of accomplishment I get from the job	--	25	--	75	--
	Very Dissat.	Dissat.	N	Sat.	Very Sat.

Group Mean 76

Percentile 70

Table 4.3--Frequency of Response on the Short Form
Minnesota Satisfaction Questionnaire of
Managers at Sites Where Informal Training
Took Place.

On my present job, this is how I feel about . . .	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Being able to keep busy all the time	--	--	--	17	83
2. The chance to work alone on the job	--	--	33	17	50
3. The chance to do different things from time to time	--	--	--	50	50
4. The chance to be "somebody" in the community	--	--	50	33	17
5. The way my boss handles his/her workers	--	33	--	50	17
6. The competence of my supervisor in making decisions	--	17	--	33	50
7. Being able to do things that don't go against my conscience	--	--	--	33	67
8. The way my job provides for steady employment	--	--	--	50	50
9. The chance to do things for other people	--	17	16	17	50
10. The chance to tell people what to do	--	--	34	33	33
11. The chance to do something that makes use of my abilities	--	33	--	17	50
12. The way company policies are put into practice	--	67	--	33	--
13. My pay and the amount of work I do	--	17	--	66	17
14. The chances for advancement on this job	50	--	--	50	--
15. The freedom to use my own judgment	--	--	17	50	33
16. The chance to try my own methods of doing the job	--	--	33	50	17
17. The working conditions	--	17	--	66	17
18. The way my co-workers get along with each other	17	33	--	50	--
19. The praise I get for doing a good job	17	--	17	49	17
20. The feeling of accomplishment I get from the job	--	17	17	49	17
	Very Dissat.	Dissat.	N	Sat.	Very Sat.

Group Mean 76.66

Percentile 71

Table 4.4.--Frequency of Response on the Short Form
Minnesota Satisfaction Questionnaire of
Staff at Sites Where Formal Training
Took Place.

On my present job, this is how I feel about . . .	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Being able to keep busy all the time	--	--	18	55	27
2. The chance to work alone on the job	--	--	--	55	45
3. The chance to do different things from time to time	--	9	--	27	64
4. The chance to be "somebody" in the community	--	18	27	46	9
5. The way my boss handles his/her workers	18	--	10	36	36
6. The competence of my supervisor in making decisions	9	9	18	55	9
7. Being able to do things that don't go against my conscience	9	--	--	73	18
8. The way my job provides for steady employment	--	--	--	36	64
9. The chance to do things for other people	--	9	9	46	36
10. The chance to tell people what to do	9	--	36	55	--
11. The chance to do something that makes use of my abilities	9	9	--	36	46
12. The way company policies are put into practice	9	9	18	46	18
13. My pay and the amount of work I do	--	18	--	73	9
14. The chances for advancement on this job	9	36	19	36	--
15. The freedom to use my own judgment	9	9	9	46	27
16. The chance to try my own methods of doing the job	--	9	18	55	18
17. The working conditions	--	--	9	55	36
18. The way my co-workers get along with each other	--	--	--	45	55
19. The praise I get for doing a good job	--	9	18	46	27
20. The feeling of accomplishment I get from the job	--	18	9	27	46
	Very Dissat.	Dissat.	N	Sat.	Very Sat.

Group Mean 78

Percentile 73

Table 4.5.--Frequency of Response on the Short Form
Minnesota Satisfaction Questionnaire of
Staff at Sites Where Informal Training
Took Place.

On my present job, this is how I feel about . . .	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Being able to keep busy all the time	--	13	13	67	7
2. The chance to work alone on the job	13	--	21	53	13
3. The chance to do different things from time to time	7	7	32	27	27
4. The chance to be "somebody" in the community	7	32	27	27	7
5. The way my boss handles his/her workers	--	53	13	27	7
6. The competence of my supervisor in making decisions	--	27	27	46	--
7. Being able to do things that don't go against my conscience	--	--	27	60	13
8. The way my job provides for steady employment	--	--	20	27	53
9. The chance to do things for other people	--	20	20	53	7
10. The chance to tell people what to do	--	20	40	40	--
11. The chance to do something that makes use of my abilities	--	27	6	47	20
12. The way company policies are put into practice	13	20	40	27	--
13. My pay and the amount of work I do	--	20	7	60	13
14. The chances for advancement on this job	40	33	13	7	7
15. The freedom to use my own judgment	7	20	40	20	13
16. The chance to try my own methods of doing the job	13	20	13	47	7
17. The working conditions	7	13	33	40	7
18. The way my co-workers get along with each other	7	32	7	27	27
19. The praise I get for doing a good job		33	33	27	7
20. The feeling of accomplishment I get from the job	8	13	33	33	13
	Very Dissat.	Dissat.	N	Sat.	Very Sat.

Group Mean_67_

Percentile_58_

<u>Test of Significance</u>: The group means were subjected to t-tests to determine if there were any significant differences between the groups that had formal training and the groups that had informal training. These t-tests and the resulting probability values (p-value) were used to indicate acceptance or rejection of Research Hypotheses 1 and 2. A p-value of less than .05 resulted in rejecting the null hypothesis.

<u>Hypothesis 1</u>: There is no statistically significant difference in job satisfaction between managers at sites where formal training took place and managers at sites where informal training took place.

The mean score on the Minnesota Satisfaction Questionnaire for the managers with formal training was 76.00 while managers with informal training scored 76.66. In the test of significance, the t-value was -.11, which was significant at the .918 level (Table 4.6). This did not prove to be significant at the .05 level; therefore, Hypothesis 1 could not be rejected.

Table 4.6.--T-ratios of Management With and Without Formal Training on the Minnesota Satisfaction Questionnaire.

Scale	Training	Mean	Standard Deviation	t-value[a]	2-tail Probability
MSQ	Formal	76.00	7.78	-.11	.918
	Informal	76.66	12.04		

[a] Degrees of freedom for pooled variance = 8.

Hypothesis 2: There is no statistically significant
difference in job satisfaction between staff at sites
where formal training took place and staff at sites
where informal training took place.

The mean score on the Minnesota Satisfaction Question-
naire for the staffs with formal training was 78.00 while
the staffs that had informal training scored 66.06. This
yielded a t-value of 2.49 which was significant at the
.022 level (Table 4.7). This indicated a significant dif-
ference; therefore, Hypothesis 2 was rejected.

Table 4.7.--T-ratios of Staff With and Without Formal
Training on the Minnesota Satisfaction
Questionnaire.

Scale	Training	Mean	Standard Deviation	t-value[a]	2-tail Probability
MSQ	Formal	78.00	12.79	2.49	.022*
	Informal	66.06	11.02		

[a] Degrees of freedom for pooled variance = 22.

* Significant at less than .05.

Automation Satisfaction Questionnaire

The Automation Satisfaction Questionnaire (ASQ) was
designed to measure the degree of satisfaction for staff
and management on issues relating to office automation.
The questionnaire contained seventeen items to which staff
and management responded. The frequency of responses,
group means, and percentiles are presented in Tables 4.8
through 4.11. Scores were tabulated for each of these
four groups: (1) managers from sites where there was formal
training, (2) managers from sites where there was informal

training, (3) staff from sites where there was formal training, (4) staff from sites where there was informal training.

Manager and Staff Response - Formal and Informal Training: The managers and staff from the group that had formal training indicated similar degrees of satisfaction (managers, 61st percentile; staff, 65th percentile). The scores of the managers and staff from the group that did not have formal training were even more consistent, they varied by only one percentile point (managers, 48th percentile; staff, 47th percentile). All four sets of scores were within the range of average satisfaction; however, the group that had formal training had significantly higher satisfaction ratings than those that did not have formal training.

Tests of Significance: The group means were subjected to t-tests to determine if there were any significant differences between the groups that had formal training and the groups that had informal training. These t-tests and the resulting probability values (p-values) were used to indicate acceptance or rejection of Research Hypotheses 3 and 4. A p-value of less than .05 resulted in rejecting the null hypothesis.

Table 4.8.--Frequency of Response on the Automation Satisfaction Questionnaire of Managers at Sites Where Formal Training Took Place.

Regarding the automation of the office, this is how I feel about...	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Office automation in general...	—	—	25	50	25
2. My involvement in the decision making for the automation of our office...........	—	25	25	50	—
3. The automated equipment installed in our office............................	—	—	—	75	25
4. The software used in our office..	—	—	—	50	50
5. Location of the automated equipment.......................................	—	—	25	50	25
6. The training I received...	—	—	25	75	—
7. The amount of time allowed for me to learn to operate the automated equipment..	—	—	25	75	25
8. The support of my supervisor during the change-over.........................	—	—	—	75	25
9. Ongoing support in the use of automated equipment..........................	—	—	25	50	25
10. The way office automation has changed my job.............................	—	—	25	50	25
11. My present job performance now that the office is automated.................	—	—	50	25	25
12. Productivity levels..	—	—	—	75	25
13. Quality of work produced..	—	—	—	75	25
14. The future effects of technology on my job...............................	—	—	—	50	50
15. My overall satisfaction with my present job..............................	—	—	25	75	—
16. The degree of job satisfaction expressed by my co-workers.................	—	—	50	50	—
17. My bosses' satisfaction with the automated office system..................	—	—	—	100	—

Group Mean 68

Percentile 61

Table 4.9.--Frequency of Response on the Automation Satisfaction Questionnaire of Managers at Sites Where Informal Training Took Place.

Regarding the automation of the office, this is how I feel about....	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Office automation in general.................................			16	67	17
2. My involvement in the decision making for the automation of our office......		66		17	17
3. The automated equipment installed in our office..................	17	17	33	33	
4. The software used in our office..............................	17		33	50	
5. Location of the automated equipment..........................		33		50	17
6. The training I received.....................................	17	50		33	
7. The amount of time allowed for me to learn to operate the automated equipment..	17		66	17	
8. The support of my supervisor during the change-over..............		17	17	66	
9. Ongoing support in the use of automated equipment...............		17		83	
10. The way office automation has changed my job...................			50	33	17
11. My present job performance now that the office is automated.......	17		33	50	
12. Productivity levels...			33	67	
13. Quality of work produced....................................	17			83	
14. The future effects of technology on my job.....................			17	83	
15. My overall satisfaction with my present job....................		16		67	17
16. The degree of job satisfaction expressed by my co-workers........		50		50	
17. My bosses' satisfaction with the automated office system.........			67	33	

Group Mean 57

Percentile 48

Table 4.10.--Frequency of Response on the Automation Satisfaction Questionnaire of Staff at Sites Where Formal Training Took Place.

Regarding the automation of the office, this is how I feel about....	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Office automation in general...........	18	—	—	64	36
2. My involvement in the decision making for the automation of our office.......	—	9	46	18	9
3. The automated equipment installed in our office......	—	—	—	63	37
4. The software used in our office.......	—	—	9	64	27
5. Location of the automated equipment.......	9	9	—	36	46
6. The training I received........	9	—	27	18	46
7. The amount of time allowed for me to learn to operate the automated equipment..	—	—	18	36	46
8. The support of my supervisor during the change-over.......	—	—	18	46	36
9. Ongoing support in the use of automated equipment.......	—	9	9	18	64
10. The way office automation has changed my job........	—	—	27	27	46
11. My present job performance now that the office is automated........	—	—	18	46	36
12. Productivity levels.........	—	—	—	55	45
13. Quality of work produced........	—	—	—	36	64
14. The future effects of technology on my job........	—	—	—	36	64
15. My overall satisfaction with my present job........	—	9	9	46	36
16. The degree of job satisfaction expressed by my co-workers........	—	9	37	27	27
17. My bosses' satisfaction with the automated office system........	—	—	—	54	46

Group Mean 71

Percentile 65

Table 4.11.--Frequency of Response on the Automation Satisfaction Questionnaire of Staff at Sites Where Informal Training Took Place.

Regarding the automation of the office, this is how I feel about...	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Office automation in general....	8	8	7	62	15
2. My involvement in the decision making for the automation of our office....	8	23	23	31	15
3. The automated equipment installed in our office....	—	23	31	46	—
4. The software used in our office....	—	—	38	62	—
5. Location of the automated equipment....	15	15	16	69	8
6. The training I received....	15	31	7	39	8
7. The amount of time allowed for me to learn to operate the automated equipment..	15	39	23	15	8
8. The support of my supervisor during the change-over....	15	23	23	31	8
9. Ongoing support in the use of automated equipment....	—	8	38	46	8
10. The way office automation has changed my job....	15	8	15	54	8
11. My present job performance now that the office is automated....	—	8	30	54	8
12. Productivity levels....	8	8	—	84	—
13. Quality of work produced....	—	15	8	62	15
14. The future effects of technology on my job....	—	8	38	46	8
15. My overall satisfaction with my present job....	8	8	30	54	—
16. The degree of job satisfaction expressed by my co-workers....	—	31	30	39	8
17. My bosses' satisfaction with the automated office system....	—	15	39	38	8

Group Mean 56

Percentile 47

Table 4.11.--Frequency of Response on the Automation Satisfaction Questionnaire of Staff at Sites Where Informal Training Took Place.

Regarding the automation of the office, this is how I feel about...	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Office automation in general.........	8	8	7	62	15
2. My involvement in the decision making for the automation of our office.......	8	23	23	31	15
3. The automated equipment installed in our office.......	·	23	31	46	—
4. The software used in our office.......			38	62	—
5. Location of the automated equipment.......		15	16	69	8
6. The training I received.......	15	31	7	39	8
7. The amount of time allowed for me to learn to operate the automated equipment..	15	39	23	15	8
8. The support of my supervisor during the change-over.......	15	23	23	31	8
9. Ongoing support in the use of automated equipment.......		8	38	46	8
10. The way office automation has changed my job.......	15	8	15	54	8
11. My present job performance now that the office is automated.......		8	30	54	8
12. Productivity levels.......	8	8		84	—
13. Quality of work produced.......		15	8	62	15
14. The future effects of technology on my job.......		8	38	46	8
15. My overall satisfaction with my present job.......	8	8	30	54	—
16. The degree of job satisfaction expressed by my co-workers.......		31	30	39	—
17. My bosses' satisfaction with the automated office system.......		15	39	38	8

Group Mean 56

Percentile 47

Hypothesis 3: There is no statistically significant
difference in automation satisfaction between managers
at sites where formal training took place and managers
at sites where informal training took place.

The mean score on the Automation Satisfaction Question-

naire for managers with formal training was 67.75, while

managers with informal training scored 56.83. In the

test of significance, the t-value was 2.48, which was sig-

nificant at the .042 level (Table 4.12). This was signifi-

cant at the .05 level; therefore, Hypothesis 3 was rejected.

Table 4.12.--T-ratios of Management With and Without Formal
Training on the Automation Satisfaction Ques-
tionnaire.

Scale	Training	Mean	Standard Deviation	t-value[a]	2-tail Probability
ASQ	Formal Informal	67.75 56.83	6.55 7.19	2.48	.042

[a] Degrees of freedom for pooled variance = 8.

* Significant at less than .05.

Hypothesis 4: There is no statistically significant
difference in automation satisfaction between staff
at sites where formal training took place and staff
at sites where informal training took place.

The mean score on the Automation Satisfaction Question-

naire for the staffs with formal training was 70.99 while

the staffs that had informal training scored 55.92. This

yielded a t-value of 3.80 which was significant at the

.001 level (Table 4.13). This clearly indicated a signi-

ficant difference; therefore Hypothesis 4 was rejected.

Table 4.13.--T-ratios of Staff With and Without Formal
Training on the Automation Satisfaction
Questionnaire.

Scale	Training	Mean	Standard Deviation	t-value[a]	2-tail Probability
ASQ	Formal	70.99	7.84	3.80	.001[*]
	Informal	55.92	10.16		

[a] Degrees of freedom for pooled variance = 22.

[*] Significant at less than .05.

Data From Selected Items: Percentiles of selected
items from the Automation Satisfaction Questionnaire are
presented in Table 4.14 and are discussed below. The
added emphasis on these six items stems from their relation-
ship to the research questions addressed in this study.

Item one asked participants to indicate how they felt
about office automation in general. The managers and staff
from the group that had formal training had percentile scores
in the high satisfaction range (management 75, staff 84), as
did managers from sites without formal training (76). The
lowest percentile score was from the staff that did not have
formal training (68); yet this score was in the range of
average satisfaction and was only five points away from the
high satisfaction range. It should be noted, however, that
the highest percentile score was generated by the staff with
formal training (84) while the lowest percentile score
came from the staff with informal training (68). The range
between these two groups was 16 points.

Item two measures satisfaction with individuals' involve-
ment in the decision making process. Management and staff

from both groups indicated average satisfaction. None
of the scores varied more than six points from the 50th
percentile (46 to 56).

Item six measures individuals' satisfaction with the
training they received. Here, too, all percentiles are
within the range of average satisfaction, but the variance
between them is significant. The highest percentile score
was 73 for staff that had formal training. The managers
in the formal training group were slightly less satisfied,
with a percentile score of 69. The lowest percentile score
came from the managers without formal training 36, while
the staff without formal training scored 49. In both groups,
formal training and informal training, managers were less
satisfied with their training than staff.

Item twelve and thirteen measured satisfaction with the
resulting productivity and quality of work produced. All
percentile scores for managers and staff in the group that
had formal training were in the high satisfaction range,
varying from the 81st percentile to the 91st percentile.
The scores for the management and staff in the group that
did not have formal training were in the average satisfaction
range, with little variance, 63rd percentile to the 69th
percentile.

Item fifteen indicated overall job satisfaction. The
highest rating came from the staff that had formal training,
78th percentile. This was the only group that scored in
the high satisfaction range, all others scored in the range

of average satisfaction. The lowest percentile score,
59, came from the staff that did not have formal training.
It appeared that training did not affect managers' job
satisfaction, as the variance was minimal (formal training
69, informal training 71).

Open-ended Questionnaire and Patterned Interview

The Open-ended Questionnaire and Patterned Interview
consisted of a series of questions which queried both
management and staff. They contained several questions
which were staff or management specific. The data resulting
from the Open-ended Questionnaire and Patterned Interview
were discussed in tandem since the questions and resulting
responses were interrelated and followed a similar format.
The questions were divided into three chronological cate-
gories: Prior to Automation, Automation Implementation,
and Results of Automation. This order was utilized in
the analysis of the data. The data were presented as
relative frequencies for each of the four groups: (1)
managers from sites with formal training, (2) managers
from sites with informal training, (3) staff from sites
with formal training, (4) staff from sites with informal
training.

There were several instances where there were no
responses given. Some of the participants indicated that
they could not answer because the question was not appli-
cable or they didn't know the answer. The majority of
these responses resulted from the hiring of staff after

Table 4.14.--Percentiles of Selected Items from the Automation Satisfaction Questionnaire for Managers and Staff With and Without Formal Training.

Items	Formal Training		Informal Training	
	Managers	Staff	Managers	Staff
Regarding the automation of the office, this is how I feel about...				
1. Office automation in general.	75	84	76	68
2. My involvement in the decision making for the automation of our office.	56	48	46	55
6. The training I received.	66	73	38	49
12. Productivity levels.	81	86	66	65
13. Quality of work produced.	81	91	63	69
15. My overall satisfaction with my present job.	69	78	71	59

implementation. In the case of Site I, the staff was specifically hired for computer operation services in a newly created department.

Prior to Automation - Manager Response

ITEM 1: When did you decide to automate?

Two of the managers from sites with formal training indicated that automation had been an ongoing process since 1980. The remaining site with formal training automated in 1983.

One site with informal training was automated in 1982, while two informally trained sites were automated in 1983.

Collectively, those sites with formal training had experienced automation for a longer period than those with informal training.

ITEM 2: What triggered this decision?

The responses from both groups of managers indicated that the need to increase productivity was the impetus to change.

ITEM 3: Was a needs assessment done?

All of the managers indicated that there was some form of needs assessment done.

ITEM 4: Was the staff involved in any of the decision making?

Half of the managers in both groups indicated that the staff was involved in the decision making process.

Managers identified three areas of staff involvement: the decision to automate, equipment selection, and training plans.

ITEM 5: How did you decide on the organization from whom you bought the hardware and software?

The managers from sites with formal training stated that the vendor was selected following an evaluation of the available equipment. The managers from sites with informal training reported that the decision was made by others or based within another department's project.

ITEM 6: What were your concerns regarding automation prior to the installation of the equipment in your office?

Managers from sites with formal training reported equal concern pertaining to the impact of automation on the quality of work and user resistance (50%).

Two additional concerns were noted by managers with informal training. Their major concern was the capability of the equipment. Fifty percent questioned whether or not "it could do all it promised." Twelve percent were concerned with "the level of support and training to insure proper usage." These managers indicated less concern with quality of work (25%) and user resistance (13%).

The frequency of responses for both groups are listed in Table 4.15.

Table 4.15.--Manager Concerns Prior to Automation.

Response Categories	Formal Training	Informal Training
1. Impact on quality	50	25
2. Equipment reliability	--	50
3. User Resistance	50	13
4. Staff training	--	12

Note. Scores are reported as relative frequencies.

Automation Implementation - Manager Response

ITEM 7: Were there organizational constraints to implementation?

Twenty-five percent of the managers from sites with formal training indicated that there were organizational constraints, compared to eighty-three percent of the managers from sites with informal training who also responded "yes." Budgetary constraints, hiring freezes, and controlling factors related to upper management were the issues listed by both groups of managers.

ITEM 8: Do you use automated equipment in your job?

All of the managers from sites with formal training indicated that they did use automated equipment in their work. The managers from sites with informal training also indicated a high percentage of use (83%). However, the extent of this use was not indicated.

ITEM 9: Were you trained on the use of automated equipment?

Seventy-five percent of the managers from sites with formal training reported that they had been trained in

the use of automated equipment, while eighty-three percent of the managers from sites where there was informal training reported that they were trained.

ITEM 10: How was the training of staff done?

Managers from the three sites where there was formal training reported that the staff received basic training from the vendor at an off site location. This was followed by review sessions or in-house updates.

Two managers from sites where there was informal training stated that a self-paced tutorial program was purchased from the vendor and used by the staff to learn the various functions of the equipment. The third manager from the group that had informal training indicated that there was vendor training prior to installation, but the focus of the training was not applicable to worker tasks. This was followed with informal instruction by an inexperienced programmer who became frustrated with the reluctant learners.

ITEM 11: Was training timely?

Two of the three managers from sites with formal training responded "yes"; whereas only one manager from the three sites where there was informal training indicated that training was timely.

ITEM 12: Did training address worker attitudes and adjustment needs?

The response pattern on this question was identical to the previous item. Two of the three managers from sites with formal training responded "yes," while only one manager from the sites with informal training responded "yes."

ITEM 13: Was training cost effective?

Although there was no attempt to measure the cost effectiveness of training at any of the sites, the majority of the managers responded "yes" (formal training 100%, informal training 67%).

ITEM 14: Are there provisions for ongoing training, support, and retraining?

All of the managers from both groups indicated that there were provisions for ongoing training. However, the approaches varied from providing materials to formal reviews and updates.

Results of Automation - Manager Response

ITEM 15: Has automation been cost effective?

All of the managers from the sites where there was formal training responded "yes," compared to a much lower frequency (50%) for those managers who were from sites where there was informal training. The remaining managers from the informally trained group reported "no" (17%) or "don't know" (33%).

ITEM 16: Do you feel that productivity has increased
since automation? If yes, approximately
what percent?

All of the managers from sites with formal training

observed that productivity had increased since automation,

while only 67% of the managers from sites with informal

training reported an increase.

The highest levels of productivity increase were

reported by the managers from sites where there was formal

training: 25% indicated an increase of 21-30%, 25% reported

an increase of 31-40%. The managers from sites where there

was informal training reported an increase of only 21-30%.

A large number of managers from both groups did not respond

to the question or stated that they did not know the amount

of increase. The percentages for the two groups is listed

in the table below.

Table 4.16.--Manager Reported Increase in Productivity
Following Automation.

Response Categories	Formal Training	Informal Training
1. 21-30%	25	33
2. 31-40%	25	--
3. Don't know	25	17
4. No response	25	50

Note. Scores are reported as relative frequencies.

ITEM 17: How long did it take to reach satisfactory
productivity levels following automation?

Twenty-five percent of the managers from sites with

formal training reported that satisfactory levels were

reached within 30 days compared to 17% of the managers from sites without formal training. However, 2-6 months was the most common response for both groups of managers. At the extreme, one third of the managers from the sites without formal training indicated that satisfactory levels had not yet been reached approximately nine months after implementation. The percentages for both groups are presented in Table 4.17.

Table 4.17.--Manager Reported Length of Time before Satisfactory Productivity Levels Were Reached Following Automation.

Response Categories	Formal Training	Informal Training
1. Immediately	--	--
2. Within 30 days	25	17
3. 30-60 days	--	--
4. 60-90 days	--	33
5. 6 months	50	17
6. 8 months - 1 year	25	--
7. Not there yet	--	33

Note. Scores are reported as relative frequencies.

ITEM 18:   How much downtime (loss of productivity) did you experience after implementation?

Seventy-five percent of the managers from sites where there was formal training reported that there was no loss in productivity (50%) or less than one week (25%). Half of the managers from sites where there was informal training reported a loss of 1-2 weeks, with one-third reporting a loss of 30 days. The percentages for each group are presented in Table 4.18.

Table 4.18.--Manager Reported Loss of Productivity
Following Implementation.

Response Categories	Formal Training	Informal Training
1. None	50	--
2. Less than 1 week	25	--
3. 1-2 weeks	--	50
4. 30 days	25	33
5. 60 days	--	--
6. Don't know	--	17

Note. Scores are reported as relative frequencies.

ITEM 19: How often can you update or change hardware/
software without overstressing the operators?

The responses from both groups of managers was similar.
Seventy-five percent of those from sites with formal train-
ing reported six months to one year. One hundred percent
of the managers from sites with informal training reported
this as well. The only other response indicated that
major system changes could take place every two to three
years.

ITEM 20: Were there personnel problems as a result of
automation?

Fifty percent of the managers from sites with formal
training reported that there were personnel problems.
The managers from the sites that had informal training
had a higher frequency of "yes" responses, eighty-three
percent. Work avoidance behaviors and grievances were
problems listed by the managers.

ITEM 21: Has automation displaced any workers?

One manager indicated that workers were reassigned due to automation, yet none of the managers reported layoffs or reduction in staff.

ITEM 22: Has automation reduced your need to hire additional people?

One manager from the group that had formal training and two managers from the group that had informal training reported that they were able to meet increasing production demands without adding staff or did not need to refill vacancies.

ITEM 23: Have operators' jobs expanded due to automation?

The two groups of managers responded in a similar manner. Seventy-five percent of the managers from the group that had formal training and eighty-three percent of the managers from the group that had informal training answered "yes." Managers reported that their staffs were more skilled and had increased time to do individual projects. Additionally, a few of the managers stated that staff now functioned in a semi-professional role and were involved in more decision making.

ITEM 24: Has automation changed your job?

All managers reported that their jobs had changed due to automation. They commented on the release from manual tasks which allowed more time for problem solving. Managers also stated that they were making different kinds

of decisions and their job included an increased teaching function.

ITEM 25: What are the rewarding aspects of your job?

The managers from sites where there was formal training reported that "service" (40%), "responsibility" (40%), and "various aspects of automation" (20%) were rewarding elements in their jobs.

Managers from sites that had informal training also reported "service" (33%) and "aspects of automation" (25%) most frequently. They also mentioned "variety" (17%), "job tasks" (17%) and "co-worker" (8%).

ITEM 26: What would you recommend to others who are preparing to implement automated office equipment?

The most frequent response from both groups of managers was "involve, inform, and support staff" (50% formal training, 27% informal training). The other areas of joint consensus were "train staff" (17% formal training, 9% informal training) and "do a thorough feasibility study" (17% formal training, 18% informal training). The managers from the sites with informal training also stressed the importance of "matching equipment to the office needs" and "obtaining a qualified person to install the system" (18%).

Prior to Automation - Staff Response

ITEM 1: To what degree were you involved in the decision making process?

The majority of the staff from both groups indicated that they had no involvement or minimal involvement in the decision making process regarding automation (85% formal training, 68% informal training). However, staff that did not have formal training indicated a higher level and more varied involvement. In the categories of "somewhat involved" and "total involvement" the response frequency for the staff that had formal training was 15% compared to 32% for those who did not have formal training. These frequencies are presented in Table 4.19.

Table 4.19.--Staff Involvement in Decision Making.

Response Categories	Formal Training	Informal Training
1. No involvement	54	62
2. Minimal involvement	31	6
3. Somewhat involved	15	21
4. Total involvement	--	11

Note. Scores are reported as relative frequencies.

ITEM 2: In what way(s) were you involved in the decision making process?

Staff from both groups reported involvement in equipment selection, location of equipment, and training plans. In addition, the staff from sites where there was informal training indicated that they were involved in the decision to automate and the installation plans.

ITEM 3: What were your concerns about automation prior to the installation of the equipment in your office?

The staff from sites with formal training reported most frequently that they had no concerns (43%). Of the concerns that they listed, "ability to learn" (21%) and "equipment reliability" (21%) were the two most frequently reported. Only 6% of the staff from sites with informal training reported no concerns. Their most frequent concern was the "impact on quality" (28%), followed by "ability to learn" (18%), and "equipment reliability" (18%). Table 4.20 depicts the responses.

Table 4.20.--Staff Concerns Prior to Automation.

Response Categories	Formal Training	Informal Training
1. Ability to learn	21	18
2. Impact on quality	7	28
3. Loss of job	--	12
4. Allotted time to learn	8	--
5. Equipment reliability	14	18
6. Boredom	--	6
7. Availability of equipment	--	12
8. None	43	6

Note. Scores are reported as relative frequencies.

Automation Implementation - Staff Response

ITEM 4: Describe your training.

The staff that received formal training participated in off site vendor classes where self-paced manuals were used, as well as lecture, training disks, and cassettes.

The staff that were informally trained were provided with self-paced tutorials and had to schedule their own

learning time as their work load allowed. At one site the programmer provided informal instruction.

ITEM 5: Were you given enough training?

Eighty percent of the staff that had formal training responded "yes" compared to the 25% who responded "yes" from the group that had informal training.

ITEM 6: Identify those elements of your training that were (1) outstanding and (2) needed improvement.

The modal response (34%) of staff that had formal training indicated that the overall training methods and procedures were outstanding. This was followed by training materials with a frequency of 22%. The remaining responses were reported equally (11%): user-friendly equipment, experiencing new learnings, nothing, and not applicable. The staff that had informal training reported the positive aspects of peer and management support most frequently (50%). Training materials and "nothing" were both reported with a 13% frequency while 24% indicated that the question was not applicable.

The emphasis on those elements of training that staff identified as needing improvement varied considerably between the two groups. Those who had formal training desired further instruction in advanced functions (34%), while 11% indicated that the overall training methods and procedures needed improvement. In comparison, 50% of those who had informal training felt that the overall

training methods and procedures needed improvement. The total responses for both groups are listed in the Table 4.21.

Table 4.21.--Staff Response to Training and Improvements.

Response Categories	Outstanding		Needs Improvement	
	Formal Training	Informal Training	Formal Training	Informal Training
1. Peer and management support	--	50	--	10
2. Training methods and procedures	34	--	11	50
3. Trainer	--	--	11	--
4. Training Materials	22	13	11	10
5. Allotted time to learn	--	--	11	10
6. User-friendly equipment	11	--	--	10
7. Having input	--	--	11	--
8. Nothing	11	13	--	--
9. New learnings	11	--	--	--
10. Advanced instruction	--	--	34	--
11. Not applicable	11	24	11	10

Note. Scores are reported as relative frequencies.

ITEM 7: In the process of automating the office,
I found the following to be helpful:

The most frequent response of the staffs who were given formal training reported the support they received from their manager, trainer, and other co-workers (25%). Training and time to learn had a frequency of 17%, as did gradual conversion. Being informed and involved was also mentioned (8%). Thirty-three percent indicated that the question was not applicable.

Being informed and involved had the highest response frequency (25%) from the staffs that had informal training This was followed by training manuals at 20%. The remaining comments had a frequency of 6%: support, gradual conversion,

nothing, and not applicable. Thirty-one percent did not respond. These frequencies are presented in Table 4.22.

Table 4.22.--Staff Reported Helps for Implementation.

Response Categories	Formal Training	Informal Training
1. Being informed and involved	8	25
2. Support	25	6
3. Gradual conversion	17	6
4. Training and time to learn	17	--
5. Training materials	--	20
6. Nothing	--	6
7. Not applicable	33	6
8. No response	--	31

Note. Scores are reported as relative frequencies.

Results of Automation - Staff Response

ITEM 8: To what degree has automation changed the follow-
ing: your job, who you work with, work flow,
where you work, career opportunities, your inter-
action with fellow employees, pay.

The staff from sites that had formal training reported some change or total change in three areas: work flow, career opportunities, and interaction with fellow employees. The two areas that did not change for any of the staff in this group was where you work and pay.

Overall, the responses of the staff from the sites that had informal training indicated a higher degree of change compared to the staff from sites with formal training. The only area that did not change for any of the staff from this group was pay.

It was interesting to note that all of the staff that
received formal training reported some or total change
in their career opportunities, while sixty-seven percent
of the staff that had informal training reported no change.
The response frequency for each group is presented in
Table 4.23.

Table 4.23.--Staff Response to Degree of Change Resulting
from Automation.

Response Categories	No Change		Minimal Change		Some Change		Total Change	
	FT	IT	FT	IT	FT	IT	FT	IT
1. Your job	50	11	50	11	--	56	--	22
2. Who you work with	83	44	17	11	--	33	--	11
3. Work flow	50	--	17	22	33	33	--	44
4. Where you work	100	44	--	--	--	33	--	22
5. Career opportunities	--	67	--	--	33	22	67	11
6. Your interaction with fellow employees	33	33	17	--	33	56	17	11
7. Pay	100	100	--	--	--	--	--	--

Note. Scores are reported as relative frequencies.
FT = Formal Training, IT = Informal Training

ITEM 9: How stressful was your transition to automated
equipment?

Those with formal training indicated considerably
lower stress levels: 45% reported no stress or minimal
stress, 28% reported somewhat stressful or very stress-
ful trainsition. This response pattern was reversed for
those with informal training: 25% reported no stress or
minimal stress, 56% reported somewhat stressful or very
stressful transition. These responses are charted in
Table 4.24.

Table 4.24.--Staff Reported Stress Levels During Transition.

Response Categories	Formal Training	Informal Training
1. No stress	18	6
2. Minimal stress	27	19
3. Somewhat stressful	18	25
4. Very stressful	10	31
5. Not applicable	27	6
6. No response	--	13

Note. Scores are reported as relative frequencies.

ITEM 10: Did you experience fatigue with the new equipment? If yes, describe.

The most frequent response for both groups was "yes," (46% formal training, 62% informal training). Eighteen and nineteen percent of these two respective groups did not respond or stated that it was not applicable.

The fatiguing factors for each group are listed in the table below. The two most frequent responses for the two groups were eye strain (18% and 22% respectively) and general fatigue related to stress (18% and 17% respectively). It is interesting to note that worry was a fatigue factor in the group with informal training.

Table 4.25.--Staff Reported Fatigue Factors.

Response Categories	Formal Training	Informal Training
1. Eye strain	18	22
2. Backache	9	6
3. Boring	9	17
4. Headaches	--	6
5. Neckaches	--	5
6. Worry	--	5
7. Multiple factors	9	5
8. Not applicable	37	17

Note. Scores are reported as relative frequencies.

ITEM 11:   Since installation of automated equipment, I
           like my job: better, somewhat better, no
           change, somewhat less, a lot less.

Seventy-three percent of the staff at sites where there was formal training reported that they liked their jobs better or somewhat better. The other 27% indicated that the question was not applicable. The staff at sites where there was informal training reported that they liked their jobs better or somewhat better at a frequency of 55%. Thirteen percent of those who had informal training stated that there was no change, and 19% said they liked their job somewhat less or a lot less. These data are listed in Table 4.26.

Table 4.26.--Staff Reported Change in Job Satisfaction.

Response Categories	Formal Training	Informal Training
Since installation of automated equipment, I like my job:		
1. Better	64	6
2. Somewhat better	9	49
3. No change	--	13
4. Somewhat less	--	6
5. A lot less	--	13
6. Not applicable	27	--
7. No Response	--	13

Note. Scores are reported as relative frequencies.

ITEM 12:   Factors related to my job. (1) What I like best.
           (2) What I like least.

Both groups indicated the same three factors as major elements affecting their job satisfaction. "Variety and challenge" were reported most frequently by the two groups, staff with formal training 34%, informal training 50%. This

was followed by "people I work with" (12% formal training, 29% informal training), and "various aspects of automation" (33% formal training, 14% informal training). The responses for this question are listed in Table 4.27. Also listed in this table are the staff responses regarding what would make the job better.

The responses to "What I like least about my job" indicated that "allotted work time" was a major factor for both groups (30% formal training, 21% informal training). The other two major responses listed by the staff that had formal training were "career path" (30%) and "pay" (20%). The most frequent response for those who had informal training was "management and the established policies" (36%), with "variety and challenge" (22%) and "aspects of automation " (14%) stated as additional factors.

Table 4.27.--Staff Response to "What I Like Best About
             My Job," and "What Would Make My Job Better."

Response Categories	Like Best		Make Job Better	
	Formal Training	Informal Training	Formal Training	Informal Training
1. Variety and challenge	34	50	10	22
2. People I work with	12	29	--	7
3. Automation	33	14	--	14
4. Job task	--	7	10	--
5. Service to others	7	--	--	--
6. Responsibility	7	--	--	--
7. Management and policies	7	--	--	36
8. Allotted work time	--	--	30	21
9. Pay	--	--	20	--
10. Career Path	--	--	30	--

Note. Scores are reported as relative frequencies.

ITEM 13: Do you feel that productivity has increased since automation? If yes, approximately what percent?

Seventy-three percent of the staff who received formal training responded "yes" compared to 56% of the staff who received informal training. The majority of the staff from both groups reported that they didn't know what the increase was, or they did not respond to the question (73% formal training, 75% informal training).

ITEM 14: How long after your training before you felt at ease and productive on the new equipment?

Sixty-four percent of the staff that had formal training reported that they felt productive immediately or within thirty days. Those who were given informal training had a much lower frequency, 25% within 30 days. At the extreme, 25% of the staff from sites where there was informal training reported that approximately nine months after implementation they had not yet reached a level of ease and productivity. The modal response for the informally trained staff was 31% at 5 months. The responses are presented in Table 4.28.

ITEM 15: How often do you feel that hardware/software can be updated or changed without causing you a high degree of stress?

There was a wide range of responses for both groups on this question. The most consistant response came from the group that had formal training. Their most frequent response was 6 months to 1 year (36%), followed by "when necessary" (19%). Thirty-seven percent of the staff from

sites that had informal training did not respond or
stated that they didn't know. Table 4.29 depicts the
response frequencies for the two groups.

Table 4.28.--Staff Reported Length of Time before Satis-
factory Productivity Levels Were Reached
Following Automation.

Response Categories	Formal Training	Informal Training
1. Immediately	18	--
2. Within 30 days	46	25
3. 30-60 days	18	--
4. 60-90 days	--	13
5. 5 months	9	31
6. 6 months	--	6
7. Not there yet	--	25
8. Not applicable	9	--

Note. Scores are reported as relative frequencies.

Table 4.29.--Staff Response to "How Often Can Equipment
Be Upgraded Without Causing a High Degree
of Stress?"

Response Categories	Formal Training	Informal Training
1. Less than six months	--	13
2. Six months to one year	36	6
3. Every year	--	19
4. Every two years	9	13
5. Four years	9	--
6. When necessary	19	--
7. Not at all	9	6
8. Not applicable	9	6
9. Don't know	--	13
10. No response	19	24

Note: Scores are reported as relative frequencies.

ITEM 16: What would you recommend to others who are pre-
paring to bring automated equipment into the
office?

The responses from both groups were very similar. The
most frequent response was "inform, involve and support
people" (51% formal training, 56% informal training).
This was followed by "train and provide support staff"
(32% formal training, 22% informal training), and "select
appropriate equipment and professional analyst" (16% formal
training, 11% informal training). The only other response
came from the staff that had informal training, "don't
do it" (11%).

Trainer Survey

The purpose of this survey was to acquire specific
information regarding staff training. Additional data
were gathered regarding trainer qualifications, job satis-
faction, and training satisfaction.

This survey was administered to two vendor trainers
and one in-house trainer from the sites that had formal
training. The responses are presented in the same format
that was used for the Open-ended Questionnaire and Patterned
Interview.

ITEM 1: Describe your background and training.

The trainers came from a variety of backgrounds:
data system analyst, computer trainers, and clerical/
educational. All three reported experience in consulting
and in-house training.

ITEM 2:   What are the rewarding aspects of your job?

The trainers reported that the interaction and contact with people was the rewarding element in their jobs.

ITEM 3:   My overall satisfaction with the training staff received.

Two of the trainers reported that they were satisfied, while one indicated he was very satisfied.

ITEM 4:   What were the strong points of the operator's training?

Two of the three trainers discussed the benefits of one-on-one assistance, while the third trainer reported that the hands-on approach was very beneficial.

ITEM 5:   Where did training take place?

The two vendor trainers reported that off site training labs were used, while the in-house trainer answered that training was done on-site.

ITEM 6:   What was the duration of the training sessions?

The three trainers reported that eight to twelve hours were provided for the basic instruction. Advanced seminars were also available through the vendors.

ITEM 7:   Did operators have equipment to train on and practice on?

All three trainers responded "yes."

ITEM 8: Describe the training methods used.

Lecture and hands-on were the most frequent responses. In addition, the trainers discussed the use of role play and visual aids.

ITEM 9: What materials were used for training?

A variety of materials were used; however, the self-paced manual appeared to be the foundation for the instruction. Handouts, reference materials, tapes, and disks were also mentioned.

ITEM 10: Was there a preassessment of needs?

The two vendor trainers replied "yes." They met with the operators and discussed their needs.

ITEM 11: Were operator attitude and adjustment needs met?

All three trainers responded "yes." However, no specifics were given as to how this was done.

ITEM 12: Was there follow-up to the basic training?

Again all three trainers answered "yes." There was on-site visitation by all of the trainers, and two of them provided review sessions.

ITEM 13: Is there ongoing support?

Here,too,the three managers marked "yes." Updating classes, advanced classes and user meetings were reported by all three. In addition, two of the trainers reported vendor phone support and user newsletters.

ITEM 14: Was operator progress evaluated during or after
          training?

All three trainers reported that operators were eval-
uated by informal performance tests. Two trainers also
indicated that self-evaluation was used.

CASE SUMMARY OF SITES

Each case summary follows a similar format. First,
descriptive factors of the site provides background infor-
mation regarding the function of the office. This is
followed by a discussion which focuses on needs assessment
and the resulting impetus for change, date of implementation,
and staff involvement in the decision making process. The
pertinent data from the Minnesota Satisfaction Questionnaire
and the Automation Satisfaction Questionnaire are also
reviewed. A discussion of training, support provided for
staff, and productivity concludes the presentation.

The sites are presented sequentially as organizational
pairs. The first two sites are offices in the state govern-
ment, sites three and four are departments in the national
headquarters of a major insurance company, and sites five
and six are offices in a major university.

To aid in the comparison of the sites a summary table
which lists the percentiles from the Minnesota Satisfaction
Questionnaire and the Automation Satisfaction Questionnaire
for staff and management from each site is included at
the end of this section.

SITE I: State Department With Formal Training

After a nine month feasibility study this department
was created as an automated resource center which processes
work and designs systems for other departments. Due to
its origin it did not go through the transition from a
manual operation to an automated one. The staff members
were specifically hired as computer operators. Consequently,
many of the survey and interview questions regarding tran-
sition were not applicable.

This office was automated in 1980 and continued
to upgrade and expand by incorporating new software and
placing units in field sites. The job satisfaction scores
on the Minnesota Satisfaction Questionnaire were in the
high satisfaction range for the manager, 83rd percentile,
while the staff was only two percentage points below
the high range, 73rd percentile. The scores from the
Automation Satisfaction Questionnaire were in the high
range for both management and staff, 76th percentile and
83ed percentile respectively.

Training was viewed as an integral part of this depart-
ment's continued efficiency and improved productivity.
The original training consisted of a self-paced manual
and two days of vendor training. This basic training
taught staff how to perform the various functions of the
equipment. However, the department manager, who also
served as an in-house consultant/trainer, believed that
truly efficient operators must know more than the basic

functions. They must know how to analyze and combine
various options if they are to utilize the equipment fully.
It is this logic-based instruction that was the focus
of the ongoing training and support received by this staff.

Due to this philosophy and the variety of tasks that
came into the department, this small office was a major
test site for new software created by their vendor. The
staff and manager took great pride in this and revelled
in the challenge of finding the limits of the machine.
One operator commented, "It's the machine--human aspect,
the kinship of getting to know the limitations of the
machine's interactions."

SITE II: State Department Without Formal Training

This office was service oriented and dealt directly
with the public. Its major function was scheduling hearings
and maintaining case files. The projected increase in
case load triggered the move to automate these procedures
which began in the fall of 1983. Automation brought major
operational and structural changes to this department.
It was subsequently divided into two units: those who
worked on the automated equipment and those who continued
to serve the public and prepared information for the auto-
mated center. Work flow and job tasks were changed con-
siderably.

Prior to automation two significant changes took place,
the government workers had voted to be part of a union
and a new manager was assigned to the division. This

combination of change and the resulting stress was a vola-
tile mixture which was ignited by an inexperienced programmer/
trainer and unreliable equipment. This was further fueled
by government cut-backs, fear of job loss, a tight job
market, and the numerous procedural changes brought about
by automation. No longer could cases be "walked through"
by the individual staff member, and files were not easily
accessible to all workers. A complex system of codes,
additional forms, and longer time lapse in scheduling
hearings added frustration for the staff and the public
they served.

Both units of this department were participants in
this study. Although only one unit actually worked on
the equipment, the function of the other unit was drama-
tically affected by the change.

All of the staff in the department received introduc-
tory instruction on the use of the automated equipment
and were given the opportunity to apply for transfer to
the automated unit. Not everyone was accepted, however.
The result was disappointment and frustration over the
selection of automated operators. Some who were accepted
became frustrated and requested placement back in the non-
automated section of the division. At one point there
were multiple requests for transfer to other divisions.

The job satisfaction scores on the Minnesota Satis-
faction Questionnaire were in the average range for both
management and staff (69th and 50th percentile, respectively).

The Automation Satisfaction Questionnaire scores were
also in the fiftieth percentile range (managers 58th per-
centile and staff 54th percentile). Although all of these
scores are in the average range, collectively they are
the lowest scores in this study.

The staff received vendor training which focused on
the basic editing functions of the machine, but not on
the programming and coding necessary to adapt the equip-
ment to the needs of this office. The usefulness of this
training was further diminished because it was so far re-
moved in time from the actual implementation, rendering it
virtually ineffective.

Due to the governmental freeze on hiring, the program
analyst/trainer that had been selected to set up the system
could not be employed. Consequently, a lawyer from a neigh-
boring department who had some programming skills took over
this complex task.

There were many difficulties throughout this process,
not the least of which was the lack of vendor support.
The equipment was a new line and relatively untested;
its capabilities were not well suited to the needs of
the department. Much of the implementation process was
trial and error with frequent procedural changes even
during the training period. As each part of the system
was completed the programmer trained the staff in its
use and actual input began. Both staff and trainer were
under pressure from production demands which necessitated

the maintenance of both the old and the new systems by one staff. There was virtually no time for testing the system and very little time for training or practice. Frustration ran high, lowering everyone's tolerance level.

Although the staff was involved in the decision making process, it was not a rewarding experience. They were being asked to help design a system they didn't understand on equipment that did not lend itself to the task. The satisfaction with their involvement in decision making was in the fortieth percentile range.

The division manager expressed serious reservations about the automation of the department. She stated that automation was very costly in equipment expenditures as well as in staff morale. Although the equipment had made the staff more accurate, they had not yet seen any gain in productivity. In fact, cases were taking longer to schedule. The decision to automate had been made by the previous manager and was based on a needs assessment that predicted an increasing case load. The increase never materialized. Instead the case load dropped substantially.

The high stress levels throughout the department were demonstrated by many grievances, a period of work avoidance behaviors, transfer requests, and antagonism toward the new system, the programmer/trainer, and management. One of the unit managers pointed out that there were attitude and performance problems with some of the staff before automation. These were further aggravated

by the new process. To aid in establishing a more positive
staff morale a field manager who had a degree in guidance
and counseling was brought in to manage and support the
staff in the automated unit. Also, there were plans to
provide additional in-house training as a means of
supporting both the automated and nonautomated unit.
As the system smoothed out, personnel problems dissipated,
yet traces of these negative feelings were still detectable
a year later when this study took place.

SITE III: Insurance Company With Formal Training

This site was a word processing center which provided
services for other departments throughout the organization.
Its structure was reminiscent of the onetime typing pool.
They were production oriented. Line count and error rate
were carefully monitored.

Automation was introduced into this office in 1980.
In 1983, after a nine month needs assessment, a more sophis-
ticated system was implemented. Although the operators
worked on a wide variety of documents for many departments,
their overall task of entering data did not vary. Operators
were confined to their terminals all day; therefore, ergo-
nomics played a key role in their comfort level and con-
sequent productivity. Nonglare screens, acoustical covers
for printers, and ergonomic chairs that were designed
for frequent readjustment were some of the environmental
amenities provided for the operators.

The managers' rating of job satisfaction on the
Minnesota Satisfaction Questionnaire was in the average
range, 64th percentile, while the staff's rating was eleven
percentile points higher (75th percentile) and within
the range of high satisfaction. A similar pattern was
present on the Automation Satisfaction Questionnaire.
The managers scored in the average range, 70th percentile
while the staff was again within the range of high satis-
faction, 76th percentile.

The vendor provided two days of basic training,
followed by two days of advanced training. The original
training sessions were held off site at the vendor's training
lab. Cassettes and self-paced manuals were the basic
teaching tools. The operators stated that they would
have liked more personal attention from the trainer who
was frequently out of the room. The staff's satisfaction
with their training was in the average range, 56th percen-
tile.

The frustration that the operators experienced in
the transition was the pressure of maintaining productivity
levels at the busiest time of their year and the slow
performance of the new equipment which was still in the
testing stage. The result of this slowdown was several
months of mandatory overtime which many operators resented.
Some of the operators also expressed a desire for more
involvement in the equipment selection, which was reflected

in the satisfaction rating of their involvement in the
decision making process at the 38th percentile.

Training was an ongoing part of office operations.
Additional support was provided by the vendor in the form
of seminars and bulletins, as well as in-house updates
on new software and application procedures. This depart-
ment was led by a very enthusiastic manager who kept abreast
of the latest technological advances and was sensitive
to employee satisfaction and comfort levels.

Due to the organizational structure of this department
and its history of documenting productivity, it was the
only site that had statistical pre and post data on produc-
tivity levels. The present equipment had increased produc-
tivity 25-35% with an error rate of less than 1%. (Note:
This department had been partially automated prior to
the purchase of the present equipment.) The manager also
pointed out that the total conversion, training, and the
development of expertise on the equipment took nearly
one year.

SITE IV: Insurance Company Without Formal Training

This small department provided analytical and pro-
cedural support to other units and individuals within the
organization. It was through these improved methods that
company growth and individual effectiveness was increased.
The staff in this department took great pride in their
work and were very conscious of the professional quality
of their product.

The need to increase productivity, a hiring freeze,
and the staff's desire for a tool that would aid in the
analysis and production of documents, led to the acqui-
sition of personal computers in 1982. An analysis of inter-
nal applications and the logging of time were used as a
basis for selection. The actual purchase of the hardware
was based on a larger pilot contract within another project
in the company.

The manager had a high level of job satisfaction,
84th percentile, while the staff was slightly below the
high range at the 70th percentile. Management and staff
reported identical levels of automation satisfaction at
the 68th percentile which is in the average range.

The staff stated that they had been involved in the
decision to automate from the beginning. They had the
highest satisfaction rating on this issue in the study:
the 91st percentile.

This staff also had the lowest rating in this study
regarding training satisfaction. Their satisfaction rating
was at the 16th percentile which is in the low satisfaction
range. Formal training was not provided for this department.
The computer came with a tutorial manual and a telephone
sevice number if one became stuck. The staff found this
method of self-instruction very frustrating and time con-
suming as indicated by the low satisfaction rating of train-
ing. The manuals were not always clear and often some
of the steps were left out. Help from the telephone service

number was slow in coming, and staff soon gave up using
it. Staff had to find time during a busy day to sit at
the machine and go through the tutorial program, a hard
thing to do when one is under pressure to get work completed.
As a result, the staff learned to use the equipment and
improve their efficiency and the quality of their work,
but on a limited basis.

The personal computers that were provided for the
staff was viewed as a tool to aid them in their tasks.
Although staff were encouraged in the use of this new equip-
ment, there was little support provided for training or
time to learn due to project demands. The staff reported
this process as being somewhat stressful.

The department manager was pleased with the increased
productivity. He estimated that the staff was approximately
30% more productive with the automated equipment. He
also projected that this can be further improved with the
addition of other computerized operations such as
electronic mail, electronic files, calendaring, and computer
scheduling.

SITE V: University Department With Formal Training

This department provided clerical service for one
of the colleges in a major university. It was responsible
for preparing and publishing a variety of documents. An
informal needs assessment and the desire to increase
productivity while reducing repetitive tasks led to the

decision to purchase a dedicated word processing system.
The university had done a comparative study of word pro-
cessing equipment which aided this department in its choice
of vendor.

Job satisfaction was in the average range for manage-
ment and staff as indicated by their scores on the Minne-
sota Satisfaction Questionnaire (70th and 69th percentile
respectively). However, satisfaction with the automated
system was in the high range, (management, 86th percentile;
staff, 82nd percentile).

The two days of introductory training took place
in the vendor's training lab. Self-paced training manuals,
personal support from the trainer, and periodic evaluation
(both formal and informal) were the instruction techniques
used. The vendor also provided two review sessions, as
well as ongoing site visitations and telephone support
for the life of the equipment. There were advanced classes
in systems administration and communications in addition
to user newsletters.

This was one of the university approved vendors,
and several departments had installed their equipment
previously. A university users' support group had developed
to exchange ideas and techniques for equipment applications.

Although staff was included in the decision making,
they would have liked even more involvement. The staff
indicated this by their satisfaction rating at the 56th
percentile that decision making received on the Automation

Satisfaction Questionnaire and by their comments on the questionnaire/interview. Overall, the staff responses were positive and they appreciated the advantages of automation. As one person commented regarding the equipment provided for them, "It made an impression about how management feels about us."

The manager felt that productivity had increased approximately 40% and that error rate had decreased substantially. Contracted printing costs had been virtually eliminated as this was now done in-house due to the capabilities of the new equipment. The manager also felt that job satisfaction increased due to automation. This was indicated by the decline in absenteeism and increased cooperation levels. Automation had eliminated many of the repetitive tasks and had aided in the laborious process of correcting and editing documents.

SITE VI: University Department Without Formal Training

This was a small, specialized department within a major university. The production of publications was a major function of the clerical staff. The increased work load and reduced funds for hiring additional staff led to the 1983 purchase of personal computers to aid production. Prior to the purchase of the computers, the staff participated in a needs assessment and were involved in the preliminary decision regarding the purchase of equipment. However, there were budgetary constraints so the necessary

funding for the preferred equipment and training were not available.

The manager indicated average satisfaction with her job on the Minnesota Satisfaction Questionnaire, 66th percentile, while the staff rated their satisfaction within the high range, 75th percentile. On the Automation Satisfaction Questionnaire the manager again rated her satisfaction in the average range, 62nd percentile, with staff reporting a high satisfaction at the 83rd percentile.

A tutorial program was provided for learning the operations of the equipment. Staff scheduled their own training time and were aided by the manager who was also self-taught via the tutorial program. There had been avoidance on the part of one staff member in scheduling training time, which may reflect the resistance observed by the manager. The manager kept the use of the automated equipment limited to those who had gone through the tutorial program step-by-step for fear of a system crash and resulting loss of data.

The staff that was using the equipment was frustrated by the lack of training and support. Although they reported that their supervisor was helpful, they felt that they needed an uninterrupted time to sit with the manual, and they desired formal training with someone on hand to answer their questions.

The manager estimated that productivity increased 25-30% with the installation of word processing equipment.

In addition to the need for training, the manager expressed the need for professional assistance in adapting the system to meet specific departmental needs. For several weeks the equipment was not usable. The inexperienced staff struggled to get the system "up and running" without success. The vendor telephone support was incapable of dignosing the problem. Finally, assistance from another computerized department on campus was offered and it was determined that the problem was "bad disks."

A summary of the characteristics which were present at each site is depicted in Table 4.30. In Table 4.31 the percentiles are presented for staff and management from the Minnesota Satisfaction Questionnaire, Automation Satisfaction Questionnaire, and selected items on the Automation Satisfaction Questionnaire.

Table 4.30.--Summary of Characteristics Present at Each Site.

Categories	STATE DEPT. SITE		INSURANCE CO. SITE		UNIVERSITY SITE	
	I	II	III	IV	V	VI
Formal Training	X	--	X	--	X	--
Major changes in office operations and structure	--	X	--	--	--	--
Ongoing staff support	X	X	X	--	X	--
Degree of staff stress	N/A	81*	77*	66	50	63
High production demands during conversion	N/A	X	X	X	--	--

Note. Staff scores are presented as percentiles.

* = high range (75-100)
N/A = Not applicable

Table 4.31.--Summary Table of Management and Staff Percentile Rating on Key Issues by Site.

Categories	STATE DEPT. SITE		INSURANCE CO. SITE		UNIVERSITY SITE	
	I	II	III	IV	V	VI
Formal Training	X	--	X	--	X	--
Minnesota Satisfaction Questionnaire						
Management	83*	69	64	84*	70	66
Staff	73	50	75*	70	69	75*
Automation Satisfaction Questionnaire						
Management	76*	58	70	68	86*	62
Staff	83*	54	76*	68	82*	83*
Automation Satisfaction Questionnaire - Itemization						
1. Decision making						
Management	75*	25**	50	100*	50	75*
Staff	N/A	42	38	91*	56	N/A
2. Training						
Management	50	50	75*	25**	75*	0**
Staff	75*	56	56	16**	88*	50
3. Productivity						
Management	75*	69	75*	50	100*	75*
Staff	91*	61	81*	75*	88*	88*
4. Quality						
Management	75*	19**	75*	75*	100*	75*
Staff	91*	61	75*	91*	100*	88*

* = high satisfaction range (75-100)
** = low satisfaction range (0-25)
N/A = Not applicable

SUMMARY

The statistical and descriptive analyses of the data were presented in this chapter. Part one was a presentation of the data that were generated by each instrument: Minnesota Satisfaction Questionnaire, Automation Satisfaction Questionnaire, Open-ended Questionnaire, Patterned Interview, and Trainer Survey. The test of significance and their resulting probability values were discussed for each research hypothesis. A summary of these null hypotheses and a brief discussion of those that were rejected were presented in Table 4.31. Selected items from the Automation Satisfaction Questionnaire were also discussed. This was followed by a presentation of the data for each item on the Open-ended Questionnaire, Patterned Interview, and Trainer Survey.

Part two was a descriptive analysis of the individual sites. These case summaries were based on anecdotal information that was gathered by the researcher and supported by the statistical data that were derived from the various instruments. Table 4.32 is a summary of the significant findings of the individual sites.

Table 4.31.--Summary of Research Hypotheses.

Hypothesis	Accept/Reject	Level of Significance	Discussion
Hypothesis 1: There is no statistically significant difference in job satisfaction between managers at sites where formal training took place and managers at sites where informal training took place.	Accept		
Hypothesis 2: There is no statistically significant difference in job satisfaction between staff at sites where formal training took place and staff at sites where informal training took place.	Reject	.022	Formal training had a signif-icant influence on staffs' job satisfaction. A signifi-cant discrepancy in job satis-faction lies between the staffs that received formal training and the staffs that received informal training.
Hypothesis 3: There is no statistically significant difference in automation satisfaction between man-agers at sites where formal training took place and managers at sites where informal training took place.	Reject	.042	Formal training had a signif-icant influence on managers' satisfaction with automated office equipment. A signifi-cant discrepancy in automation satisfaction lies between the managers from sites with for-mal training and managers from sites that had informal train-ing.

Table 4.31.--Continued.

Hypothesis	Accept/ Reject	Level of Significance	Discussion
Hypothesis 4: There is no statistically significant difference in automation satisfaction between managers at sites where formal training took place and managers at sites where informal training took place.	Reject	.001	Formal training had a significant influence on staffs' satisfaction with automated office equipment. A significant discrepancy in automation satisfaction lies between the staffs that received formal training and the staffs that received informal training.

Table 4.32.--Summary of Key Issues as Rated by Staff and Management for Each Site.

Categories	STATE DEPT. SITE		INSURANCE CO. SITE		UNIVERSITY SITE	
	I	II	III	IV	V	VI
Formal Training	X	--	X	--	X	--
MSQ - Management	X	--	--	X	--	--
MSQ - Staff	--	--	X	--	--	X
ASQ - Management	X	--	--	--	X	--
ASQ - Staff	X	--	X	--	X	X
ASQ - Decision making						
Management	X	O	X	X	--	X
Staff	N/A	--	--	X	--	N/A
ASQ - Training						
Management	--	--	X	O	X	O
Staff	X	--	--	O	X	--
ASQ - Productivity						
Management	X	--	X	--	X	X
Staff	X	--	X	X	X	X
ASQ - Quality						
Management	X	O	X	X	X	X
Staff	X	--	X	X	X	X
Major office changes	--	X	--	--	--	--
Ongoing staff support	X	X	X	--	X	--
Staff stress	N/A	X	X	--	--	--
Production demands during conversion	N/A	X	X	X	--	--

X = high range (75-100)   MSQ = Minnesota Satisfaction Questionnaire
O = low range (0-25)   ASQ = Automation Satisfaction Questionnaire
N/A = Not applicable

CHAPTER V

SUMMARY AND CONCLUSIONS

This chapter includes a summary of the study, a discussion of the findings as they apply to the research hypotheses and the research questions, conclusions, and recommendations for future research.

SUMMARY

The purpose of this study was to describe the implementation of computer-based, automated office equipment as viewed by the staff, department managers, and trainers, with special emphasis on the training which accompanied the implementation.

In preparation for the study, an extensive literature search was undertaken. Computerized office equipment is relatively new. Research on this topic was virtually non-existent; therefore, a global perspective was pursued. The field of sociotechnical research, which attends to the social ramifications of technological change, provided the theoretical basis for this study. It was supplemented by pertinent literature from related fields: communication and organizational culture, the psychology of motivation

and reward, adult learning, organizational training, and
the dynamics of planned social change.

Four instruments were developed for this study: Auto-
mation Satisfaction Questionnaire, Open-ended Questionnaire,
Patterned Interview, and Trainer Survey. In addition,
the Short Form Minnesota Satisfaction Questionnaire was
used. This indicates degree of job satisfaction.

The participants came from six offices located in
the greater Lansing area. Three of the offices were selected
as exemplary. Their implementation included a formal training
program. The other three that were selected had no formal
training.

The data were gathered on-site by the researcher
and submitted to statistical analysis. The computer pro-
gram used to tabulate the scores was the Statistical Package
for the Social Sciences (SPSS).

FINDINGS

The findings from the data which were presented in
Chapter IV are presented in two parts. Part one is a
discussion of the results of the t-tests that were applied
to the research hypotheses. In part two the research ques-
tions are restated and the findings from the data that are
pertinent to the questions are discussed.

Hypothesis 1

> There is no statistically significant difference in
> job satisfaction between managers at sites where formal
> training took place and managers at sites where informal
> training took place.

A comparison of means from the composite scores on

the Minnesota Satisfaction Questionnaire between managers

from sites with formal training and managers from sites

with informal training were not significant at the .05

level. The p-value was .918.

Hypothesis 2

> There is no statistically significant difference in
> job satisfaction between staff at sites where formal
> training took place and staff at sites where informal
> training took place.

A comparison of means from the composite scores on

the Minnesota Satisfaction Questionnaire between staff

from sites with formal training and staff from sites with

informal training revealed a statistically significant

difference of less than .05. The p-value was .022.

Hypothesis 3

> There is no statistically significant difference in
> automation satisfaction between managers at sites
> where formal training took place and managers at
> sites where informal training took place.

A comparison of means from the composite scores on

the Automation Satisfaction Questionnaire between managers

from sites with formal training and managers from sites

with informal training revealed a statistically significant

difference of less than .05. The p-value was .042.

Hypothesis 4

> There is no statistically significant difference in
> automation satisfaction between staff at sites where
> formal training took place and staff at sites where
> informal training took place.

A comparison of means from the composite scores on

the Automation Satisfaction Questionnaire between staff

from sites with formal training and staff from sites with

informal training revealed a statistically significant

difference of less than .05. The p-value was .001.

Research Question 1

> How has implementation of computer-based equipment
> affected office operations?

Automation brought little change to the actual opera-

tions of the offices at five of the six sites. Overall,

productivity of the staff increased and three of the man-

agers stated that they were sending fewer documents out

for reproduction since they had the capability of doing

it themselves.

Due to reduced staffing at a majority of the sites,

the thrust of automation was on increasing the present

staff's production rate rather than establishing new

procedures or work flow.

Site II was the only department in this study that

experienced major operational change. The original depart-

ment was divided into two units, and many procedual changes

took place. The staff that operated the automated equipment

was placed in one unit while the remainder of the staff

continued in their original assignments. Although the
nonautomated staff remained in their original assign-
ments, several aspects of their tasks were taken over by
the automated unit, procedures changed considerably. This
department also experienced the most resistance to change
as well as difficulties with the complexities of implemen-
tation.

Research Question 2

> In what way(s) is automation compatible with the
> rewarding aspects of staff and management jobs.

The most frequent responses given by staff regarding
what they liked best about their jobs, in order of mention,
were "variety and challenge," "people I work with," and
"various aspects of automation."

Staff both praised and condemned automation's effect
on their jobs. To some, it has provided an ongoing challenge,
new learnings, relief from tedious and repetitive tasks,
ease of editing, and pride in a quality product. It also
provided rewarding interactions with other staff members:
"We have more in common and something to talk about."
People also spoke of working more cooperatively and sharing
new ideas.

Automation had a negative impact as well. Those
whose jobs involved sitting at a machine all day re-
cording information, reported that it was tiring, boring,
and physically stressful. Also, their actual work time
and production rate were more easily monitored and errors

were more conspicuous. The staff felt added pressure from this increased accountablity. Some staff reported that they felt isolated from the others because they were confined to their terminals and no longer had the casual interactions with co-workers.

The managers spoke favorably of the changes automation had brought to their work. Record keeping was more easily facilitated leaving them more time to address other areas and attend to problem solving. When asked what they found rewarding about their jobs, they reported the service aspects most frequently, followed by their involvement with automation. They spoke of the creative, challenging aspect of automation and the exposure to a new arena of responsibility and leadership.

Research Question 3

> To what extent was staff involved in the decision making process regarding the automation of the office?

Fifty-six percent of the managers reported that their staff was involved in the decision making process. They indicated that staff provided task related information regarding the application of computerized equipment and were given the opportunity to voice their opinions regarding equipment selection. The other area where management reported staff involvement was training plans which generally involved the scheduling of training.

When the staff was asked about their participation in the decision making process, they indicated that they were

less involved than management had reported. Sixty to seventy percent said that they had no involvement in the decision to automate, equipment selection, or installation plans. However, 50% reported that they participated in the training plans.

This variance in reporting may be accounted for in the following ways: (1) some of the staff who participated in the study were hired after the automated equipment had been installed; consequently, they were not involved in any of the decision making. (2) The staff may have viewed involvement as an active participation throughout the whole process rather than the more passive role of providing information, stating their opinion regarding equipment selection, or choosing a training schedule. (3) A few of the staff said that they were not interested in the added responsibility of being involved in the decision making process or that they felt incapable of participating because of their lack of knowledge about the computerized equipment.

At only one site did the staff indicate high satisfaction (91st percentile) with their involvement in the decision making process. The others reported average satisfaction from the 38th to the 56th percentile, or that the question was not applicable due to the recent hiring of several employees.

Overall, staff members stated that they would like to have been more actively involved in the decision making

and implementation processes. Several felt that some of the problems that were encountered might have been eliminated through staff involvement.

Research Question 4

What methods and materials were used in the training of staff and management?

In all cases a hands-on approach and self-paced manuals were used in the introductory training. The self-paced manuals were supported by trainers or a telephone service number. Other materials were also mentioned by the trainers: cassettes, instructional disks, role playing, simulations, lectures, flow charts, visual aids, and trainer developed materials.

At those sites where vendor training was provided, off site training labs were used, which provided staff with a learning environment free of interruptions. Two of the vendors provided follow-up sessions, on-site visitations, and some type of continuing support such as newsletters or telephone support.

The two sites where training consisted of a self-paced manual and a telephone service number, staff and management reported dissatisfaction with the support they received. The telephone service was inadequate and limited in its scope of problem solving ability.

The trainers indicated that evaluation consisted of informal observations, reviews, and various self-evaluation

quizzes located throughout the manuals. Formal performance
tests were used by only one trainer.

Research Question 5

Did the staff, management, and trainers preceive training
as efficient/effective?

To provide a more detailed account of the findings,
the responses were divided into two groups: those who
had formal training and those who had no formal training.
The reported degree of training satisfaction, cost effective-
ness, timeliness, and attention to worker attitudes and
adjustment needs were used as indicators of training
efficiency/effectiveness. The effects of training on
productivity, quality, and downtime is discussed in
Research Question 6.

Sites With Formal Training

The participants from sites where formal training
took place indicated average to high satisfaction with
staff's training (staff, 73rd percentile; management, 69th
percentile; trainers, 85th percentile). The lowest satis-
faction rating for this group was the rating that management
gave the training they received (66th percentile).

The basic training that the staff received at each of
these three sites was provided by the vendor. All of
the managers indicated that it was cost effective. Also,
two of the three managers felt that it was timely and
addressed worker attitudes and adjustment needs.

Sites Without Formal Training

The satisfaction levels were consistantly lower for participants from these three sites. The degree of satisfaction regarding staff training are as follows: staff, 58th percentile; management, 60th percentile. The staff and management responses align very closely, as they did at the sites with formal training. Here, too, the managers indicated far less satisfaction with the training they received (38th percentile).

The training at these sites consisted of self-paced tutorial manuals that were purchased from the vendor or, at one site, poorly administered vendor training followed by the trial and error methods of an inexperienced programmer/trainer. Only one third of the managers felt that the training was timely, and one indicated that it addressed worker attitudes and adjustment needs. Yet, half of the managers reported that training was cost effective, as their investment in training manuals was a minimal expense.

Research Question 6

What impact, if any, did training have on the implementation of computer-based office equipment?

The type of training appears to have influenced the length of time needed for operators to become productive on the automated equipment and satisfaction with the quality of work produced. However, the data did not indicate that training had any effect on the percentage of

productivity increase. This was relatively consistant at four of the six sites, ranging from 25-40%. Of the remaining two sites, one had little measurable increase, in fact, documents were taking longer to process. The other site was established as an automated center; therefore, this indicator was not applicable.

Sixty-four percent of the staff from sites that provided formal training stated that they felt at ease and productive within thirty days. This is comparable with the amount of downtime reported by the managers. Fifty percent reported no loss in staff productivity, and 25% indicated a loss of less than one week. The staff and managers' rating of work quality on the automated system was in the high satisfaction range (staff, 91st percentile; management, 81st percentile).

Only 25% of the staff from sites that provided informal training reported that they were productive within thirty days; whereas, approximately nine months after implementation, 25% responded that they were not yet at ease or productive on the automated equipment. The managers from these sites also reported longer downtime; 50% experienced one to two weeks while 33% reported thirty days. The staff and manager rating of work quality was in the average range, but considerably lower than those with formal training (staff, 69th percentile; management, 63rd percentile).

CONCLUSIONS

A final summary of the findings is presented in this
section. The first part of this section is a discussion
of the findings resulting from the research hypotheses
and the research questions. The second section is dedicated
to the practical application of this research. The key
issues that appeared in this study are presented as an aid
to those who are considering implementation of computer-
based, automated office equipment.

Conclusions from Hypotheses

The findings from hypothesis 1 and 2 indicated that
training had no effect on manager job satisfaction.
However, there was a significant difference in staff job
satisfaction. Although all but one manager reported that
they used the automated equipment, the levels of use were
not indicated. Decision making and problem solving were
the dominant roles discussed by the managers; whereas, the
production of documents via the automated equipment was a
dominant task of the staff. Therefore, it can be concluded
that the formal training of staff in the use of automated
office equipment had a positive effect on the degree of
job satisfaction. (Note. This is further supported by
staff responses regarding change in job satisfaction,
see Table 4.26.)

The findings from Hypotheses 3 and 4 indicated that managers and staff who were provided with formal training had a higher degree of satisfaction with their automated system. This was supported throughout the responses on the questionnaires and interviews.

Conclusions from Research Questions

Although there were many variables in this study, such as office function, equipment application, staff positions, jobs, and vendors, the overall responses were remarkably consistent. What cannot be determined with this small sample is whether or not the deviant responses were reflective of a subpopulation. Therefore, these findings are based on the responses which reflect consensus. Consideration, but little emphasis, was given to the deviant responses.

The limiting effects of the depressed economic conditions in the State of Michigan were reported by both staff and management. The managers were limited by budgetary constraints and various hiring freezes which were reported at each of the sites. This limiting of staff made it necessary to focus on improving the productivity of the present staff. Thus, the stage was set for the purchase of automated office equipment. Another constraint resulting from the depressed economy was the tight job market which drastically reduced worker mobility both laterally and vertically. The managers reported that this had produced a more stable staff. However, employees expressed

concern about the effect of the limited job market on one's career path.

The primary methods in staff training included self-paced manuals and hands-on experience. The key factor distinguishing formal training from informal training was the presence of a professional trainer to support and guide the operators. The basic vendor training took place in off site training labs where the operators were free of interruptions. The vendors also provided follow-up and ongoing support. At one site a user support group had been developed throughout the organization.

The overall results of automation included increased productivity and improved quality of production with fewer errors. The implementation of automated equipment had virtually no effect on staff job satisfaction. The staff voiced concern about their inability to learn how to operate the equipment and the possibility of losing their jobs. Although one site reported relocation of staff, no one lost a job as a result of automation.

The measure of stress levels for each site correlated closely with the production pressures during implementation. The two sites that reported the highest stress levels were also the ones who reported high production demands during conversion.

The automated system appeared to have had a positive as well as a negative effect. The staff praised the new system's ability to perform repetitive tasks easily.

They also reveled in the challenge and stimulation it provided and delighted in the camaraderie that developed among the users.

On the negative side, there were complaints of boredom and confinement. Recording information all day was repetitive and being confined to the machine resulted in the reduction of interaction with others.

In evaluating the effects of automation on worker autonomy, this positive--negative effect appears again. Some of the staff reported that they could no longer control various aspects of their jobs. In some cases they had to share equipment or wait for others to access the information for them; or worst of all, wait out equipment failure and hope that there was no loss of data.

One of the most lamented losses was from those in the nonautomated unit of Site II. They no longer saw cases through from start to finish, nor could they provide special processing for rush cases. The major blow, however, came from the removal of their typewriters. They now had to fill out prompts for the automated center by hand, resulting in a loss of dignity and power.

On the positive side, automation provided staff with increased autonomy. At some of the sites they no longer had to send their documents out as they now had the capability to complete projects themselves. Many of the staff spoke with pride about the improved quality of their work.

Automation also relieved them of many tedious and repetitive tasks, allowing more creative endeavors.

It can be inferred from these findings that formal training had the following effects:

1. The staffs which were given formal training were more satisfied with their jobs.

2. The staff and management that were given formal training were more satisfied with automation.

3. Operators who were given formal training felt more efficient and became productive on the computerized equipment sooner than those without formal training.

4. Staff and management from sites with formal training were more satisfied with the quality of work that was produced.

Overall, it can be concluded that:

Implementation was most successful when the staff was provided with formal training, and that self-training was superior to training that was ill planned and/or executed.

Automation was viewed positively by the staff when it was presented as a tool to relieve them of the repetitive, tedious tasks and provided an ongoing challenge.

Implementation Considerations

This final presentation is the accumulated recommendations that were gleaned from the responses. These are

meant to serve as a practical guide for those who are con-
sidering the implementation of an automated office system.

The planning stage identifies many of the elements
which are crucial to a successful implementation. Since
through needs assessment is the foundation for good decision
making, the following should be considered before final
decisions are made.

1. What are the present and projected productivity
   needs and how does the equipment match these needs?

2. Vendor reliability and service are key issues. Has
   the equipment been thoroughly tested?

3. How will automation affect the social structure?
   Note. One must take into consideration the estab-
   lished norms and the rewarding aspects of employees'
   jobs as well as growth needs and present staff morale.
   Resistance can be costly in terms of absenteeism, loss
   of time-on-task, and grievances.

4. How will staff be involved in the process? A concern
   that was repeatedly reported was the need to be kept
   informed and the desire for active involvement in the
   decision making process.

5. How will the equipment be adapted to the specific
   needs of the office?

6. Ergonomics also plays a key role. Sound hoods, glare
   screens, and computer compatible furnishings are
   additional expenditures that need consideration.
   In some offices it may also mean structural changes in

lighting, electrical wiring, or the physical arrange-
ment of work areas.

7. Will both staff and management be given formal training
   and provided with ongoing support? Key issues in
   training are:
   --the presence of a supportive, professional trainer
   --clearly written manuals
   --adequate learning time
   --learning environment that is free of disruptions
   --reduced production pressures

To fully utilize the equipment and the operator's
creative ability requires a logic-based, systematic approach
to the various functions of the equipment and its adaptations.

Effective management of a computerized system requires
training of managers as well. Managers must understand
the various functions and their application if they are
to provide guidance to their staffs.

Advances in both hardware and software provide a
continual choice of upgrading possibilities. Yet, how
frequently can operators experience changes without undue
stress? Generally, the participants reported that updating
could occur every six months to one year without undue stress.

In the process of planning for office automation it is
crucial that the emphasis lay in the direction of purchasing
equipment that will meet the needs of the staff by providing
them a tool that they can creatively apply to their work
task, rather than adapting the people to the equipment.

RECOMMENDATIONS FOR FURTHER RESEARCH

This study is a descriptive analysis of the implementation of computer-based office equipment with emphasis on the role of training. It is intended to serve as preliminary research in unraveling the effects of sociotechnical change in today's offices. The following suggestions are offered as areas in which further research could be conducted.

1. Since Michigan is currently a depressed state, replication of this study in an area with a healthier economic climate may provide different conclusions.

2. A longitudinal study could provide a more detailed account of the changes that occur when office operations are automated.

3. A study might be conducted in which the effectiveness of training content and methodology are evaluated for both the staff and the managers.

4. A replication of this study in an organization that has installed multifaceted, integrated systems which provide computerized communications between staff and management, and between departments may provide different conclusions.

5. Automation appeared to have dramatic effects on operations and staff morale of the one nonautomated unit in this study. A study which examines the effects of automation on the supportive departments which are not automated would provide insights into the broad effects of automation.

APPENDICIES

APPENDIX A

MINNESOTA SATISFACTION QUESTIONNAIRE

UNIVERSITY OF MINNESOTA
TWIN CITIES

Department of Psychology
Elliott Hall
75 East River Road
Minneapolis, Minnesota 55455

January 7, 1985

Suzette S. Lee
8096 Dixon Road
Rives Junction, MI 49277

Dear Ms. Lee:

Thank you for expressing interest in the materials published by Vocational Psychology Reseach. We are pleased to grant you permission to use the Minnesota Satisfaction Questionnaire Short Form and to include a copy of the instrument in your thesis. We ask that you send a copy of your completed research to Vocational Psychology Research for inclusion in our archives.

If there is any service we can provide for you in the future, please do not hesitate to contact us.

Sincerely,

Ellen Stewart
Assistant Director,
Vocational Psychology Research

minnesota satisfaction questionnaire

(short-form)

Vocational Psychology Research

UNIVERSITY OF MINNESOTA

minnesota satisfaction questionnaire

The purpose of this questionnaire is to give you a chance to tell **how you feel about your present job,** what things you are **satisfied** with and what things you are **not satisfied** with.

On the basis of your answers and those of people like you, we hope to get a better understanding of the things people **like and dislike about their jobs.**

On the next page you will find statements about your **present** job.

• Read each statement carefully.

• Decide **how satisfied you feel about the aspect of your job** described by the statement.

   Keeping the statement in mind:

      —if you feel that your job gives you **more than you expected,** check the box under **"Very Sat."** (Very Satisfied);

      —if you feel that your job gives you **what you expected,** check the box under **"Sat."** (Satisfied);

      —if you **cannot make up your mind** whether or not the job gives you what you expected, check the box under **"N"** (Neither Satisfied nor Dissatisfied);

      —if you feel that your job gives you **less than you expected,** check the box under **"Dissat."** (Dissatisfied);

      —if you feel that your job gives you **much less than you expected,** check the box under **"Very Dissat."** (Very Dissatisfied).

• Remember: Keep the statement in mind when deciding **how satisfied you feel about that aspect of your job.**

• Do this for **all** statements. Please answer **every** item.

Be frank and honest. Give a true picture of your feelings about your **present job.**

*Ask yourself: How **satisfied** am I with this aspect of my job?*

     Very Sat. *means I am very satisfied with this aspect of my job.*

     Sat. *means I am satisfied with this aspect of my job.*

     N *means I can't decide whether I am satisfied or not with this aspect of my job.*

     Dissat. *means I am dissatisfied with this aspect of my job.*

     Very Dissat. *means I am very dissatisfied with this aspect of my job.*

On my present job, this is how I feel about . . .	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Being able to keep busy all the time	☐	☐	☐	☐	☐
2. The chance to work alone on the job	☐	☐	☐	☐	☐
3. The chance to do different things from time to time	☐	☐	☐	☐	☐
4. The chance to be "somebody" in the community	☐	☐	☐	☐	☐
5. The way my boss handles his/her workers	☐	☐	☐	☐	☐
6. The competence of my supervisor in making decisions	☐	☐	☐	☐	☐
7. Being able to do things that don't go against my conscience	☐	☐	☐	☐	☐
8. The way my job provides for steady employment	☐	☐	☐	☐	☐
9. The chance to do things for other people	☐	☐	☐	☐	☐
10. The chance to tell people what to do	☐	☐	☐	☐	☐
11. The chance to do something that makes use of my abilities	☐	☐	☐	☐	☐
12. The way company policies are put into practice	☐	☐	☐	☐	☐
13. My pay and the amount of work I do	☐	☐	☐	☐	☐
14. The chances for advancement on this job	☐	☐	☐	☐	☐
15. The freedom to use my own judgment	☐	☐	☐	☐	☐
16. The chance to try my own methods of doing the job	☐	☐	☐	☐	☐
17. The working conditions	☐	☐	☐	☐	☐
18. The way my co-workers get along with each other	☐	☐	☐	☐	☐
19. The praise I get for doing a good job	☐	☐	☐	☐	☐
20. The feeling of accomplishment I get from the job	☐	☐	☐	☐	☐
	Very Dissat.	Dissat.	N	Sat.	Very Sat.

APPENDIX B

AUTOMATION SATISFACTION QUESTIONNAIRE

OPEN-ENDED QUESTIONNAIRE

PATTERNED INTERVIEW

TRAINER SURVEY

MICHIGAN STATE UNIVERSITY

COLLEGE OF EDUCATION   EAST LANSING • MICHIGAN • 48824-1034
DEPARTMENT OF ADMINISTRATION AND CURRICULUM
ERICKSON HALL

Dear Participant:

I am a doctoral candidate at Michigan State University, and I am presently collecting data for my dissertation. The topic is:

> THE CONTEXTUAL CHARACTERISTICS THAT FACILITATE THE EFFECTIVE •
>
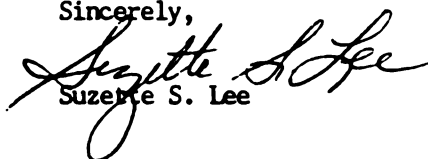> EFFICIENT IMPLEMENTATION OF AUTOMATED OFFICE EQUIPMENT

The purpose of this survey is to determine the level of job satisfaction experienced by workers who use automated office equipment, and the identification of those elements that aided or hindered the introduction of new automation.

Individual responses will be kept confidential. The compiled results of all participants will serve as the basis for my thesis. Consolidated organizational findings will be available to the organization's management.

Throughout this questionaire the term automated refers to computer-based equipment such as: word processors, personal computers, integrated work stations, computer operated printers, any hardware that serves as an input or output device for a computer. It does not include: caculators, memory typewriters or telephones.

Your cooperation and time is sincerely appreciated. If you wish to contact me I can be reached at: 517 7845576.

Sincerely,

Suzette S. Lee

Satisfaction Scale   AUTOMATION SATISFACTION QUESTIONNAIRE

Ask yourself: How satisfied am I with this aspect of office automation?

Very Sat. means I am very satisfied with this aspect of the automation.
Sat.   means I am satisfied with this aspect of the automation.
N means I can's decide whether I am satisfied or not with this aspect of the automation
Dissat. means I am dissatisfied with this aspect of the automation.
Very Dissat. means I am very dissatisfied with this aspect of the automation.

Regarding the automation of the office, this is how I feel about...	Very Dissat.	Dissat.	N	Sat.	Very Sat.
1. Office automation in general........................	—	—	—	—	—
2. My involvement in the decision making for the automation of our office........	—	—	—	—	—
3. The automated equipment installed in our office........	—	—	—	—	—
4. The software used in our office........	—	—	—	—	—
5. Location of the automated equipment........	—	—	—	—	—
6. The training I received........	—	—	—	—	—
7. The amount of time allowed for me to learn to operate the automated equipment..	—	—	—	—	—
8. The support of my supervisor during the change-over........	—	—	—	—	—
9. Ongoing support in the use of automated equipment........	—	—	—	—	—
10. The way office automation has changed my job........	—	—	—	—	—
11. My present job performance now that the office is automated........	—	—	—	—	—
12. Productivity levels........	—	—	—	—	—
13. Quality of work produced........	—	—	—	—	—
14. The future effects of technology on my job........	—	—	—	—	—
15. My overall satisfaction with my present job........	—	—	—	—	—
16. The degree of job satisfaction expressed by my co-workers........	—	—	—	—	—
17. My bosses' satisfaction with the automated office system........	—	—	—	—	—

OPEN-ENDED QUESTIONNAIRE

MANAGEMENT

DEMOGRAPHIC DATA

Male_____ Female_____

Age: under 25____ 25-35____ 36-45____ 46-55____ over 56____

Total number of years work experience in your present occupation:

less then 1 yr____ 1-3 yrs.____ 4-7 yrs.____ over 7 yrs.____

Number of years employed in this organization:

less then 1 yr____ 1-3 yrs.____ 4-7 yrs.____ over 7 yrs.____

Number of years employed in your present job:

less then 1 yr____ 1-3 yrs.____ 4-7 yrs.____ over 7 yrs.____

Prior to Automation

1. When did you decide to automate?_____

2. What triggered this decision?

3. How did you decide on the organization from whom you bought the hardware and software?

4. What were your concerns regarding automation prior to the installation of the equipment in your office?

Automation Implementation

5. Do you use automated equipment in you job?

    yes____ no____

6. Were you trained on the use of automated equipment?

    yes____ no____

Management Questionnaire Continued.

<u>Results of Automation</u>

7. Has automation been cost effective?   yes___   no___
   Explain.

8. Do you feel that productivity has increased since
   automation?   If yes, approximately what percent?_____

   yes___   no___

9. How long did it take to reach satisfacotry productivity
   levels following automation?

   ___immediately
   ___within 30 days
   ___30-60 days
   ___60-90 days
   ___satisfactory levels have not yet been reached
   ___other_____days

10. How much downtime (loss of productivity) did you
    experience after implementation?

    ___none
    ___less than 1 wk.
    ___1-2 wks.
    ___30 days
    ___60 days
    ___other_____

11. How often can you update or change hardware/software
    without overstressing the operators?

    ___not at all
    ___less than 6 mo.
    ___6 mo. - 1 yr.
    ___every year
    ___every two years
    ___other_____

PATTERNED INTERVIEW

MANAGEMENT

Prior to Automation

1. Was a needs assessment done?   yes___   no___
   If yes, describe.

2. Was the staff involved in any of the decision making?
   yes___   no___   If yes, describe.

Automation Implementation

3. Were there organizational constraints to implementation?
   yes___   no___   If yes, describe.

4. How was the training of staff done?

5. Was training timely? yes___   no___   Explain.

6. Did training address worker attitudes and adjustment
   needs?
   yes___   no___   If yes, describe.

7. Was training cost effective?   yes___   no___   Explain.

8. Are there provisions for ongoing training, support, and
   retraining?
   yes___   no___   If yes, describe.

Management Interview Continued.

Results of Automation

9. Were there personnel problems as a result of automation?

yes___ no___ If yes, describe.

10. Has automation reduced your need to hire additional people?

yes___ no___ If yes, explain.

11. Have operators' jobs expanded due to automation?

yes___ no___ If yes, explain.

12. Has automation changed your job?

yes___ No___ If yes, explain.

13. What are the rewarding aspects of your job?

14. What would you recommend to others who are preparing to implement automated office equipment?

OPEN-ENDED QUESTIONNAIRE

STAFF

DEMOGRAPHIC DATA

Male_____   Female_____

Age: under 25____ 25-35____ 36-45____ 46-55____ over 56____

Total number of years work experience in your present occupation:

less then 1 yr____ ·1-3 yrs.____ 4-7 yrs.____ over 7 yrs.____

Number of years employed in this organization:

less then 1 yr____ 1-3 yrs.____ 4-7 yrs.____ over 7 yrs.____

Number of years employed in your present job:

less then 1 yr____ 1-3 yrs.____ 4-7 yrs.____ over 7 yrs.____

Prior to Automation

1. What were your concerns about automation prior to the installation of the equipment in your office?

Automation Implementation

2. Identify those elements of your training that were:
   (1) outstanding

   (2) needed improvement

3. In the process of automating the office, I found the following to be helpful:

Staff Questionnaire Continued.

Results of Automation

4. How stressful was your transition to automated equipment?

___no stress
___minimal stress
___somewhat stressful
___very stressful

5. Did you experience fatigue with the new equipment?

yes___ no___ If yes, describe.

6. Since installation of automated equipment, I like my job:

___better
___somewhat better
___no change
___somewhat less
___a lot less

7. Factors related to my job.

(1) What I like best.

(2) What I like least.

8. Do you feel that productivity has increased since automation? If yes, approximately what percent?_____

yes___ no___

9. How long after your training before you felt at ease and productive on the new equipment?

___immediately
___within 30 days
___30-60 days
___60-90 days
___satisfactory levels have not yet been reached
___other_____days

Staff Questionnaire Continued.

10. How often do you feel that hardware/software can be
    updated or changed without causing you a high degree
    of stress?

    ___not at all
    ___less than 6 mo.
    ___6 mo. - 1 yr.
    ___every year
    ___every two years
    ___other_____

PATTERNED INTERVIEW

STAFF

Prior to Automation

1. To what degree were you involved in the decision making process?

   ___no involvement
   ___minimal involvement
   ___somewhat involved
   ___total involvement

2. In what way(s) were you involved in the decision making process?

Automation Implementation

3. Describe your training.

4. Were you given enough training? yes___ no___ Explain.

Results of Automation

5. Using a scale of 0-1-2-3

   0 = no change, 1= minimal change, 2 = some change,

   3 = total change

   Describe to what degree has automation changed the following?

   ___your job
   ___who you work with
   ___work flow
   ___where you work
   ___career opportunities
   ___your interaction with fellow employees
   ___pay

6. What would you recommend to others who are preparing to bring automated equipment into the office?

TRAINER SURVEY

DEMOGRAPHIC DATA

Male_____   Female_____
Age: under 25____   25-35____   36-45____   46-55____   over 56____
Total number of years work experience in your present occupation:
less then 1 yr____   1-3 yrs.____   4-7 yrs.____   over 7 yrs.____

Number of years employed in this organization:
less then 1 yr____   1-3 yrs.____   4-7 yrs.____   over 7 yrs.____

Number of years employed in your present job:
less then 1 yr____   1-3 yrs.____   4-7 yrs.____   over 7 yrs.____

1. Describe your background and training.

2. What are the rewarding aspects of your job?

3. My overall satisfaction with the training staff received.

very dissatisfied_____   dissatisfied_____   neither_____

satisfied_____   very satisfied_____

4. What were the strong points of the operator's training?

5. Where did training take plece?
   ____on-site/in the office   ____on-site training lab
   ____off site/in a training lab   ____other_____

6. What was the duration of the training sessions?

   Number of training sessions_____
   Length of sessions_____

Trainer Survey Continued

7. Did operators have equipment to:

   train on?   yes___   no___
   practice on? yes___   no___

8. Describe the training methods used.

9. What materials were used for training?

10. Was there a preassessment of needs? yes___   no___
    If yes, explain.

11. Were operator attitude and adjustment needs met?

    yes___   no___   If yes, explain.

12. Was there follow-up to the basic training?

    yes___   no___   If yes, describe.

    ___review sessions
    ___on-site visitation
    ___other

13. Is there ongoing support?   yes___   no___
    If yes, describe.

    ___vendor phone support
    ___updating classes
    ___advanced classes
    ___user newsletters
    ___user meetings
    ___other

14. Was operator progress evaluated during or after training?

    yes___   no___   If yes, describe.

    ___self evaluation
    ___formal performance test
    ___informal performance test
    ___other

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