

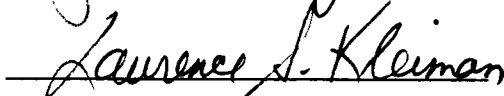
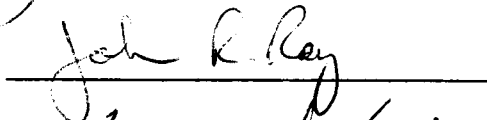
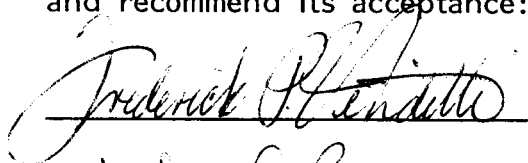
To the Graduate Council:

I am submitting herewith a dissertation written by Marlene Margaret Christensen Bradshaw entitled "A Study of Employee Attitudes and Perceptions of Open-Plan and Enclosed Office Environments." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Administration and Supervision.



Charles M. Achilles
Major Professor

We have read this dissertation
and recommend its acceptance:



Accepted for the Council:



The Graduate School

A STUDY OF EMPLOYEE ATTITUDES AND PERCEPTIONS OF
OPEN-PLAN AND ENCLOSED OFFICE ENVIRONMENTS

A Dissertation
Presented for the
Doctor of Education
Degree
The University of Tennessee, Knoxville

Marlene Margaret Christensen Bradshaw
August 1984

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ACKNOWLEDGMENTS

The author wishes to express sincere appreciation to Dr. Charles Achilles, committee chairman, for his support and direction in this study. His sharp wit and editorial skills made the task seem lighter. Much gratitude is also due to Dr. Lawrence Kleiman for his encouragement and statistical expertise; to Dr. Frederick Vendetti and Dr. John Ray for their insightful comments and assistance; and to Dr. Robbie Blakemore for her help and guidance.

This dissertation is lovingly dedicated to my ancestors from Germany, Norway and Scotland for their gifts; to my father, Earl P. Christensen, for his lessons of personal courage and a love for learning; to my grandparents, Simpson and Bertha Christensen and James and Mary Tait whose lessons of perseverance and commitment served as invaluable inspiration; to my parents, William and Margaret Keller, whose support and faith made my first degree possible; to God's special blessings, my sons, Kevin, Thomas and Michael, who helped me maintain a proper perspective by teaching me about the important things in life: sports and music; to my daughter-in-law, Allison, for her example of unconditional love and strength; and especially to my beloved husband, Dale, whose love, patience and optimism helped to make this dream a reality.

"From everyone who has been given much, much will be demanded. And from the one who has been entrusted with much, more will be asked" (Luke 12:48).

ABSTRACT

This study investigated the major elements in the physical office setting that influence employee attitudes about their work environment and determine whether or not, in the employee's opinion, their office supports them in their work activities. The information gained from the study was to be used for recommendations to office planners and companies to assist them in planning facilities that are functional, economical and that support the psychological needs of employees.

One hundred and eighty-two employees from three service- and three product-oriented companies responded to an attitudinal questionnaire designed to evaluate the physical features of their office.

The major findings of the study included:

1. There were no differences in the attitudes of employees in service and product companies in the assessment of their offices.
2. Employees in open-plan offices were far less satisfied with their work areas than employees in enclosed offices.
3. Enclosed office employees stated a strong preference for their office design; however, open plan employees had to adjust to less-than-satisfactory offices, which in their opinion, did not assist them in the performance of their work.
4. While there were equal numbers of male and female managers and an equal number of males and females who supervised others, according to this study, females had the least desirable offices.

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CHAPTER I

INTRODUCTION

The economy in the United States is changing from one that is product-oriented to one that is service-oriented. As the numbers of service organizations have grown, such as insurance, consulting and engineering companies, the demand for office space has increased. Functions within businesses may change and potential growth requires planning ahead.

Businesses today are looking for feasible answers to the problems of anticipating future spatial needs, escalating building costs and providing an environment that encourages employee efficiency. As companies attempt to fuse the principles of human resource management with economic constraints, the ideal office environment seems elusive.

In recent years one frequent solution to these problems has been an open-plan office arrangement. The lack of interior walls not only affords flexibility but lighting, heating and air-conditioning systems are also simplified, lowering building and maintenance costs.

Some employees are adamant in their preference for a private office for reasons of status, psychological comfort or because their tasks require intense concentration. Others feel that they are more productive when they have privacy. Still others are satisfied working either in enclosed offices or in the open-plan office.

Labor is an expensive resource as compared to the office space itself. Organizations cannot afford to sacrifice the well-being of their

employees; the environment should be a positive contributor. The open-plan office may afford such advantages as better communication and group cohesiveness but may sacrifice employee creativity and productivity.

Office planners today are going down a road similar to the one that school facility planners traveled in the late 1960s and 1970s. They, too, needed flexible facilities that were economical, yet responsive to teachers and students. The ideal facility then was considered to be the carpeted, acoustically-treated, open-plan school. Teachers, like business employees, are primary factors of production. If they functioned well, their productivity was high as shown by the quality of educated students they produced. Many of these schools were highly successful, but some were not. Teachers felt that some students were distracted by the noise and movement of other students. Teachers themselves experienced numerous distractions and had feelings of being on display (Metropolitan Toronto School Board, 1975; Weinstein, 1979).

The open-plan school is a part of the history of the architectural concept of fewer permanent interior walls to enable the users of the facility to arrange and rearrange the spaces to suit their needs. Like the schools, the modern office may look attractive, but at the same time fail to meet the psychological and physical needs of employees which enable them to carry out their tasks.

This study has attempted to identify the positive factors in the office environments which assist employees in the performance of their work.

Statement of the Problem

✓ Because individual attitudes toward the use of space are defined by one's culture at an affective level of learning, adjustment to the open-plan work environment poses problems for many employees (Hall, 1959, 1966). The American culture is considered to be comprised of noncontact persons who require more distance between themselves and others than do people in some other cultures (Watson, 1970). The open-plan office places workers in proximity to others, often quite closely. In addition, "rolling up one's shirt sleeves" and settling down to work, in our culture, usually means going to a quiet place to do it (Brookes and Kaplan, 1972; Sundstrom, Burt & Kamp, 1980).

Many major companies are building or remodeling their offices with the open-plan concept. While this may be perfectly acceptable and functional for some types of companies and some personnel, there are work tasks that would be performed better within more enclosed spaces. People who perform complicated tasks requiring intense concentration and creative thought might reasonably expect to have a work place that offers solitude and a low level of noise. Even employees who regularly perform repetitious tasks have expressed greater job satisfaction when they have more privacy (Sundstrom et al., 1980).

Research has shown that the environment does affect man's behavior (Bridgwater, 1981; Hall & Hall, 1975; Sommer, 1969; Sundstrom et al., 1980). Some employees have difficulty feeling comfortable and

adjusting to the open-plan facility, completing all their tasks and reaching their full level of productivity.

Purpose

The purpose of this study was to investigate the major elements in the physical setting that seem to influence employee attitudes toward their work environment and especially to analyze these elements in open-plan and enclosed office facilities.

The research explored the central question: Did the work environment support the kind of work being performed as well as support the psychological needs of employees?

The research questions dealt with environmental characteristics and employee attitudes in business organizations in an attempt to ascertain if the employees, by their own definition, were helped or hindered in their work by the environment.

Importance of the Study

With billions of dollars being spent on new construction and remodeling of older buildings to contain work organizations, more research needs to be done to determine the effects of these structures on employee attitudes, productivity and group behavior. The relationship between the physical work setting and employees is important. It is important in an economic sense and a sociological and psychological sense. The building must be affordable and practical as well as supportive of employee and organizational goals. Rather than going

along with a new building fad, businesses need to assess fully the impact of the environmental change on employees in the same way that school systems had to evaluate the open-plan schools.

The literature review of this study examines some of the factors that contributed to the success or failure of the open-plan school facilities. This information could be used in a positive way to make recommendations to business organizations.

Architect Eero Saarinen worked with William Hewitt, Chairman of the John Deere Company, for seven years before the company headquarters in Moline, Illinois, was completely built in 1964 (Hall & Hall, 1975). Hewitt's goals were to centralize company functions within one building, improve employee working conditions and to attract highly qualified personnel. While office planners and architects may seldom be given seven years to complete their work, certainly the planning aspect of their jobs should not be underemphasized. Perhaps this research will not only serve as useful information to them in future planning, but will also stimulate further research in this area.

Businesses want the best return for their expenditures. They cannot afford to outgrow their structures too quickly or find that the structure does not support the particular work of their organization. Any information that can be gleaned from research could help to enlighten businesses and help them avoid costly mistakes and employee morale problems.

Assumptions

Any research is predicated on certain assumptions. Some of the assumptions guiding this study were as follows:

1. Certain similarities exist between managers, supervisors, professional and clerical employees in terms of their attitudes, personalities and work ethics.

2. Respondents answer questions about work space in offices in a general way and are not influenced by minor and specific adjustments in the space (e.g., the number of windows).

3. It is possible to isolate and measure attitudes about one's physical work environment.

4. There are fewer first-generation Americans in Chattanooga, Tennessee (where the study was conducted) than in some other cities. Thus, the predominant cultural values represented will be American rather than European, South American or Asian. (This is important because space usage is a cultural phenomenon.)

Limitations and Delimitations

The study was limited to office employees in service- and product-oriented businesses in the Chattanooga, Tennessee, area.

The site selection was delimited to offices with an open-plan design or enclosed offices. The open-plan offices included both those with and those without partitions between work areas.

The sample studied was limited to the nationalities and minorities represented as well as the southern climate and culture of Chattanooga, Tennessee.

The study analyzed differences between open and enclosed offices, and did not make fine distinctions among types of open offices.

The study was limited to a one-time survey in 1984 using a self-report format.

Definition of Terms

For the purpose of the study the following terms were defined:

Autonomy in the work place refers to the freedom to be self-directing in performing one's work.

An enclosed office is one with individual rooms with floor-to-ceiling separations on all four sides with one or more doors. An enclosed office is usually occupied by one or two persons.

The term landscaped office applies to a large, open-plan office which uses plants and other greenery as partial dividers between work areas. It is usually synonymous with the term open-plan office.

Open-plan or open-space work areas have no load-bearing interior walls but may have movable partitions serving as dividers between work spaces. Partitions under four feet high will visually separate workers while seated; whereas, partitions five feet or higher will visually separate workers while standing as well.

White noise is an indecipherable background sound with various frequencies and random amplitudes used to camouflage ordinary conversation and other audible distractions.

The work space is the actual area where business employees carry out the majority of their tasks.

Hypotheses and Questions

The review of the literature presented somewhat opposing viewpoints concerning individual responses to the current architectural design of the workplace in the United States. Some business organizations have found open-plan offices to be highly successful in terms of employee satisfaction and productivity. Other organizations, due in part to the type of tasks required, have had to remodel and enclose their former open-office areas.

This study was conducted utilizing the following null hypotheses:

H₀1: There are no differences between the attitudes of employees in open-plan and those employees in enclosed offices about characteristics of their office environments.

H₀2: There are no differences between attitudes of employees in product companies and the employees in service companies about characteristics of their office environment.

The null hypotheses were rejected if differences were found at $p \leq .05$. Additional analyses were explored by the following questions:

1. Does the physical work environment appear to help or hinder employees in the performance of their tasks in business organizations?
 - a. Are acoustic and visual distractions frequent sources of irritation?
 - b. To what extent do employees experience feelings of crowdedness or roominess in their work area?
 - c. Is the freedom to exert control over one's work space through personalization or ambient adjustments related to satisfaction with the space?
 - d. Does the work area provide sufficient privacy to accomplish necessary tasks?
 - e. To what extent do employees feel comfortable and relaxed in their work area?
2. Do employees in open-plan or enclosed offices perceive a higher level of group cohesiveness, feelings of autonomy and communication with co-workers?
3. Do office employees prefer an open-plan office, enclosed office or a combination of an open-plan with access to enclosed rooms for conferences and solitary work?
4. What is the employees' overall assessment of their present work area?
5. What differences are there between men and women in their work space preferences?

Procedures

The study analyzed the opinions and attitudes of office employees about their work space. Six companies in Chattanooga, Tennessee, were selected to participate; three were product-oriented and three were service-oriented companies. Employees surveyed in those companies worked in either open-plan offices or enclosed offices. The open-plan offices contained similar features, such as carpeting, movable furniture, sound-absorbent partitions and acoustically-treated ceilings. Some offices had no partitions between workers. The jobs of the employees were classified as clerical, managerial, supervisory, or professional.

The questionnaire was developed to collect data on office employees' assessment of their office environments. The questionnaire requested demographic data from the employees concerning the number of years they had worked in their present office, the type of office space occupied, job title, supervisory responsibilities and type of office they preferred.

The researcher met with managers from each of the six companies to explain the purpose of the study and to enlist his/her company's cooperation. After the managers obtained permission for their employees to participate, they distributed the questionnaires, along with a cover letter to those employees volunteering to be a part of the survey (see Appendix). Participants sealed their completed questionnaires in the envelopes provided. Approximately one week later, the envelopes were collected by the researcher. At this time, a formal

observation of each open-plan office was made with physical features recorded on an observation chart for future comparison. The open-plan offices were selected for their similarity in features.

The data collected were reported as frequencies and percents for each category. The analysis of variance (ANOVA) was the major analysis tool and supplementary analyses were done with chi-square and t-tests. Because of the numbers of respondents in some categories, some data were combined. For example, new categories were made for the purposes of meeting the chi-square requirements of 5 or greater in each matrix. In this situation employees who worked in open offices with no dividers were grouped with those in open offices with 4' or lower dividers for one response group. The remaining two groups, those in open offices with 4' or higher dividers and those in enclosed offices remained as separate response groups.

Organization of the Study

The study was divided into the following chapters:

Chapter I contains the introduction, statement of the problem, purpose of the study, importance of the study, assumptions, limitations and delimitations, definition of terms, hypotheses and questions, procedures and organization of the study.

Chapter II includes the review of the literature pertinent to the development of office design.

Chapter III contains the methodology and procedures utilized in the study.

Chapter IV contains the presentation and analysis of the data.

Chapter V includes the summary, findings, conclusions and recommendations.

CHAPTER II

A REVIEW OF SELECTED LITERATURE

This chapter reviews selected literature related to space usage in offices. The information came from books, periodical literature, dissertations, and research studies. This chapter is divided into the following sections: (1) Introduction, (2) Cultural Aspects of Physical Environments, (3) Space Usage in Offices, (4) Historical Development of Open-Plan Offices, (5) Open-Plan Schools, (6) Models, and (7) Summary.

Introduction

Corporate growth of the 1970s has meant an expansion and a change in facilities as well as the addition of electronic equipment. Whereas companies used to spend most of their budgets on factory facilities, white collar areas are now being given much attention. With 42 percent of all workers spending their work days in an office, the impact of the office environment on employee satisfaction and productivity is a vital concern (Gaskie, 1980).

Organizational change has brought about the restructuring of tasks and a reorganization of work groups. Rapid changes have occurred in communication methods, office equipment technology and organizational and management styles (Ouchi, 1981). If organizations want to reach their goals, employees must be able to understand and relate to them in a supportive environment and physical spaces that are planned to reflect the image and changes that are occurring.

Employees must be able to identify with the physical image and feel that it is responsive to them (Moleski & Lang, 1982). Ideally, the work environment should fit the individual and the organization so well that the employee is able to adjust to it readily (Hall & Hall, 1975). Employees should be able to personalize their work spaces, communicating an expression of themselves (Moleski & Lang, 1982).

More than 30 percent of office workers now perform their tasks in open-plan offices. In a public-opinion poll by Louis Harris and Associates ("The Open Plan Is Scrutinized," 1979), few workers understood the purpose of the open-plan office. Nearly one half felt that they should have a say in office planning, but merely 19 percent were actually involved in any sort of planning.

In the Harris poll, 87 percent of the business executives saw open-plan offices as a growing trend. The main reasons given for this trend were the necessity for economy in construction and maintenance costs, energy conservation and flexibility. As work groups change or organizational growth occurs, interior partitions can be rearranged almost overnight.

All has not gone well with the open-plan concept, however; problems have developed which have forced certain businesses to add more partitions or interior walls. Employees cite the loss of status and privacy, disruptive noise from other employees, less independence, a feeling of being watched and less opportunity to personalize their work spaces as some of the criticisms (Boje, 1971; Sundstrom et al., 1980; "The Trouble with Open Offices," 1978; Wineman, 1982).

Cultural Aspects of Physical Environments

Edward T. Hall (1966) helps us to understand the basis of some of the difficulties in open-space offices by his theory of man's attitude toward social and personal space. Franz Boas originated the viewpoint that communication is at the core of one's culture. Man sees the world around him and expresses his reactions through his own language. Hall believes that just as man's perception of events is limited and defined by his language, his other behavior as well is shaped by his culture. Men speak different languages and have different sensory worlds.

Hall used the term "proxemics" to mean the observations and theories about man's use of space as a part of his culture. Proxemic behavior is learned by imitating others rather than by being taught specifically how to behave. This hidden, internalized way of behaving is learned early in life.

Hall (1966) defines three levels of behavior. The infracultural level is that behavior which is a part of "man's phylogenetic past" and is biological and private. The next level is precultural, referring to man's capacity to perceive space through his senses. His culture influences this sensory base. The third, the microcultural level, is the one most observed. It has three elements: fixed feature space, semifixed space and informal space. Fixed-feature space is a way of organizing according to the plan of our culture. It is evident in the layout of cities, the design of buildings and the internal organization of houses. Semifixed feature space is the way man divides space

through the use of screens, movable partitions or furniture arrangement depending on whether the purpose of the space is to bring people together (sociopetal) or to keep them apart (sociofugal). The third element is informal space. Informal space is the distance maintained between persons depending on their relationships with each other. This distance is also impacted by how one feels about another at the moment of communication. A closer distance is maintained for intimate encounters with another, anywhere from actual body contact to one-and-a-half feet. Personal and social distances range up to twelve feet; the typical distance for conversation is six feet apart. In the work environment desks placed too closely together encourage in a sense "obligate" people to communicate with each other (Sundstrom et al., 1980). Workers require at least eight feet of space between their work areas to feel any degree of privacy (Hall, 1966). A public distance is the farthest, from twelve to twenty-five feet or more and is used largely for public speaking or in deference to an important public person.

The distance maintained for communication with another is not only determined by the relationship with that person, it is influenced by one's cultural background (Hall, 1959, Hall & Hall, 1966; Watson, 1970). Americans, northern Europeans, Asians and Indians are considered generally noncontact persons who stand and sit quite far away from each other and touch very little. On the other hand, Arabs, Latin Americans and southern Europeans are contact persons who sit and stand very close to each other and who touch more frequently

(Watson, 1970). While there are some behaviors which have universal meaning, such as expressions of fear and happiness, frequently people from different cultures will not attach the same meaning to similar behaviors (Mehrabian, 1971).

In the United States, space usage is different, but no more rational, than that of the Japanese or Arabs. American homes have a specific function for each room; a certain pattern is followed (Hall, 1966). Typically, American middle-class children have their own bedrooms, especially in their teen years. As grown-ups, given their preference, middle-class American expect to have their own work space or offices at work. Homes and work places have public and private areas to correspond to man's public and private facade. In private rooms, one is able to be oneself without being observed (Hall, 1966, 1975; Sundstrom et al., 1980). The physical structure provides architectural privacy by isolating one from visual and acoustical distractions. Psychological privacy is the sense of control of one's access to others and is impacted by the degree of existing architectural privacy. Therefore, private rooms or offices allow a person to regulate his or her social contact (Sundstrom et al., 1980). Even within the United States, minorities such as Blacks and American Indians have different values concerning the use and structuring of time, space and materials. All of these are learned early in life (Glazer & Moynihan, 1963; Hall, 1966).

Spacing is as significant to man as it is to animals. Territories and personal spheres are a part of both worlds (McBride, 1971). Most

of our attitudes about territory spring from the affective level of learning. The emotional reaction to possession of territory causes one to come to the defense of his country. The desirability of a private territory is reflected in the expression, "A man's home is his castle," a part of English common law for centuries. Ethnic areas in cities are further evidence of territoriality (McBride, 1971).

Space Usage in Offices

Some workers feel a loss of personal territory when they move to a large, open space (Sundstrom et al., 1980; "The Trouble With Open Offices," 1976). The subsequent feelings of being on display and a part of a mass can produce anxiety. If the space is crowded, it will cause more dramatic reactions such as a decrease in productivity, increased conflicts, alienation and a loss of identity with the organization (Boje, 1971; "The New Green Look," 1973).

In contrast to the viewpoint that man's use of space is pre-determined by his culture, is the theory that man is adaptive. Man is constantly changing and adjusting to his environment, rather than creating an environment to suit his needs. Because people will search and find ways to instill equilibrium in their personal and social lives, employees will learn to be comfortable in a new work setting (Chamberlin, 1975; Nemecek & Grandjean, 1973; Shoshkes, 1976). Nemecek and Grandjean's study (1973) of offices in Switzerland found that employees had developed new ways of behaving such as increased cooperation and the formation of a group cohesiveness. Employees and managers had

more mutual respect for each other after their move to the open-plan office. Only 3 percent felt that they had not adjusted to the new office and sought employment elsewhere.

Whether man should design his work environment to suit his needs or adapt to one already provided, both viewpoints point to the fact that office environments do have an affect on workers. Research since the 1950s has shown that the environment does shape man's behavior (Bridgwater, 1981; Hall & Hall, 1975; Sommer, 1969; Sundstrom et al., 1980).

The impact of the office on the employees is twofold: what the building does to them and what the building tells them about the company (Hall & Hall, 1975). If the furnishing budget allows for lavish decorating of the executive offices and low-cost, inferior furniture for the rest of the employees, the company's organizational bias is evident. Employees look at their surroundings from their own point of view, and a well-designed office instills a sense of pride in their workplace and in the company as well. Their own immediate surroundings profoundly influence their reaction to the building as a whole (Marans & Spreckelmeyer, 1983). A building's efficiency and beauty may also affect employees' approach to work in terms of their creativity and ability to solve problems (Hall & Hall, 1975). In the newly designed John Deere Headquarters in Moline, Illinois, sky-lit gardens were provided as well as outside balconies on each level with tables so employees could enjoy their lunches there. An employee said of the open plan with its view of the outdoors, "It's not just a place to go to in the morning, it's a place to grow to" (Marlin, 1979, p. 88).

Office space needs are ideally defined by one's work activities. The degree of satisfaction experienced with the office space is related to the consideration given to the opinions of the employees regarding their office requirements (Gaskie, 1980, "The Open Plan Is Scrutinized," 1979; "The Trouble with Open Offices," 1978). Farrenkopf and Roth's study (1980) at two universities found that the location of the office in terms of its proximity to others and to classrooms was ranked as the highest priority, with privacy and space for work and storage coming next. Seventy-six percent of the faculty interviewed said that they had no choice or input into the selection or location of their offices. Offices were usually assigned, even though there is a clear link between satisfaction and decision-making participation ("The Open Plan Is Scrutinized," 1979; Wineman, 1982).

Employees need to have the opportunity to exert some sort of control over their work spaces by making temperature adjustments, if necessary, personalizing their work areas or being free to move to another location for some types of tasks (Wineman, 1982). Those who had more control over their immediate environment tended to be more satisfied with it than those who had less control (Marans & Spreckelmeyer, 1983).

Historical Development of Open-Plan Offices

Energy shortages, building costs and organizational changes within companies that required different configurations of work groups called for a different type of office facility. The first open-plan office, or landscaped office, was built in Germany in the late 1950s by

a firm of office management consultants called the "Quickborner Team." The term "landscaped office" arose from the profusion of plants used as dividers. Two brothers, Eberhard and Wolfgang Schnelle, led the "Quickborner Team." These consultants were concerned with the relationship between the office organization and work flow and how the office setting could improve this relationship. The offices they designed had distinct characteristics. Furniture was arranged in clusters in a random pattern according to the communication flow and the work groups within the organization. No rooms had fixed partitions. The acoustics were controlled by carpeting, ceiling systems, movable sound-absorbing screens and "white noise." The "white noise" was an indecipherable background sound with various frequencies and random amplitudes used to camouflage ordinary conversation and other audible distractions. The open plan included everyone, even high-level managers (Shoshkes, 1976).

The open-office concept caught on in the United States more readily than in England or continental Europe. This was due, to some extent, to the fact that the open "bullpen" office had already been utilized in the United States for many years; whereas, it was uncommon in Europe (Shoshkes, 1976).

At the same time that the open-office concept was beginning to influence office design, a parallel, though somewhat different idea was being developed by Robert Propst with the backing of Herman Miller, Inc., of Grand Rapids, Michigan. Propst believed that the standard office equipment did not suit the user's needs. His study of the way

office work was carried out led to the design of his "Action Office" furniture, manufactured by Herman Miller, Inc. The differences between the "Action Office" concept and the landscaped office were that the "Action Office" planning allowed for greater storage, a variety of furniture equipment and the use of more enclosed spaces where needed by the company (Pile, 1976; Shoshkes, 1976).

The rationale of planning and structuring the office around the organizational processes and relationships has continued. Small work units which overlap with other units are spatially organized to facilitate interaction and communication. As groups expand or operations change, the space can be reorganized easily and with little expense (McLain, 1983; Pile, 1976).

In such an office plan, each employee and manager becomes more accessible. There is more of a democratic, team feeling generated (Boje, 1971; Nemecek & Grandjean, 1973; "The New Green Look," 1973).

In addition to organizational advantages, there are economic reasons for the open plan. Building costs are reduced because of the lack of interior walls. It costs far less for heating, ventilation and air conditioning than it would for partitioned offices because air flow distribution is more direct and less linear feet of ductwork per unit of volume are required.

The open arrangement allows more workers to enjoy the windows, and some workers feel the room's climate and lighting are improved (Nemecek & Grandjean, 1973). Through the elimination of dead spaces

and corridors, more usable space is available; therefore, there is a reduction in the over-all amount of square feet per person (Jones, 1982).

The openness calls for new employee behaviors. Boje's study (1971) revealed that employees had learned to speak more softly and to be more considerate. They dressed better and fewer and low-pitched arguments were observed.

The concept of landscaped offices has been implemented by many large companies in the United States, such as Eastman Kodak, DuPont, Owens Illinois, Weyerhaeuser, McDonalds and the Port of New York Authority. A survey of Kodak employees found that most felt that the psychological climate was improved with the new, attractive office. Four out of five of their employees preferred the open space, and supervisors claimed a 35 percent increase in employee efficiency (Brookes & Kaplan, 1972).

Zeitlin's before-and-after-the-move study (Brookes & Kaplan, 1972) found that the work efficiencies reportedly coming from the landscaped design concept occurred simultaneously with the redesign of work activities and a layout to correspond with them. These advantages may just as likely have come from a well-designed conventional office.

While there are some clear improvements in some areas, employees have been quite vocal in their complaints about what they have given up by a move to the new facilities. The lack of privacy and disruptive noise from other employees are frequent criticisms (Boje, 1971; Brookes & Kaplan, 1972; Farrenkopf & Roth, 1980; Nemecek & Grandjean, 1973;

Wineman, 1982). Sundstrom et al., (1980) study showed that the self-ratings of performance of clerical workers went up as the degree of privacy was increased.

The location of the workspace and its distance from an adjacent work space all impact the amount of privacy the worker feels (Hall, 1966; Sundstrom et al., 1980). A worker near the flow of traffic through the office will have more disturbances than one who is near a corner (Wineman, 1982).

Causes of distraction are acoustic and visual. Acoustic disturbances coming from office machines are not as distracting as telephone or in-person conversations, not because of their decibel level but because of their source and content. People are simply more interested in people than machines (Boje, 1971). The Nemecek and Grandjean study (1973) identified no significant correlation between the measured decibel level of noise and the frequency of complaints, although 35 percent said that they were greatly disturbed by noise.

The visual movement and general bustle of people passing by are sources of irritation (Farrenkopf & Roth, 1980; Nemecek & Grandjean, 1973). Further, the visual accessibility of fellow workers promotes increased social interaction and communication which is not necessarily work related (Wineman, 1982). In the Farrenkopf and Roth study (1980), faculty whose offices were housed in an open-plan arrangement ranked acoustical and visual privacy high in importance but low as to what their offices offered.

The disturbances in concentration appear to be felt less by managers than by other employees, although confidential conversations were more of a concern of managers and their secretaries (Hall & Hall, 1975; Nemecek & Grandjean, 1973). In fact, the unsuitability of open-plan offices for certain administrative functions and employee tasks is a viable concern. If tasks require intense concentration and creative thought, they can be performed best in a quiet location. If many visitors come into the office, particularly competitors, conflicts may arise (Boje, 1971).

Office planning companies say that the open-plan office works best with large pools of staff doing similar work, such as insurance companies ("The Open Plan Is Scrutinized," 1979); however, Sundstrom et al. study (1980) indicated that workers preferred some sort of privacy even while doing fairly routine tasks. The open-plan office is not considered a good arrangement for companies with a high ratio of managers to staff ("The New Green Look," 1973).

Not every employee can function at his or her best in an open-plan office. A feeling of security is more difficult in a large space, which may result in emotional anxiety and a feeling of mass isolation (Boje, 1971; Nemecek & Grandjean, 1973). Kodak employees' complaints about "being on display" and "the area being too public" rose from 21 percent to 34 percent after one year of occupancy in their new offices (Brookes & Kaplan, 1972).

In addition, the worker's personal feelings are affected by the norms and policies of his or her work group. Rules of behavior and

courtesy need to be established to ensure some sort of privacy. This may have a greater impact than the physical features (Boje, 1971).

An open-office plan may actually reduce employee feelings of autonomy, supervisor and co-worker feedback and task identity. Yet it is these very factors that have been related to job satisfaction, productivity and motivation (Oldham & Brass, 1979). This same study found that workers in open-plan offices perceived a decrease in their efficiency. Some workers felt that they were not only accomplishing less, but that there was less cooperation with co-workers (Hundert & Greenfield, 1969).

Open-Plan Schools

There is a parallel between companies and the schools which occupy open-plan facilities. Just as companies sought new design solutions to answer their needs for energy-efficient spaces, lower construction and maintenance costs and flexibility to accommodate organizational changes, so did the schools.

Many public schools in the late 1960s and throughout the 1970s adopted open-plan facilities as an outgrowth of open education, although some were built more for reasons of economy than philosophy (Arnold, 1975; Leggett, 1973). The trend toward open education reflected a more open society, one that was less conforming. The philosophy of the open school placed an emphasis on the individual and on grouping in a family-type environment, working together and communicating with each other. The child was responsible for his or

her own active learning. While the fulfillment of self was emphasized, the child was taught social responsibility and the importance of achieving one's goals. Teachers and students had a continuing interaction in the planning of each day's activities (Hardy, 1972).

This philosophy of education was to be carried out within a large area of unbroken space with no permanent partitions to separate classes from each other. Maximum flexibility of the space was considered a must in order to provide for a variety of different physical arrangements.

The equipment needed to be movable, the furniture light-weight and usable for several purposes. Each student did not necessarily have his or her own desk but usually had his or her own space somewhere. Students met in both large and small groups, interacting with more than one teacher throughout the school day.

Studies have indicated that students in open classrooms had a more positive attitude toward school and had increased self reliance. Their academic achievements were similar to students who attended traditional schools (Tuckman, Cochran & Travers, 1974; Weinstein, 1979). They spent a smaller amount of time in large groups, but instead interacted with the teacher more on a one-to-one basis and participated in small groups. The teachers tended to behave more informally (Tuckman, Cochran & Travers, 1974; Weinstein, 1979). Weinstein (1979) found that the teachers who described themselves as "ambitious," had greater feelings of autonomy and satisfaction teaching in the open-plan school.

Privacy has been a concern in evaluation of the school facilities just as it had with the office facilities. Fifty-four percent of the teachers said the amount of privacy in their school was sufficient (Metropolitan Toronto School Board, 1975). However, this same study indicated that the teachers were concerned that the students had insufficient privacy.

Not all students and teachers have been able to function in an open-plan school. Some needed the security of smaller physical spaces and the peace and quiet that they afforded (Sartore, 1972). Noise was a problem for most students and teachers (Anderson, 1973; Leggett, 1973; Weinstein, 1979). Noise appeared to be more of an annoyance for older students than younger ones (Metropolitan Toronto School Board, 1975), and some high schools had to modify their designs with additional sound-absorbant partitions to decrease interruptions and distractions (Weinstein, 1979). Visual distractions appeared to be only an occasional problem to most students and were less of a problem if the movements occurred in another group. Any distractions seemed to be accentuated by crowdedness (Metropolitan Toronto School Board, 1975).

A study of fourteen elementary schools in Calgary, Alberta (Carson, Johnson & Oliva, 1974) revealed that open-plan teachers perceived that their teaching activities were supervised and evaluated by fellow teachers more than those in traditional classrooms. Four times as many open-plan teachers as traditional teachers felt that the

evaluation was "very often" or "fairly often." In innovative situations, teachers felt that there was more observation by their peers, but two thirds said that their principals rarely supervised them (Carson, Johnson & Oliva, 1974).

As schools went to open-space designs, it was as if a different language was being introduced for the students and their parents. The large, open spaces and the movement within them seemed confused and without purpose. To Americans, edges and corners connote ownership and a definite purpose, whereas open space is perceived as public property. If something is purposeful, it is usually fenced in (Bockman, 1975).

In the Metropolitan Toronto study (1975), only 49 percent of the teachers had requested to teach in an open-plan school. Many teachers who had wanted to teach in the new facilities did not know how because the numbers of in-service orientation programs have been insufficient in some school districts. Teacher input during the design and planning stages of facilities has been minimal (Arnold, 1975). Often teachers were unsure and insecure in their new environment; the changes had come too fast and with far too little preparation. In Future Shock, Eric Toffler expresses the viewpoint that rapid change produces stress and disorientation in individuals. Too much change in too short a time is "the disease of change" (Toffler, 1970, p. 4).

Teachers had no way to escape from "the numbers," no interesting, quiet places to go to and get away from the crowd, nor did the

students (Leggett, 1973)! Teachers reacted to the noise and distractions by adding dividers, bookcases and partial walls. In some schools the decision was made to install permanent, full walls between classrooms.

Why did this happen in some schools, while in others the students and teachers heartily continued to endorse their environment? Was there a difference in the principal's or teachers' personalities or proxemic behavior? What have we learned from the open-plan school experience that might be applied to business? In the final analysis, is it more cost effective to have a low maintenance work space that is flexible but results in lower employee morale and performance or a more conventional space with less noise and interruptions where employees perform better?

Models

Two models emerge from the current literature which influence the attitudes of employees about their work space. The advantages of the enclosed office comprise the first model (Figure 1). Those advantages are: (1) control over one's environment, (2) privacy, (3) status, (4) quiet, (5) autonomy and (6) personal comfort (see especially Hall, 1966; Sundstrom et al., 1980). The second model (Figure 2) illustrates the various features of the open-plan office which contribute to the employees' satisfaction with that type of office design.

Components which contribute to positive attitudes of employees about their work space

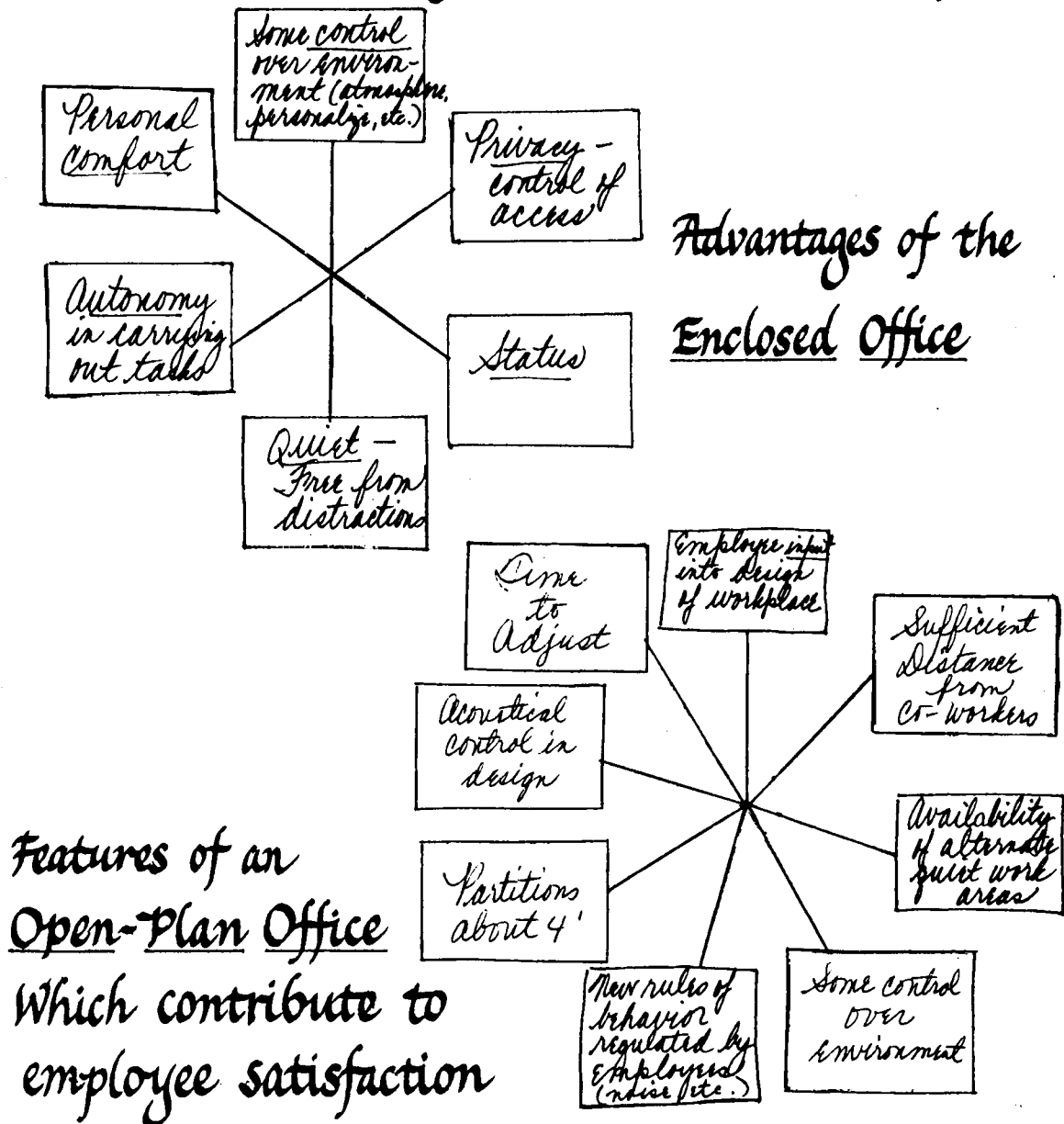


Figure 1. Components which contribute to positive attitudes of employees about their work space. Advantages of the enclosed office.

Components which contribute to positive attitudes of employees about their work space-

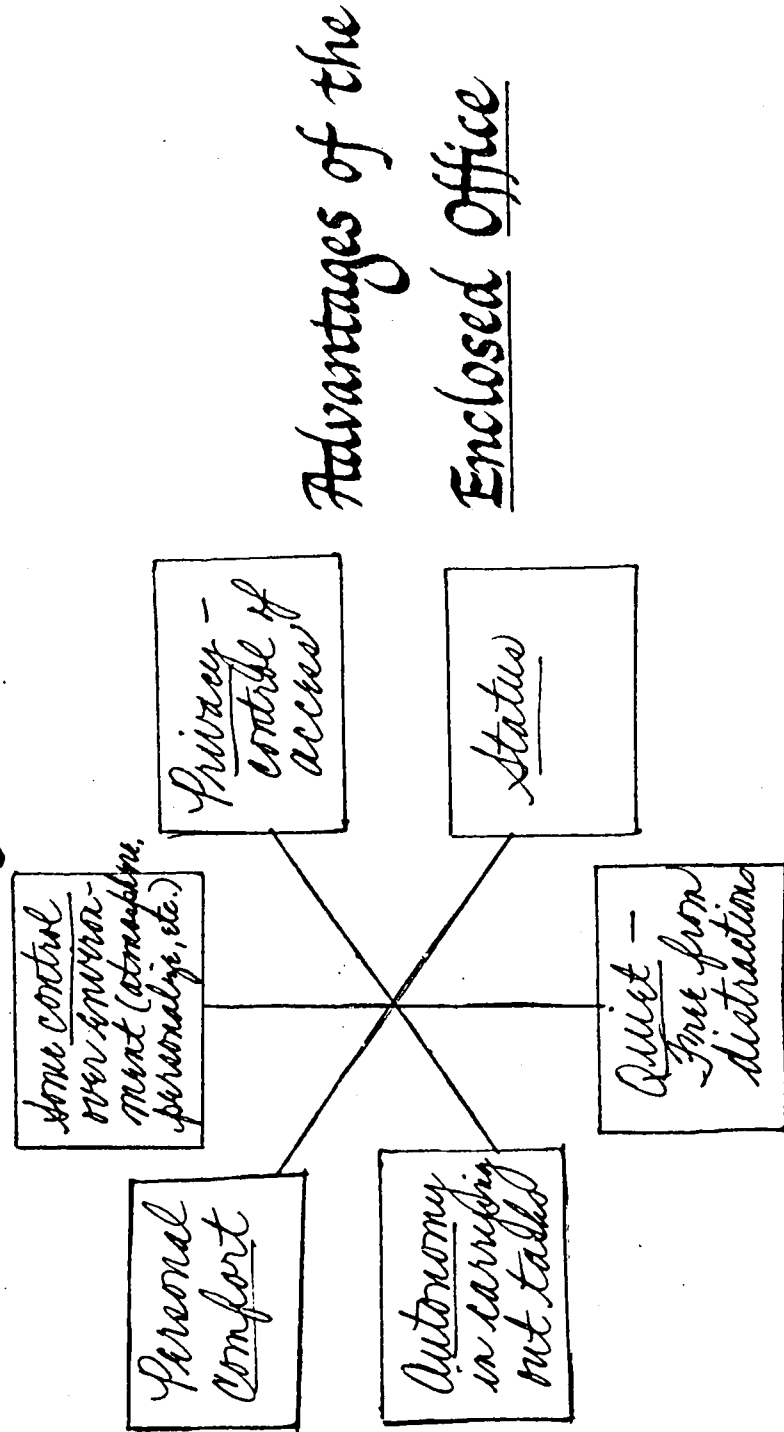


Figure 2. Components which contribute to positive attitudes of employees about their work space. Features of an open-plan office which contribute to employee satisfaction.

The Enclosed Office Model

Some control over the environment. The enclosed office does offer some definite advantages to employees who work in them. An important advantage is that employees have some control over their environment. They have the freedom to adjust window shades, draperies and overhead lighting. It is more likely that they will be able to adjust the air temperature through the use of individual thermostats. Being able to open or close an office door permits some control of the air flow. They have more wall space than employees in an open-office which affords them the opportunity for personalizing their work spaces through display of photographs, paintings, posters and bulletin boards.

Privacy. The enclosed office affords employees a greater degree of privacy and more control over other's access to them. If necessary, the door can be closed, signaling a desire to be left alone. One is able to concentrate on work tasks free from interruptions and the conversations of others. Telephone or in-person conversations are not overheard nor are they a disturbance to others.

Status. The assignment of a worker to an enclosed office indicates that the individual has risen to a higher level in the organization which warrants the reward of a work place of one's own. It signifies not only the importance of the new position but also the importance of the tasks one is about to perform. The worker may feel that he has finally "arrived" with his occupancy of a private, enclosed office.

Quiet. A space surrounded by four walls with a door to close insures a certain amount of peace and quiet to the occupant. Not only are there less auditory distractions, as compared to the open-plan office, but visual distractions and passers-by are less likely to disturb or annoy the occupants.

Autonomy. An employee has a sense of autonomy in carrying out work duties in enclosed spaces. No one is observing or monitoring an employee's work procedures or progress.

Personal comfort. Within this type office, an employee is able to relax and loosen one's necktie or remove uncomfortable shoes. One may lean back in a comfortable chair and prop up one's feet while working. The employee is free to concentrate on his tasks without feeling "on display."

The Open-Plan Office Model

While employees who are used to working in an enclosed office may prefer that environment, other employees find the open-plan office to their liking. There are some features which contribute to the satisfaction of workers. If these features are present, most employees, given time, are able to adjust to working in an open-plan office (see especially Boje, 1971; Marans & Spreckelmeyer, 1983, Wineman, 1982).

Employee input into design of the workplace. It is helpful for the users of the space to have input into the design and planning of their work area. They, more than anyone else, understand the

spatial, furniture and equipment needs. It is also important that they be located close to those employees with whom they share information and resources.

Sufficient distance from co-workers. Employees are uncomfortable when they feel too crowded. Placing desks at a minimum of eight feet from each other not only alleviates feelings of crowdedness (Hall & Hall, 1975), but also results in less noise and visual distractions.

Availability of alternate, quiet work areas. Some tasks may be readily accomplished in the open environment; but, for those tasks requiring intense concentration or private conversations, alternate, quiet spaces should be provided. Rooms for small groups to gather are convenient and prevent disturbances to others.

Control over environment. Employees appreciate having some flexibility and control within their environment. It contributes to the natural feelings of territoriality associated with occupancy of their work space. Companies may accommodate employees in this regard through the inclusion of task lighting, adjustable furniture or the freedom to add personal accessories (Marans & Spreckelmeyer, 1983; Wineman, 1982).

New employee rules of behavior. To eliminate constant interruptions and distractions, employees need to agree on new codes of behavior. Employees in open spaces learn to speak in lowered voices to each other as well as on the telephone (Boje, 1971). A respect for

another's privacy and the freedom to work undisturbed are issues best dealt with and regulated by the workers themselves.

Partitions four feet or higher. Partitions between work areas that are four feet or higher block the line of vision of employees from each other. This frees employees from certain visual distractions as well as the obligation to talk with each other.

Acoustical control in design. Acoustical control is generally built into the design of the open-plan office. Noise absorption is accomplished, in part, through the use of carpeting and acoustical ceiling tiles as well as by the dividers themselves. Without these features, the noise would be overwhelming. Additionally, some offices use "white noise" or music (Shoshkes, 1976).

Time to adjust. Lastly, employees need time, usually one to two years, to adjust to the open-plan office, particularly if they have never worked in one before (Chamberlin, 1975; Nemecek & Grandjean, 1973). The majority of employees find that most tasks can be performed reasonably well, but possibly not, by their own definition, at the previous level (Sundstrom et al., 1980).

Summary

The need for office space that is flexible and economical is causing office planners to consider open-plan offices as a feasible design solution. Because the American culture has influenced spatial arrangements in housing and public facilities, people in the United

States are accustomed to a certain degree of privacy. Workers are more used to private offices than open office areas.

While the enclosed office has advantages, the inclusion of certain features in the open-plan office, as mentioned in Figure 2, will do much to enhance the suitability of the open-plan design for more companies. In addition, careful planning and employee involvement appears to assist workers in a move from enclosed to open-plan offices.

CHAPTER III

METHODS AND PROCEDURES

Introduction

This chapter explains the methods and procedures used in the study. The purpose of the study was to investigate the various elements in the physical environment of the office that affect employees in their work performance. Two general null hypotheses guided the study:

H_{01} : There are no differences between attitudes of employees in open-plan offices and those employees in enclosed offices about characteristics of their office environments.

H_{02} : There are no differences between attitudes of employees in product companies and the employees in service companies about characteristics of their office environments.

The study analyzed the attitudes and perceptions of office employees toward their work spaces. The study took place in a southern city and included office workers in three product companies and three service companies. The employees who participated in the study worked in one of four office arrangements: (1) open offices with no partitions, (2) open offices with partitions no higher than four feet, (3) open offices with partitions four feet or higher, and (4) enclosed offices. Their jobs were classified as clerical, managerial, professional or supervisory.

Design of the Study

This was a "one-shot" study, undertaken after employees were already working in their office spaces. The study was descriptive in that actual observation of the work spaces occurred and a survey of the office occupants was undertaken. Those participating in the study assessed their work environments according to their own personal experience. No manipulation of the variables occurred.

The parametric analysis of variance (ANOVA) was used for the basic test of the hypotheses. The ANOVA was used for its robustness and parsimony. In applying the ANOVA, it was assumed that the distribution was normal and that the data were interval. No tests of these assumptions were made.

Subsidiary analyses included the Pearson Product Moment Correlation Coefficient in development of item clusters and the t-test for analysis of differences between two groups on single items. A chi-square analysis was completed for each item. The chi-square and t-test results appear in an appendix.

Development of the Instrument

The review of the literature generated a model of the advantages of an enclosed office as perceived by office employees (Figure 1, p. 31). Those advantages are: (1) more privacy, (2) status, (3) quiet, (4) autonomy in carrying out tasks, (5) personal comfort, and (6) some control over the environment.

A second model came from the literature regarding certain features of the open-plan office which, if present, appear to contribute to employee satisfaction (Figure 2, p. 32). Those features are: (1) employee input into design of their workplace, (2) sufficient distance between work areas, (3) availability of alternate quiet work areas, (4) some control over the environment, (5) a new code of employee behavior, (6) partitions four feet or higher, (7) acoustical control in the design, and (8) time to adjust to the open-plan office.

These two models provided a basis for the items on the questionnaire concerning the elements of the work space. The questionnaire was attitudinal and opinion-oriented. Participants were asked to assess the environment in which they spent the greatest part of their work day. Included was a semantic-differential type scale which paired adjectives opposite in meaning, such as crowded-roomy and noisy-quiet. The adjectives were separated along a bi-polar scale ranging from 1 to 5; the choice of 3 was considered to be a neutral response.

Space was available on the questionnaire for participants to include open-ended comments of a negative or positive nature. After data were collected, the 85 comments were grouped into 18 categories of responses. The comments are summarized in the fourth chapter.

Certain demographic data were requested from the employees including the number of years they had worked in their office space, experience in open-plan and enclosed offices, the openness of their present office, office design preference, job title, number of workers

they supervised, if any, and their age and sex. This information was used as a basis of comparison of attitudes between individuals in open and enclosed offices, product and service company employees, and between males and females.

To assist in establishing validity of the questionnaire, a pilot test was conducted. A draft of the questionnaire used for this study was distributed to employees in two different office buildings. Seven of the employees worked in a public service company, and five worked in a university. The sample included managers, clerical personnel and university professors. Written comments and suggested improvements were solicited from the participants, particularly regarding clarity of terminology. A personal interview was conducted with each participant after she/he had completed the questionnaire. Several suggestions from the participants were incorporated into the final version of the questionnaire.

The reliability of the questionnaire was estimated by the Cronbach's Alpha test using responses of the final administration ($N = 182$). The reliability estimate was .88; therefore, the instrument was judged to be sufficiently reliable for purposes of this descriptive study.

Validity was addressed in two ways. First, questionnaire items were generated from the literature and the models of open-plan and enclosed offices (construct validity). Second, the field test provided opportunities for responses and revisions to aid clarity and utility. The instrument appears as Appendix A.

The Sample

The sample for this study consisted of office employees in Chattanooga, Tennessee. The employees worked in three service-oriented and three product-oriented companies. Males and females were included, and the employees worked in open-plan and enclosed offices.

Two hundred and ten questionnaires were distributed, and 182 were returned for a return rate of 86.7 percent. To obtain a range of experience that would add depth and richness to the study, more than one type office design needed to be included. The review of the literature indicated that there were advantages and disadvantages for each office design. Some companies claimed that their new open-plan offices were not only attractive, but employees were more productive (Brookes & Kaplan, 1972). Some service companies, such as insurance organizations, because of the type of tasks being performed, were very successfully housed in open-plan offices ("The Open Plan Is Scrutinized," 1979). Companies that employed people who used the telephone throughout much of the day found the privacy of the enclosed office more suitable ("The Trouble with Open Offices," 1978).

Office tasks are carried out by employees from different levels and job descriptions; therefore, it was determined that input from secretaries was as essential as from managers, supervisors and professional people. Some secretaries work in open areas while others work in enclosed offices. In the office of the 1980s managers, supervisors and professionals may spend their work days in enclosed or

open offices. To test for equivalent attitudes, employees who worked in open and enclosed offices were included.

The purposes of product and service companies are different, but it does not necessarily follow that the employees in those companies are different in their attitudes about open-plan offices. Nor does it follow that a dissimilarity in office design preference would be indicated. To test the hypothesis that workers in both types of organizations would have similar reactions to their office space, both product and service company employees were surveyed.

Method

Business organizations in Chattanooga, Tennessee, were sought that were not only willing to participate in the study, but that had open-plan offices with similar features as well as enclosed offices. Six such companies were located; three were product and three were service companies. In each of the companies that agreed to cooperate in the study, a before-the-survey observation was made of the offices. A manager in each company distributed the questionnaire to employees on a voluntary basis. When completed, the questionnaires were sealed in an envelope by the respondents, and they were collected by a designated person.

A second observation was made of the open-plan areas in each company. At this time, certain features of the work areas were noted on an observation form so that there would be a record of similarities and differences in the spaces (Table 1). There were similar features

Table 1
Observation Form--Features of an Open-Plan Office

	C1*				C2	C3	C4			C5			C6
	A	B	C	D	A	A	A	B	C	A	B	C	A
Carpeting	P**	P	P	A	P	A	P	P	P	P	P	P	P
Acoustically-Treated Ceiling	P	P	P	P	P	P	P	P	P	P	P	P	P
Movable, Sound-Absorbent Screen	A	P	P	P	P	A	P	P	P	P	P	A	P
Movable Furniture	P	P	P	P	P	P	P	P	P	P	P	P	P
"White Noise"	A	A	A	A	A	A	A	A	A	A	A	A	A
Background Music	P	P	P	P	A	A	P	P	P	A	P	A	A
No Physical Partitions, Everyone Works in Open Area	A	A	A	P	A	A	A	A	A	A	A	P	A
Partitions Between Work Areas	P	P	P	A	P	P	P	P	P	P	P	P	P
Plants or Low Furn. Used as Partial Barriers	A	A	A	A	A	A	A	A	A	P	A	A	A
Approx. Sq. Ft. per Person	126	74	63	133	228	260	64	120	86	73	120	59	N.A.***

*C = Company; A,B,C's = Office

**P = Present; A = Absent

***Not Available

present or absent in all of the offices. They differed slightly in the presence or absence of background music. No offices used "white noise" to screen out audio disturbances. Carpeting, acoustically-treated ceilings and movable, sound-absorbent screens were used to absorb noise from office machines, telephones and employees' conversations. These features were present in most of the offices. All of the offices had movable furniture rather than built-in furniture, which made the offices more flexible. The notation of partitions helped to verify the employees' own description of their office design in the demographic data section of the questionnaire. In some open-plan offices, plants and greenery are used to delineate one work area from the next; however, only one office in this study used plants as partial barriers between work areas.

The two observations helped to verify that the spaces were alike.

Analysis

A frequency table was established to include all of the responses in the survey. The SPSS Batch System for the HP/3000, Spring-Release, Version 9.1, Option: Frequencies, was used.

The questionnaire items were grouped a priori into 8 separate dimensions. The suitability of the items within each dimension was verified by an intercorrelation test. The decision rule was established that an item would be included in a final dimension scale if it correlated at .5 or greater with at least one other item in the same dimension. The Pearson r was used to test the a priori assumption of the item intercorrelations.

The analysis of variance (ANOVA) tested the interaction of each of the dimensions with three variables from the questionnaire; namely, openness of office space of the survey respondents, their sex and job titles.

A second analysis of variance (ANOVA) tested the interaction of each of the dimensions with the type of company (service or product) in which the respondents worked, their sex and job titles.

Those items failing to meet the decision rule were analyzed by the t-test procedure (Table B-3 in Appendix B). The t-test compared the means of the responses of the open-plan respondents with the enclosed-office respondents as well as the means of the responses of the product and service company respondents. The .05 level of significance was used in all analyses.

As a subsidiary analysis, a chi-square test was performed to determine the differences in the responses of the open-plan and enclosed office employees (Table B-4 in Appendix B). The SPSS option, Crosstabs, was used. Initially, the employees were divided into four groups: (1) those in open-plan offices with no dividers, (2) open-plan offices with dividers under four feet; (3) open-plan offices with dividers higher than four feet; and (4) enclosed offices. To meet the chi-square requirements (5 or more responses in each cell of the matrices), some variables were collapsed and combined. The responses of the employees in open-plan offices with no dividers were combined with open-plan offices with dividers four feet or lower. An additional reason for use of the chi-square procedure was to obtain the

actual distribution of responses and a clear picture of responses on each item.

Summary

The study of employees' attitudes about their office areas was done through the use of a questionnaire. The questionnaire items were developed into 6 clusters (dimensions). The analysis of variance (ANOVA) was used to determine differences between employees in open-plan and enclosed offices. A second ANOVA was used to determine differences between product and service companies.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Introduction

Chapter IV presents the data and findings of the study. The purpose of the study was to investigate the major elements in the physical setting of the office (open or enclosed) and to explore attitudes of office employees toward those elements. The study's central purpose was to find out if the office environment, in the opinion of the employees, assisted them in the performance of their tasks.

The data and findings could help office planners, employees and business organizations in future planning of their facilities. Important information can be gleaned from employees as to the more successful and least successful features in their work environments.

The data and findings are the result of a "one-shot" survey of office employees in six different businesses in Chattanooga, Tennessee. Three of the companies dealt with a product and three were service companies. The employees worked in private, enclosed offices (N = 70) or in open-plan offices (N = 112). Of the 182 employees who participated in the survey, 56 were males and 126 were females.

The respondents evaluated their work areas through the use of a questionnaire. Included was a semantic-differential scale which compared their work environment to an ideal office.

The open-plan offices were selected for the relative similarities in their physical features. All offices were visited before and after the

study. An observation form was completed (Table 1, p. 44) to verify the office characteristics and notations were made of the presence or absence of features usually found in open-plan facilities. Those features were: carpeting; acoustically-treated ceilings; movable; sound-absorbent screens; movable furnitures; "white noise;" background music; partitions; and plants or low furniture used as partial barriers. Measurements of the available floor space were made and the number of employees tabulated so that the square foot per employee in the open areas could be computed.

If the initial observation indicated too great a dissimilarity with other offices in design or work function, that office was not included in the survey. Such work areas observed, for example, were computer offices and laboratories. Employees in these offices were not involved in the same functions typical of the average office.

The open offices chosen for participation in the survey varied in their openness. Some were totally open with no partitions, others had partitions up to four feet high. These partitions afforded visual barriers while workers were seated. Since the partitions were sound-absorbent, they also reduced noise distractions. The third office design was also open space but had partitions higher than four feet, the typical height was five or six feet. Most employees in these offices had visual separation while seated or standing. Because of the greater height of the partitions, the sound absorption was usually better, although that was not measured.

Demographic Data

Table 2 presents selected demographic data from the sample of office employees.

Respondent age is presented first. Fifty-seven (31.3 percent) were 30 years old or less; 62 (34.1 percent) were between 31 to 40 years; 44 (24.1 percent) were 41 to 50 years; and 19 (10.4 percent) were over 50 years. Fifty-six (30.8 percent) of the respondents were males; and 126 (69.2 percent) were females.

The participants specified how much of their working experience had been in an open-plan facility. The results indicate that 26 (14.3 percent) had no experience; 28 (15.4 percent) had 1 to 2 years experience; 39 (21.4 percent) had 3 to 4 years experience; and 88 (48.4 percent) had 5 or more years experience in an open-plan facility.

The number of years the respondents had worked in enclosed offices is shown (Table 2). Sixty-five (35.7 percent) had no experience in that type office; 26 (14.3 percent) had 1 to 2 years experience; 27 (15 percent) had 3 to 4 years experience; and 64 (35.0 percent) had 5 years or more experience in enclosed offices.

Respondents listed the number of years that they had worked in their present offices as follows: 64 (35.2 percent) had worked from 0 to 2 years; 77 (42.3 percent) had worked 3 to 5 years; 29 (15.9 percent) had worked 6 to 10 years; and 12 (6.6 percent) had worked 11 or more years.

Table 2

Selected Demographic Data for Sample of Office Environment Study,
Tennessee, 1984

	N	%	N	%
<u>Age</u>				
30 or less	57	31.3		
31-40	62	34.1		
41-50	44	24.1		
Over 50	19	10.4		
Total	182	99.9*		
<u>Sex</u>				
Male	56	30.8		
Female	126	69.2		
Total	182	100		
<u>Work Experience:</u>	<u>Open Space</u>		<u>Enclosed Space</u>	
0 years	26	14.3	65	35.7
1-2	28	15.4	26	14.3
3-4	39	21.4	27	15.0
5 or more	88	48.4	64	35.0
No response	1	.5	0	
Total	182	100	182	100
<u>Work Experience in Present Office</u>				
0-2 years	64	35.2		
3-5	77	42.3		
6-10	29	15.9		
11 or more	12	6.6		
		100		
<u>Supervisory Position</u>				
Yes	59	32.4		
No	123	68.0		
Total	182	100		

*Percents may not total 100 due to rounding.

In response to the question of whether or not the participants were in a supervisory position, 59 (32.4 percent) indicated that they did supervise other employees, while 123 (68 percent) said that they did not. The number of persons supervised by the participants is shown in Table 3. One hundred and twenty-three (67.6 percent) did not supervise other employees; 34 (19 percent) supervised between 1 and 6; 15 (8 percent) supervised 7 to 15; and 10 (5 percent) supervised more than 15 employees.

Table 3 also displays the general job categories of the survey participants. Eighty-three (45.6 percent) were clerical workers; 42 (23.1 percent) were managers; 20 (11 percent) were supervisors; and 36 (19.8 percent) were professionals.

Table 4 divides respondents into four categories: open or enclosed offices and product or service companies. Of the employees who worked for a product-oriented company, 33 (54 percent) were in open-plan offices and 28 (46 percent) were in enclosed offices; the total of product company employees was 61 (34 percent) of the sample. Service company employees had 79 (65 percent) in open-plan offices; whereas, 42 (35 percent) worked in enclosed offices. A larger number of employees are represented in the open-space category since the largest group (79) being the service employees in open offices.

Hypotheses

The two hypotheses that the study sought to address were as follows:

Table 3
Supervisory Responsibilities and Job Description for Sample
of Office Environment Study, Tennessee, 1984

	N	%
<u>Persons Supervised</u>		
0	123	67.6
1-6	34	19.0
7-15	15	8.0
Over 15	10	5.0
Total	182	99.6*
<u>Job Description</u>		
Clerical	83	45.6
Manager	42	23.1
Professional	36	19.8
Supervisor	20	11.0
No Response	1	.5
Total	182	100

*Percents may not total 100 due to rounding.

Table 4

Distribution of Sample Into Two Main Categories; Office
Environment Study, Tennessee, 1984

	Product		Service		Total	
	N	%	N	%	N	%
Open	33	54	79	65	112	
Row % ()		(29)		(71)		(100)
Closed	28	46	42	35	70	
Row % ()		(40)		(60)		(100)
Total	61	100	121	100	182	100
Row % ()		(34)		(66)		(100)

H₀1: There are no differences between the attitudes of employees in open-plan and those employees in enclosed offices about characteristics of their office environments.

H₀2: There are no differences between attitudes of employees in product companies and the employees in service companies about characteristics of their office environments.

Raw data (responses) from the questionnaire appear in Table B-1, Appendix B. Some descriptive data are in Table 1, p. 44.

Development of Questionnaire Items Into Dimensions

The questionnaire items were grouped a priori into 8 dimensions. These dimensions were labelled as follows: (1) the environment supports job performance, (2) acoustical and visual distractions, (3) roominess of work area, (4) privacy, (5) comfortable and relaxed, (6) satisfaction with work environment, (7) control over environment, and (8) cohesive group (Table 5).

To test the a priori assumption of the intercorrelation of the items within each of the 8 dimensions, the Pearson Correlation analysis was utilized. A decision rule was established that required each questionnaire item to correlate at .50 or greater with at least one other item in order to be included in that dimension (Table 6). As a result, one item was eliminated from dimension 4, privacy, and one item from dimension 5, comfortable and relaxed. Items within dimension 7, control over environment, and dimension 8, cohesive group, did not meet the decision rule criteria. These two dimensions were

Table 5
A Priori Grouping of Items for Dimensions; Office
 Environment Study, Tennessee, 1984

Questionnaire Items	Dimension	Questionnaire Items	Dimension
20	Environment	21	Comfortable
22	Supports Job	24	and Relaxed
23	Performance	29	
38		35	
11	Accoustical and	36	
12	Visual Distractions		
19		25	Satisfaction
32		30	with Work
34		39	Environment
37			
13	Roominess	14	Control Over
31	of	15	Environment
	Work Area	30	
16	Privacy	26	Cohesive
17		27	Group
18		28	
33			

eliminated (Table B-2 in Appendix B). Thus, two dimensions (three items each) and two single questionnaire items were eliminated because they did not correlate with other items. The eight items were analyzed individually by the t-test procedure to compare the means of the responses of the open-plan employees with the enclosed-office employees as well as the means of the responses of the product and service company respondents. The .05 level of significance was used for the t-test results.

Table 6 shows the intercorrelation of the items within each of the six dimensions. A description of each of the six dimensions follows.

Dimension 1, the environment supports job performance, included questionnaire items 20, 22, 23 and 38. These items relate to the ease with which employees were able to perform creative tasks, the efficiency of the work environment and the general support employees felt that their environment gave them in performing their tasks.

Dimension 2, acoustical and visual distractions, included questionnaire items 11, 12, 19, 32, 34 and 37. These items related to the employees' freedom to work without audio and visual distractions as well as without other interruptions.

Dimension 3, roominess of work area, was comprised of questionnaire items 13 and 31. These items were concerned with the amount of space provided to employees in their work area.

Dimension 4, privacy, included questionnaire items 16, 18 and 33. Those items were concerned with the degree of privacy available in the work area and the capability of employees to concentrate and perform their necessary tasks.

Dimension 5, comfortable and relaxed, included questionnaire items 21, 24, 35 and 36. These items related to the cheerfulness of the work environment and the comfort it provided to employees while they worked.

Dimension 6, satisfaction with the work environment, included questionnaire items 25, 30 and 39. The items in this dimension were related to the overall satisfaction employees felt toward their offices and their preference for their work environment to any other work environment.

The Analysis of Variance (ANOVA)

Two analysis of variance (ANOVAs) procedures were used to compare the means of respondent responses of three variables with each of the 6 dimensions. The first ANOVA tested the effects of the openness of the work area, the sex of the employee and his/her job title (Table 7). The openness of the work area variable included four office designs: (1) an open-plan office with no dividers, (2) an open-plan office with dividers lower than four feet, (3) an open-plan office with dividers higher than four feet, and (4) an enclosed office. Because there were no employees in some of the cells of the ANOVA table for this group, the ANOVA procedure did not compute some two-way and three-way interactions (means reported in Table 8).

The second ANOVA tested the effects of the type of company (product or service) with the sex of the employee and his/her job title. Further analysis revealed the presence of two-way interactions in five of the six dimensions. An expanded table (Table 9) shows the

Table 7

Analysis of Variance of Mean Scores to Test the Effects
of Sex, Openness of Work Area and Job Title;
Office Environment Study, Tennessee, 1984

Source of Variation	df	MS	F	P _≤
Environment Supports Job Performance Dimension				
Main Effects	7	6.32	7.58	.001
Sex	1	.76	.91	NS
Openness of Work Area	3	8.04	9.64	.001
Job Title	3	.43	.51	NS
Acoustical and Visual Distractions Dimension				
Main Effects	7	6.65	9.90	.001
Sex	1	.35	.52	NS
Openness of Work Area	3	6.87	10.23	.001
Job Title	3	.89	1.32	NS
Roominess of Work Area Dimension				
Main Effects	7	8.28	6.98	.001
Sex	1	.30	.25	NS
Openness of Work Area	3	8.38	7.06	.001
Job Title	3	2.04	1.72	NS
Privacy Dimension				
Main Effects	7	11.30	14.06	.001
Sex	1	.27	.33	NS
Openness of Work Area	3	12.52	15.59	.001
Job Title	3	.97	1.20	NS
Comfortable and Relaxed Dimension				
Main Effects	7	5.52	8.44	.001
Sex	1	.36	.56	NS
Openness of Work Area	3	6.56	10.02	.001
Job Title	3	.10	.15	NS
Satisfaction with Work Environment				
Main Effects	7	7.39	10.08	.001
Sex	1	.02	.03	NS
Openness of Work Area	3	10.80	14.74	.001
Job Title	3	.48	.66	NS

Table 8

Means for Respondents by Sex, Job Title and Openness of Work Area;
Office Environment Study, Tennessee, 1984

	Open (N = 23)	Open with Dividers Under 4' (N = 22)	Open with Dividers over 4' (N = 66)	Enclosed (N = 70)
Means for Environment Supports Job Performance Dimension				
Clerical	0*	0*	2.50	3.75
Male	3.25	2.48	2.93	3.63
Female				
Manager	0*	4.50	0*	4.06
Male	2.25	2.00	2.50	3.25
Female				
Professional	0*	0*	2.52	4.25
Male	3.10	2.42	2.68	3.72
Female				
Supervisor	0*	0*	3.42	3.21
Male	0*	3.00	2.88	4.00
Female				
Average	3.17	2.61	2.83	3.80
Means for Acoustical and Visual Distractions Dimension				
Clerical	0*	0*	2.17	3.17
Male	2.75	2.56	2.60	3.24
Female				
Manager	0*	3.00	0*	3.90
Male	1.86	1.50	2.33	3.63
Female				
Professional	0*	0*	2.53	3.50
Male	2.87	2.28	2.64	3.60
Female				
Supervisor	0*	0*	2.89	2.94
Male	0*	1.56	2.56	3.50
Female				
Average	2.63	2.36	2.59	3.54
Means for Roominess of Work Area Dimension				
Clerical	0*	0*	4.00	4.00
Male	3.15	2.61	2.61	3.13
Female				
Manager	0*	2.50	0*	4.10
Male	2.50	2.50	2.50	3.90
Female				
Professional	0*	0*	2.64	4.00
Male	3.50	2.50	3.21	3.94
Female				

Table 8 (continued)

	Open (N = 23)	Open with Dividers Under 4' (N = 22)	Open with Dividers over 4' (N = 66)	Enclosed (N = 70)
Supervisor				
Male	0*	0*	3.00	3.00
Female	0*	1.67	2.50	4.00
Average	<u>3.20</u>	<u>2.45</u>	<u>2.70</u>	<u>3.76</u>
Means for Privacy Dimension				
Clerical				
Male	0*	0*	1.75	3.50
Female	2.63	2.14	2.60	3.32
Manager				
Male	0*	4.25	0*	3.92
Female	2.25	1.50	2.25	3.55
Professional				
Male	0*	0*	2.61	4.25
Female	2.65	1.67	2.46	3.91
Supervisor				
Male	0*	0*	3.25	2.79
Female	0*	1.75	2.29	3.88
Average	<u>2.68</u>	<u>2.29</u>	<u>2.75</u>	<u>3.93</u>
Means for Comfortable and Relaxed Dimension				
Clerical				
Male	0*	0*	3.20	3.20
Female	3.16	2.87	3.30	3.67
Manager				
Male	0*	4.60	0*	4.17
Female	2.80	2.60	3.00	3.68
Professional				
Male	0*	0*	3.00	4.40
Female	3.52	3.20	2.97	4.13
Supervisor				
Male	0*	0*	3.73	3.57
Female	0*	2.87	3.27	4.00
Average	<u>3.09</u>	<u>2.82</u>	<u>3.09</u>	<u>3.95</u>
Means for Satisfaction with Work Environment Dimension				
Clerical				
Male	0*	0*	2.67	3.67
Female	3.29	2.62	2.87	3.71
Manager				
Male	0*	4.33	0*	4.09
Female	2.33	2.33	2.44	3.53
Professional				
Male	0*	0*	2.39	3.67
Female	3.13	2.44	2.71	4.08
Supervisor				
Male	0*	0*	3.11	3.50
Female	0*	2.67	3.33	4.17
Average	<u>3.00</u>	<u>2.53</u>	<u>2.79</u>	<u>3.16</u>

* Indicates no employee in that office space

Table 9

Analysis of Variance of Mean Scores to Test the Effects
of Sex, Type of Company and Job Title, Office
Environment Study, Tennessee, 1984

Source of Variation	df	MS	F	P _≤
Dimension 1 Environment Supports Job Performance				
Main Effects	5	4.12	4.41	.001
Sex	1	2.91	3.12	NS
Type of Company	1	.58	.63	NS
Job Title	3	2.44	2.62	.05
2-way Interaction				
Sex and Job Title	3	3.31	3.56	.01
Dimension 2 Acoustical and Visual Distractions				
Main Effects	5	5.33	7.39	.001
Sex	1	2.44	3.38	NS
Type of Company	1	.96	1.33	NS
Job Title	3	3.75	5.19	.01
2-way Interaction				
Sex and Job Title	3	2.86	3.96	.01
Dimension 3 Roominess of Work Area				
Main Effects	5	6.38	5.09	.001
Sex	1	1.02	1.29	NS
Type of Company	1	.25	.20	NS
Job Title	3	5.35	4.24	.01
2-way Interaction				
Sex and Job Title	3	3.66	2.92	.05
Dimension 4 Privacy				
Main Effects	5	8.48	8.86	.001
Sex	1	3.69	3.85	.05
Type of Company	1	1.30	1.36	NS
Job Title	3	5.47	5.71	.001
Dimension 5 Comfortable and Relaxed				
Main Effects	5	3.65	5.10	.001
Sex	1	2.42	3.39	NS
Type of Company	1	.00	.00	NS
Job Title	3	1.70	2.37	NS

Table 9 (continued)

Source of Variation	df	MS	F	P $\leq$
2-way Interaction				
Sex and Job Title	3	2.22	3.11	.05
Dimension 6				
Satisfaction with Work Environment				
Main Effects	5	3.83	4.49	.01
Sex	1	.58	.69	NS
Type of Company	1	.16	.19	NS
Job Title	3	3.37	3.95	.01
2-way Interaction				
Sex and Job Title	3	4.18	4.90	.01

two-way interaction of the sex of the employees and their job titles with the openness of their work areas.

To test H_{01} , the analysis of variance (ANOVA) of mean scores compared the effects of the openness of the work area with the sex and job titles of employees for each of the six dimensions (Table 7). The mean responses within each dimension revealed a significant effect due to the openness of the offices at the .001 level. The enclosed office respondents rated their offices more positively than did the respondents in any of the three open-plan office designs: (1) open with no dividers, (2) open with dividers lower than four feet and (3) open with dividers higher than four feet. The respondents in open-plan offices with dividers lower than four feet were the most negative in the evaluation of their work environment.

There were no differences due to the sex of the employee or his/her job title. All of the differences appear to be associated with the openness of the employees' office spaces.

The t-test for significance of mean differences and a chi-square analysis added further verification of the differences between the responses of employees in open-plan offices and employees in enclosed offices. (See Tables B-3 and B-4 in Appendix B for analysis of individual questionnaire items.)

Table 8 shows mean scores for the six dimensions by openness of work area, sex and job title of respondents. Table 8 reveals that for dimension 1, the environment supports job performance, male managers in enclosed offices (4.06), male managers in open-plan offices with

dividers lower than four feet (4.50) and male professionals in enclosed offices (4.25) rated their offices the highest in the support they gave them in performance of their tasks. Female managers in open-plan offices with no dividers (2.25), dividers lower than four feet (2.00), and dividers higher than four feet (2.50) found their offices to be the least supportive in the performance of their daily work.

Dimension 2, acoustical and visual distractions, as shown in Table 8 reveals that employees in enclosed offices experience the least distractions. Male and female managers (3.90 and 3.63) rated their offices the highest. Female managers in open-plan offices with no dividers (1.86) and female managers (1.50) and female supervisors (1.56) in open-plan offices with dividers lower than four feet reported the most distractions and interruptions.

Dimension 3, roominess of work area (Table 8) shows that male managers in enclosed offices rated the spaciousness of their offices the highest (4.10). Male managers (4.00, male professionals (4.00) and female supervisors (4.00) in enclosed offices were also positive in the evaluation of their offices in terms of roominess. Female supervisors in open offices with dividers lower than four feet rated the roominess of their offices the lowest (1.67).

In Table 8, dimension 4, privacy, shows that male managers in open offices with dividers lower than four feet (4.25), male managers in enclosed offices (3.92), and male professionals in enclosed offices (4.25) were the most satisfied with the degree of privacy in their offices. The lowest ratings came from females in open-plan offices

with dividers lower than four feet; namely, managers (1.50), professionals (1.67) and supervisors (1.75).

Dimension 5, comfortable and relaxed (Table 8), reveals that male managers (4.17) and professionals (4.40) in enclosed offices and male managers in open-plan offices with dividers lower than four feet (4.60) assessed the comfort of their offices highest. Female managers in open-plan offices (2.80) and open offices with dividers lower than four feet (2.60) were the least comfortable.

Dimension 6, satisfaction with work environment (Table 8), indicates that male managers in open offices with dividers lower than four feet (4.33) and employees in enclosed offices, namely, female supervisors (4.17), male managers (4.09) and female professionals (4.08) experienced the greatest overall satisfaction with their office spaces. The most negative evaluations came from female manager in open offices (2.33), closely followed by male professionals in open offices with dividers higher than four feet (2.39).

The openness or enclosure of the four types of office designs, namely: (1) open with no dividers, (2) open with dividers lower than four feet, (3) open with dividers higher than four feet, and (4) enclosed was a significant effect at $p \leq .001$ in the ANOVA test (Table 7, p. 60). Therefore, H_0 , there are no differences between the attitudes of employees in open-plan offices and those employees in enclosed offices about characteristics of their office environments, is rejected.

H₀2 stated that there are no differences between attitudes of employees in product companies and in service companies about characteristics of their office environments. The second ANOVA compared the mean responses of employees in product and service companies. No statistically significant differences were found between the responses of persons in product and in service companies on any of the six dimensions (Table 9). (This finding was substantiated by the subsidiary chi-square and t-test analyses reported in Appendix B.) The differences of mean scores in this ANOVA in the Main Effects were due to the respondents' job titles. The analysis of the two-way interaction between the job title and sex of the employee was statistically significant at $p \leq .05$ in all but one of the six dimensions. That one dimension was "privacy" (Table 9). The following summarizes the effect of job title and sex of the employees in product and service companies. There were no significant 3-way interactions.

Table 10 presents the mean scores for respondents by job title and sex. Dimension 1, the environment supports job performance, shows that male managers rated their work areas the highest (4.08) and female managers (2.80) and male professionals (2.79) found that their offices supported them the least in the performance of their work.

Dimension 2, acoustical and visual distractions (Table 10), reveals that male managers (3.83) and male supervisors (2.96) experience distractions the least. Male clerical workers (2.33) and female supervisors (2.48) found their offices to have the most acoustical and visual distractions.

Table 10

Means for Respondents by Sex and Job Title, Office
Environment Study, Tennessee, 1984

	Clerical	Manager	Professional	Supervisor
Means for Environment Supports Job Performance Dimension				
Male	3.13	4.08	2.79	3.28
Female	<u>3.05</u>	<u>2.80</u>	<u>3.10</u>	<u>3.11</u>
Overall	3.05	3.77	2.99	3.19
Means for Acoustical and Visual Distractions Dimension				
Male	2.33	3.83	2.65	2.96
Female	<u>2.73</u>	<u>2.80</u>	<u>2.90</u>	<u>2.48</u>
Overall	2.72	3.59	2.81	2.70
Means for Roominess of Work Area Dimension				
Male	4.00	4.05	2.85	3.00
Female	<u>2.84</u>	<u>3.20</u>	<u>3.43</u>	<u>2.55</u>
Overall	2.87	3.85	3.22	2.73
Means for Privacy of Work Area Dimension				
Male	2.50	4.22	2.87	3.33
Female	<u>2.85</u>	<u>3.17</u>	<u>3.01</u>	<u>2.73</u>
Overall	2.85	3.97	2.96	3.00
Means for Comfortable and Relaxed Dimension				
Male	3.13	4.16	3.12	3.69
Female	<u>3.17</u>	<u>3.15</u>	<u>3.42</u>	<u>3.20</u>
Overall	3.17	3.92	3.31	3.42

Table 10 (continued)

	Clerical	Manager	Professional	Supervisor
Means for Satisfaction with Work Environment Dimension				
Male	3.17	4.09	2.59	3.37
Female	<u>3.08</u>	<u>2.97</u>	<u>3.25</u>	<u>3.30</u>
Overall	3.08	3.83	3.01	3.33

Dimension 3, roominess of work area, as shown in Table 10, indicates that male managers (4.05) and male clerical workers (4.00) evaluate their offices positively in terms of roominess. On the other hand, female supervisors (2.55), female clerical workers (2.84) and male professionals (2.85) found that their offices were the least roomy.

Dimension 4, privacy of the work area, in Table 10 indicates that male managers (4.22) and male supervisors (3.33) were more positive in the assessment of the privacy available in their offices, while female supervisors (2.73) and male clerical workers (2.50) were more negative.

Dimension 5, comfortable and relaxed, as shown in Table 10, indicates that the male managers (4.16) were the most comfortable in their offices. Male clerical workers (3.13) and male professionals (3.12) were the least comfortable groups in their work areas.

Dimension 6, satisfaction with the work environment, as shown in Table 10, reveals that male managers are the most satisfied group (4.09) and male professionals the least satisfied (2.59) with their work environment.

Because the differences for this second ANOVA were found to be in the relationship of the employee's job titles and their sex rather than the type of company (product or service) in which they worked, H_{02} is not rejected: There are no differences between attitudes of employees in product companies and the employees in service companies about characteristics of their office environments.

The Questions of the Study

To pursue the differences in H_{01} between employees in open and enclosed offices, the data relative to key questions (variables) were evaluated using analysis of variance (ANOVA). Those results are summarized according to the questions in this section of the study.

The series of questions was used to help the researcher determine possible causes of the differences in attitudes and perceptions of persons in open and in closed offices regarding their office environments. These questions were derived from a review of the literature and the models shown in Figures 1 and 2 (pp. 31 and 32).

1. Does the physical work environment appear to help or hinder employees in the performance of their tasks in business organizations?
 - a. Are acoustic and visual distractions frequent sources of irritation?
 - b. To what extent do employees experience feelings of crowdedness or roominess in their work area?
 - c. Is the freedom to exert control over one's work space through personalization or ambient adjustments related to satisfaction with the space?
 - d. Does the work area provide sufficient privacy to accomplish necessary tasks?
 - e. To what extent do employees feel comfortable and relaxed in their work area?

2. Do employees in open-plan or enclosed offices perceive a higher level of group cohesiveness, feelings of autonomy and communication with co-workers?
3. Do office employees prefer an open-plan office, enclosed office or a combination of an open-plan with access to enclosed rooms for conferences and solitary work?
4. What is the employees' overall assessment of their present work area?
5. What differences are there between men and women in the assessment of their work spaces?

Each question is answered on the following pages.

Question 1. Does the physical work environment appear to help or hinder employees in the performance of their tasks in business organizations?

In dimension 1, the environment supports work performance (Table 7, p. 60), the openness or enclosure of the employees' work areas showed a significant difference ($p \leq .001$). The differences in the mean responses of the survey respondents are shown in Table 8, p. 61. The differences in this dimension all reflect predominantly neutral or negative responses by persons in open spaces and positive responses by persons in enclosed spaces. The total mean response for employees in open-plan offices with no dividers was 3.17; open-plan offices with dividers lower than four feet was 2.61, and open-plan offices with dividers higher than four feet was 2.83. The total mean response to the questionnaire items in this dimension for employees in

enclosed offices was 3.80. Higher responses reflect more positive attitudes.

Question 1(a). Are acoustic and visual distractions frequent sources of irritation?

Data in Table 7, p. 60, dimension 2, acoustical and visual distractions, show that the degree of openness of the respondents' office spaces appears to affect the degree to which respondents are distracted by noise and movement of other employees. The openness of the respondents' office space is statistically significant ($p \leq .001$). The differences in the mean responses are shown in Table 8, p. 61. The responses from employees in all three types of open-plan offices were primarily negative (2.63, 2.36, 2.59); whereas, the enclosed office employees were more positive (3.54). Both male (3.90) and female (3.63) managers in enclosed offices found their offices to have fewer distractions than any other group. Employees in open offices with dividers lower than four feet appeared to have the most distractions.

Question 1(b). To what extent do employees experience feelings of crowdedness or roominess in their work area?

Dimension 3, roominess of work area, as shown in Table 7, reveals that the effect of the openness of the employees' work areas is statistically significant ($p \leq .001$). Table 8 shows that the mean responses of employees in the open-plan offices were primarily neutral or negative (3.20, 2.45, 2.70); the enclosed office employees responded positively (3.76). Those experiencing the greatest degree

of crowdedness were in the open-plan offices with dividers lower than four feet (2.45). Male managers in enclosed offices rated their work spaces as the most roomy (4.10).

Question 1(c). Is the freedom to exert control over one's work space through personalization or ambient adjustments related to satisfaction with the space?

Dimension 7, control over environment (Table B-2 in Appendix B) was excluded from further analysis because the three questionnaire items failed to correlate sufficiently with each other. The t-test was utilized to compare the means of the responses of persons in closed and in open offices for the individual questionnaire items. The information in Table 11 is from Table B-3 in Appendix B.

The means of items 14 (freedom to display items of personal interest) and 30 (satisfaction with office space) for the enclosed office respondents were positive; whereas, the respondents in open-plan offices were neutral. Item 15 (ability to adjust the heating, ventilation and air-conditioning) produced a more negative response from the open-plan office respondents than from the enclosed office respondents. Differences on all three items were significant ($p \leq .01$).

Question 1(d). Does the work area provide sufficient privacy to accomplish necessary tasks?

Dimension 4, privacy, as shown in Table 7, p. 60, indicates a significant difference in responses ($p \leq .001$) depending on the openness of the office space. Table 8, p. 61, shows that the employees in open-plan offices are fairly negative in the assessment of

Table 11
T-Test Results for Individual Items Relating to Environment
Factors; Office Environment Study, Tennessee, 1984

Item		N	$\bar{X}$	SD	TVAL	DF	Prob.	Descriptor
14	CL*	67	4.21	1.05	5.66	173	.00	Display Items
	OP**	109	3.04	1.48				
14	CI	67	2.82	1.48	2.55	174	.01	Adjust Atmosphere
	OP	109	2.25	1.44				
30	CL	67	4.34	.71	8.37	174	.00	Satisfied
	OP	109	3.10	1.08				

*CL = Enclosed Office

**OP = Open Office

(Open with no dividers, dividers lower than 4' and dividers higher than 4')

the degree of privacy available in their offices (2.68, 2.29, 2.75). Enclosed office employees responded more positively (3.93).

Question 1(e). To what extent do employees feel comfortable and relaxed in their work area?

Dimension 5, comfortable and relaxed, as presented in Table 7, p. 60, reveals a significant difference ($p \leq .001$) depending on the openness of the participant's office. The respondents in open-plan offices were neutral or negative in the evaluation of their comfort level; (3.09, 2.82, 3.09); whereas, the respondents in enclosed offices were quite positive (3.95). The male professionals rated their enclosed offices the highest (4.40) in this dimension, and the female managers in open offices with dividers lower than four feet rated their offices the lowest (2.60).

Question 2. Do employees in open-plan offices or enclosed offices perceive a higher level of group cohesiveness, feelings of autonomy and communication with co-workers?

Dimension 8, cohesive group (Table B-2 in Appendix B) was excluded from further analysis because the three questionnaire items did not meet the decision rule of a .5 correlation of items within the group. The t-test was used to compare the means of respondents in open and in closed office on the individual questionnaire items (Table B-3 in Appendix B). The t-test results are shown in Table 12.

Item 26, office space facilitates communication between co-workers, and item 28, employees in the office work as a cohesive

Table 12

T-Test Results for Individual Items Relating to Issues of Group Cohesiveness; Office Environment Study, Tennessee, 1984

Item		N	$\bar{X}$	SD	TVAL	DF	Prob.	Descriptor
26	CL*	67	3.45	1.21	-.66	173	.51	Communi-
	OP**	108	3.56	1.09				cation
27	CL	67	4.27	.85	2.17	174	.03	Freedom
	OP	109	3.95	.99				
28	CL	67	3.82	.87	.54	174	.59	Cohesive
	OP	109	3.74	.97				Group

*CL = Enclosed Office

**OP = Open Office

(Open with no dividers, dividers lower than 4' and dividers higher than 4')

group, did not show a statistically significant difference between the responses of open-plan and enclosed office employees. Item 27, freedom to supervise your own work activities, produced a .03 level of significance between the open and enclosed office employees. The enclosed office employees rated their freedom to supervise their own activities higher (4.27) than did the open-plan office employees (3.95).

Question 3. Do office employees prefer an open-plan office, enclosed office or a combination of an open-plan office with access to enclosed rooms for conferences and solitary work?

Questionnaire items 6, 7 and 8 related to office design preference and input into present office planning reveal that 59 percent of the employees prefer an enclosed office (Table 13). Six percent of the employees preferred an open office with no dividers; 3.8 percent preferred an open office with dividers lower than four feet; and 8 percent preferred an open office with dividers higher than four feet. The combination of an open-plan office with access to a conference room for solitary work was preferred by 23.1 percent of the respondents.

When participants were asked whether or not they had assisted in the planning of their office space (item 8), 33 (18.1 percent) of the employees said that they had assisted in the planning; but 149 (81.9 percent) had not.

Question 4. What is the employees' overall assessment of their present work area?

Table 13

Openness of Employee Offices, Preferred Office Design and
Input Into Planning of Present Office, Office
Environment Study, Tennessee, 1984

Item	N	%
6	<u>Degree of Openness of Present Office</u>	
	Open--No dividers	23 12.6
	Open--Dividers 4' or less	22 12.1
	Open--Dividers 4' or higher	67 36.8
	Enclosed office	70 38.4
	Total	182 99.9*
7	<u>Space Preferred</u>	
	Open--No Dividers	11 6.0
	Open--Dividers 4' or less	7 3.8
	Open--Dividers 4' or higher	14 8.0
	Enclosed office	107 59.0
	Combination Open with Access to Conference Room	42 23.1
	No response	1 .05
	Total	182 99.95
8	<u>Assist in Planning or Design of Present Space</u>	
	Yes	33 18.1
	No	149 81.9
	Total	182 100

*Due to rounding error.

Dimension 6, satisfaction with work environment (Table 7, p. 60), reveals that the openness of the work area of the respondents was a significant factor at a .001 level. The mean responses of the survey participants is shown in Table 8, p. 61. Enclosed office participants were more positive in their assessment of their work areas (3.16); participants in any of the three open-plan office designs found their work areas less satisfying (3.00, 2.53, 2.79). Male managers (4.09) and female supervisors (4.17) in enclosed offices were most satisfied with their offices; female managers in open offices with no dividers (2.33) and in open office with dividers lower than 4' (2.33) were the least satisfied.

Question 5. What differences are there between men and women in the assessment of their work spaces?

In addition to the differences revealed between the opinions of the open-plan and enclosed-office participants, some variation in responses between males and females was found. In dimension 4, privacy, a difference was found between the responses of males and females at a .05 level of significance (Table 9, p. 63). Male managers and supervisors rated the privacy element of their offices more positively; whereas, female clerical workers and professionals were more positive than their male counterparts (Table 10, p. 69).

The sex of the employee, by itself, did not appear to affect the responses to the items in the other five dimensions. Only when the sex of the employee was joined with the variable job title was there statistical significance.

The demographic data provide a backdrop for the summary of the environmental assessment by male and female employees. As indicated in Table 14, the survey included 182 office employees; 56 employees were males and 126 were females. Seventy of the employees worked in enclosed offices, and 112 in open-plan offices. Of the 70 who had enclosed offices, 40 were males and 30 were females. The open-plan group was comprised of 16 males and 96 females (Table 14).

The questionnaire asked respondents to specify the type of work area they preferred. The summary of the data showed that 82.1 percent of the males and 48.4 percent of the females preferred enclosed offices. Four percent of the males and 9.5 percent of the females preferred open-plan offices with 4 feet or higher dividers between work areas.

Thirty-three respondents assisted in some way in the planning of their office space; or approximately 36 percent of the males and 10 percent of the females participated in planning.

Sixty-two percent of the males specified that they were in a supervisory position in contrast to 19 percent of the females in the study. Of that group, 21 percent of the males and 56 percent of the females supervised six persons or fewer. Seventy-nine percent of the males in the supervisory group and 44 percent of the females supervised seven or more persons.

Table 9, p. 63, shows that the two-way interaction between the sex of the employee and his/her job title was significant at $p \leq .01$ in dimension 1, the environment supports job performance. Table 10,

Table 14

Selected Demographic Data of Male and Female Employees
for Sample of Office Environment Study,
Tennessee 1984

	Males		Females	
	N	%	N	%
<u>Degree of Openness of Present Office</u>				
Open--No dividers	0	0	24	19.0
Open--Dividers 4' or lower	1	1.8	21	16.7
Open--Dividers 4' or higher	15	26.8	52	40.5
Enclosed Office	40	71.4	30	23.8
Total	56	100	126	100
<u>Space Preferred</u>				
Open--No dividers	0	0	11	8.7
Open--Dividers 4' or lower	1	1.8	6	4.8
Open--Dividers 4' or higher	2	3.6	12	9.5
Enclosed Office	46	82.1	61	48.4
Combination of open office with access to conference room	7	12.5	35	27.8
N/R			1	1.2
Total	56	100	126	100
<u>Assisted in Planning or Design of Present Office</u>				
Yes	20	35.7	13	10.3
No	36	64.3	113	89.7
Total	56	100	126	100
<u>Supervisory Position</u>				
Yes	35	62.5	24	19.1
No	21	37.5	102	80.9
Total	56	100	126	100
<u>Percent of Respondents Supervising Others</u>				
1 to 6 persons		21		56
7 or more		79		44
Total		100		100

p. 69, shows that male clerical workers (3.13), managers (4.08) and supervisors (3.28) were more positive, while their female counterparts were more negative. The only female group that rated their work environment higher than males for its supportive elements were the female professionals (3.10).

Dimension 2, acoustical and visual distractions, in Table 9, p. 63, shows a two-way interaction between the sex of the employee and his/her job title ($p \leq .01$). Table 10, p. 69 reveals that male managers (3.83) and supervisors (2.96) found their offices to have fewer distractions than females with those same job titles. Female clerical workers (2.73) and professionals (2.90) experienced fewer distractions in their work areas than did male clerical workers (2.33) and professionals (2.65).

Dimension 3, roominess of work area, as shown in Table 9, shows a significant two-way interaction between the employee's sex and his/her job title ($p \leq .05$). The male clerical workers (4.00), managers (4.05) and supervisors (3.00) rated their offices as more spacious than did females with the same job titles (Table 10). On the other hand, female professionals (3.43) assessed the space in their offices as more roomy than did the male professionals (2.85).

Dimension 5, comfortable and relaxed, as shown in Table 9, shows a significant two-way interaction between the sex of the employee and job title ($p \leq .05$). Male managers (4.16) and supervisors (3.69) assessed their offices as more comfortable and relaxing places to work than did female managers (3.15) and supervisors (3.20). Female

clerical workers (3.17) and professionals (3.42) were more comfortable in their offices than were males in the same jobs (3.13) and (3.12) (Table 9, p. 63).

Dimension 6, satisfaction with work environment, shows a significant two-way interaction between the sex of the employee and his/her job title ($p \leq .01$), as shown in Table 9. Male clerical workers (3.17), managers (4.09) and supervisors (3.37) had a higher level of overall satisfaction with their work areas than did females in the same jobs. Female professionals (3.25) were more positive than were males (2.59) in terms of satisfaction with their work environments (see Table 9).

Summary of Questionnaire Written Comments

The survey participants were invited to write additional comments at the end of the questionnaire, if they so desired. Of the 182 persons surveyed, 46 included one or more written comments. Of the total number of 85 comments, 63 (74 percent) were negative and 22 (26 percent) were of a more positive nature. The comments were from employees in enclosed and open-plan offices. No attempt has been made here to categorize (unless mentioned) the respondents according to their assigned work spaces.

Positive Comments

Four employees found their office areas to be quiet and relaxing most of the time; even at times when it was noisy, they were able to tune out the distractions.

Two employees mentioned that their offices were in a good location away from the main office "traffic." Thus, while they were in open offices, the location afforded them more privacy than that of fellow workers. In contrast, another participant found that being close to others was entirely satisfactory. She revealed that having good access to co-workers and related work activities was important to her.

Four respondents mentioned that they had plenty of space in their work areas for work and storage.

Two participants appreciated the fact that they had a window. It not only provided good lighting, but added an openness and cheerfulness to their offices. Closely related to that comment was another by a worker who was appreciative of the excellent lighting in the office. It made work easier to see and caused less eye fatigue.

Three respondents from different companies declared that they enjoyed working for their companies and with their particular co-workers. They found their companies to be good to their employees. The people in their work groups were cooperative, and everyone worked well together.

Four enclosed-office participants professed that their offices gave them control over other's access to them. They could close the door whenever they wanted, thus insuring their privacy.

A noteworthy feature for one employee was the capability of controlling his office area climate through the use of an individual thermostat. Air flow and temperature adjustment could be made as he deemed necessary.

Negative Comments

Of the 63 comments that were made in a more negative vein, the crowdedness of the office was the most frequent complaint. Thirteen of the participants criticized the insufficient size of their office or the arrangement of the work area. Some of the employees said that the work area was inefficient or not arranged to the best advantage.

Distractions, noise and interruptions interfered with some employees and their ability to concentrate. They found that the telephone conversations of co-workers were disturbing. Closely related to distractions as an annoyance was the issue of invasion of privacy. Eleven respondents said that their office areas lacked sufficient privacy to do their work. Additionally, they were concerned that their conversations with others, either in-person or on the telephone, would be overheard by others.

Six respondents found a lack of storage or desk space in their office areas. The addition of computers or other office equipment, for some, resulted in a too-crowded arrangement. The computer was shared by other workers in one office, compounding the shortage of desk surface space.

Six participants expressed some dissatisfaction with their heating, ventilation and air-conditioning systems. They found their offices to be uncomfortable and often too hot or too cold. Since they were unable to make individual adjustments, it remained an unresolved problem.

The office color schemes or furnishings were criticized by five respondents. They said that the colors were too bright or unpleasant or that the furniture was uncomfortable.

One participant found the general bustle caused by the passers-by in his office to be a disruption; while two other employees found that being away from the center of the office had its pitfalls. Their work area was not close to the people or the storage files necessary for carrying out their tasks.

Smoking by others disturbed one employee. Three others mentioned the lack of windows in their office as a distinct disadvantage, not because of poor ventilation but for psychological reasons. They missed having the pleasure of a view of the outdoors.

Poor office lighting was a problem for three of the respondents. The lack of sufficient light caused a glare on their work. These workers had to strain to see their work which caused some fatigue.

Two open-plan office employees stated that, in their opinion, their type of office was not as productive an environment as the enclosed office and that it kept them from doing quality work.

Summary

This chapter has presented the data and the findings of the study, revealing that the employees in open offices were less satisfied with their work areas than those employees in enclosed offices. Employees in service companies evaluated their offices similarly to product company employees; few significant differences were found between them.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary

The economy is gradually changing from an industrial and product-oriented one to a service economy; the work place for millions of Americans has become the office instead of the factory. There has been a growing need for office space. The awareness of the shortage of inexpensive sources of energy has prompted contractors, architects and office planners to explore viable means of constructing energy-efficient facilities. Modern technology and materials have made it possible to build facilities with large, unobstructed interiors. The lighting, heating and air conditioning systems can be built into one large area less expensively than an area divided into cubicles.

Thus, one of the important reasons for building open-plan facilities becomes obvious: economy. A second reason is the flexibility available through the rearrangement of partitions when necessary; an important element for growing companies.

What appears to be a panacea, in reality, is not. Less expensive and flexible offices are now housing less-than-happy workers. The design is not all to blame, however. Many problems could be alleviated by involving workers in the planning process.

The purpose of this study was to look at open-plan and enclosed offices through the eyes of the employees to attempt to see how well office spaces were functioning for the people using them. Office

facilities are designed for work, so the study sought to find out if those facilities helped employees to do their work or if the design itself was a drawback.

Three conceptual models were developed from the literature. The first model isolated and recognized the advantages of enclosed offices. The second model spelled out the features that affect employee satisfaction with open-space offices. Finally, a third model specified an ideal process for companies to follow when a move from enclosed offices to open offices is being considered. From these models, a survey questionnaire was formulated. In an attempt to establish validity, the questionnaire was distributed to employees in two offices. After certain changes had been made the questionnaire was used in the study. Responses to the final instrument ($N = 182$) were tested for reliability using the Cronbach Alpha. The coefficient alpha = .88 was obtained as the reliability estimate in the current study.

Employees from three service and three product companies participated in the survey. The 182 participants worked in open (112) and enclosed (70) offices.

An analysis of variance (ANOVA) was used to compare the mean responses of product and service company employees. No significant difference was found between these two groups.

An analysis of variance (ANOVA) was also used to compare the mean responses of enclosed office employees and employees in the three types of open-plan offices; namely, (1) open with no dividers, (2) open with dividers lower than four feet and (3) open with dividers higher than four feet.

Questionnaire items were grouped into 8 clusters (dimensions). The intercorrelation of the items within the dimensions was tested using the Pearson correlation. Any item that did not correlate with at least one other item in the dimension at .5 was eliminated; thus two individual items and two dimensions (of three items each) were excluded from analysis in the ANOVA. These items were analyzed individually using a t-test for differences between respondents in open and in enclosed offices. The overall analysis procedure was facilitated by the use of five questions which guided the analysis.

Findings

Using the analysis of variance (ANOVA) to test for differences in means of respondents, one null hypothesis was rejected and the other was not rejected. Those results are summarized here.

H_O1. There are no differences between attitudes of employees in open-plan offices and those employees in enclosed offices about characteristics of their office environments. (Rejected. Differences were found in all six dimensions.)

H_O2. There are no differences between attitudes of employees in product companies and the employees in service companies about characteristics of their office environments. (Not rejected. No differences were found in any of the six dimensions.)

The findings for the five questions explored by the analysis of variance (ANOVA) helped the researcher identify what environment-related features of open or closed offices seemed related to differences

in attitudes. The findings for each question are provide here. Question 1 had five parts, labelled a-e.

1. Does the physical work environment appear to help or hinder employees in the performance of their tasks in business organizations?

The enclosed office employees found their environment to be efficient and supportive of their work activities and assisted in their productivity. Creative tasks were easily performed in their offices.

Open-plan office employees found that their offices were efficient, but their spaces did not necessarily help them to be more productive. Employees in open plan offices with no dividers rated their offices as more supportive than those in the other open office designs.

a. Are acoustic and visual distractions frequent sources of irritation?

Enclosed office employees found that their offices were more calm and quiet, and they were less disturbed by noise and passers-by. Some employees in the open offices with the partitions higher than four feet were not as disturbed by passers-by, due to increased visual privacy as employees in offices with lower dividers. Interruptions were a definite problem for open-office employees.

b. To what extent do employees experience feelings of crowdedness or roominess in their work area?

Workers in enclosed offices were fairly positive in assessing the roominess of their work areas; whereas, the open-plan workers tended to view their work areas as crowded. Males in enclosed offices acknowledged the spaciousness of their offices as greater than did

females except for female supervisors in enclosed offices. Employees in open-plan offices with no dividers felt less crowded than employees in open offices with dividers.

c. Is the freedom to exert control over one's work space through personalization or ambient adjustments related to satisfaction with the space?

Enclosed office workers had more freedom and space to display items of personal interest and were highly satisfied with their work spaces; whereas, open-plan office workers were neither satisfied nor dissatisfied.

Those employees in the open areas had less freedom to display personal items and were neutral or negative in their satisfaction with their offices. Both groups lacked the capability to adjust the atmosphere (heat, light and ventilation) to a satisfactory degree.

d. Does the work area provide sufficient privacy to accomplish necessary tasks?

The employees who had enclosed offices considered them to be quite private, affording them the ability to concentrate on their work.

Conversely, open-plan workers regarded their areas as public and had difficulty concentrating and performing the work that they were hired to do. Alternate quiet areas were not available for solitary work or meeting although more than one-third of the open-plan employees specified that would be a good arrangement.

Interestingly, employees in open-plan offices with no dividers were able to perform their tasks and felt more positively about the

degree of privacy available. Employees in open-plan offices with dividers lower than four feet were the most aware of the lack of privacy and the effect it had on their work performance. The type of work required of the employees in these two types of offices may affect their attitudes. It is possible that employees in the offices with dividers have more complicated tasks to do.

e. To what extent do employees feel comfortable and relaxed in their work area?

Enclosed offices were regarded as cheerful areas where employees felt comfortable and relaxed and free to go about their work without feeling watched or "on display."

Open-plan offices were not judged to be particularly cheerful or comfortable. Workers in the areas with no partitions and with the partitions higher than four feet did not feel as much "on display" as those with partitions lower than four feet.

2. Do employees in open-plan or enclosed offices perceive a higher level of group cohesiveness, feelings of autonomy and communication with co-workers?

Employees in both groups felt somewhat positive about the communication and cohesiveness between co-workers in their organizations; there was little difference between the groups. There were no differences between the ease with which employees communicated and the cohesiveness of the work group based upon environmental factors. Enclosed office employees were given slightly more freedom to supervise their own work activities than were open-office employees.

3. Do office employees prefer an open-plan office, enclosed office or a combination of an open-plan with access to enclosed rooms for conferences and solitary work?

Generally, the enclosed office is preferred. Employees in open offices with no partitions prefer them although some would like to have an enclosed room available for certain types of work. People who work in offices with the taller partitions (usually clerical workers or professionals) would like to have a private office or, at least, have ready access to a conference room. Enclosed office employees, more than the others, prefer exactly what they have: a private office.

While employees have definite opinions, apparently they are seldom asked to express them. Less than 19 percent of the employees surveyed, in open-plan or enclosed offices had been involved in any part of the planning process.

4. What is the employees' overall assessment of their present work areas?

Employees in enclosed offices found their work places to be slightly superior to any other and were quite strong in their stated preference for their environment. They liked enclosed offices.

Some open office workers preferred some other type of office design and were neutral in evaluating their offices as satisfactory or the "best possible." The most dissatisfied group was the employees in open office with dividers lower than four feet.

5. What differences are there between men and women in the assessment of their work spaces?

Male managers and supervisors felt that they had a greater degree of privacy than their female counterparts; whereas, female clerical workers and professionals felt that they had more privacy than male clerical workers or professionals.

Males found that their offices supported them in their work performance to a greater degree than females. The responses of the females were more negative.

Males in managerial and supervisory positions tended to be in enclosed offices more often than females; therefore they experienced fewer distractions and interruptions. In this study, 71 percent of the males were in enclosed offices, whereas only 23 percent of the females had enclosed offices. Female clerical workers were not as disturbed by noise and movement of other workers as were female supervisors. This may be due to the nature of clerical tasks, which do not require as great a degree of concentration as would supervisory duties.

Females in three of the work groups (clerical, managerial and supervisory) found their offices to be more crowded than did males. This implies that: (a) women are allotted less space in their offices or (b) women feel a greater need for space when they are working.

Male managers and supervisors were more comfortable and relaxed in their work areas than were females.

Conclusions

1. Before companies make a large investment to "improve" their work environment, they should meet and discuss with employees,

seeking their input, to determine those factors that have maximum detrimental impact on worker psychological comfort and productivity.

2. Enclosed offices appear to affect those factors that could support employee productivity.

3. People are able to adjust, in time, to differences in work environments, whether they are open or enclosed spaces.

4. Provided that the self assessment of their job titles by women were correct, women managers in organizations are not being given private, enclosed offices to the same degree that men have been.

5. Employees in open offices view their work environments in an unfavorable light as compared to those in enclosed offices.

6. Enclosed office employees stated a strong preference for their work environments. Open-plan employees have had to adjust to less-than-satisfactory work areas that, by their definition, do not help them to be productive.

7. A suggested model for the process of moving employees from enclosed offices to open offices appears in Figure 3, and is discussed here.

8. Since this study did not support findings of other studies regarding the presumed advantages of open-plan offices; namely, increased communication, group cohesiveness, and freedom to supervise their own work activities, it is possible that the offices in this study were not arranged to take the best advantage of open-plan benefits.

9. Although employees in open-plan offices with no dividers felt less crowded than employees in offices with dividers, it is not safe to

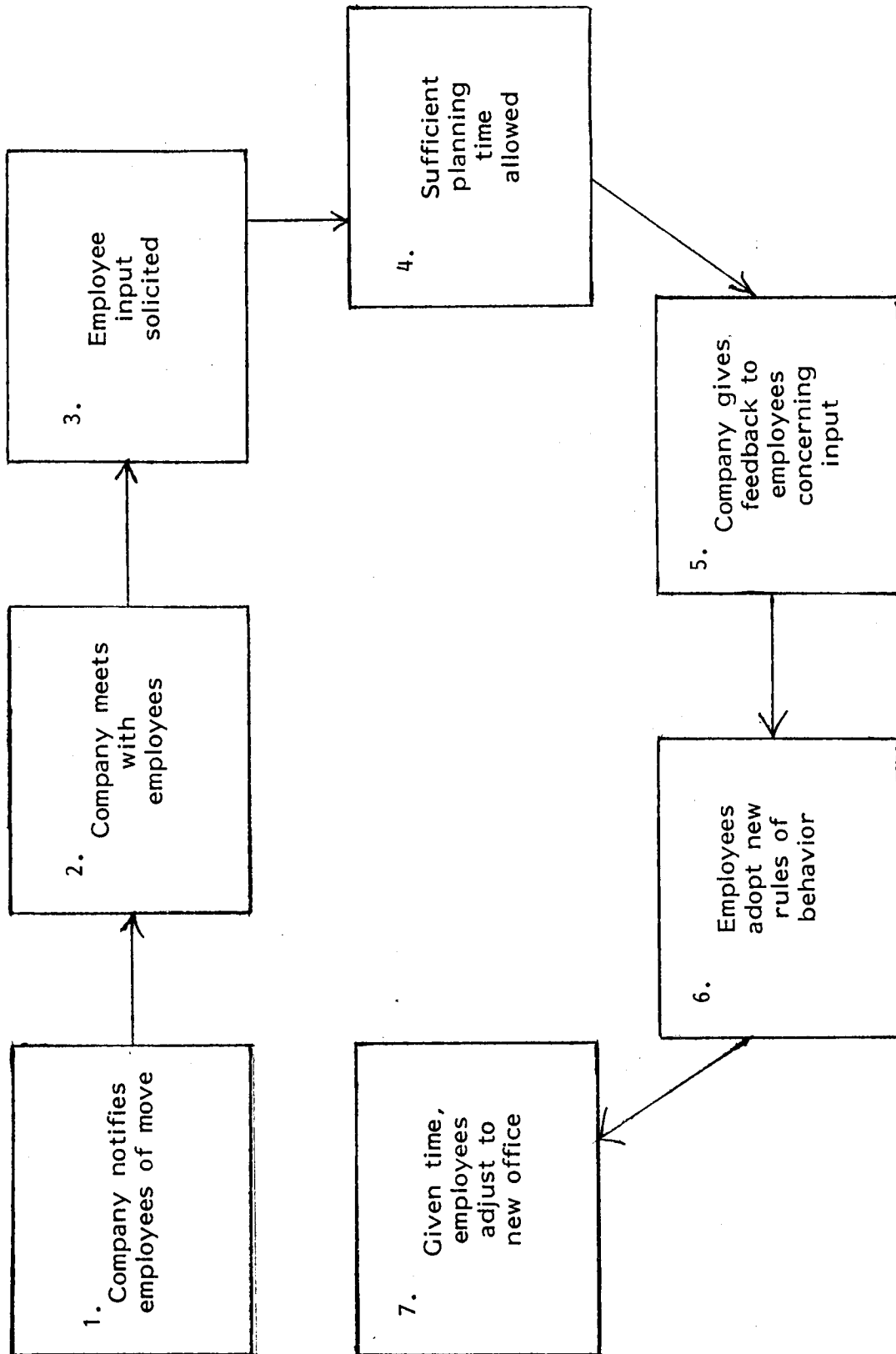


Figure 3. A model for the process of change from working in enclosed offices to open-plan offices.

conclude that this type of office design is ideal. There are too many other variables to be considered, such as privacy, comfort and the support of the environment in task performance. Therefore, it is important that office planners consider many variables rather than just one variable in designing office areas.

A Model for the Process of Change from Working in
Enclosed Offices to Open-Plan Offices

The process of change is inevitable in any work organization. Individuals may see any change in a positive framework and as an opportunity for growth; conversely, one may perceive change from a negative viewpoint and decide to resist out of fear or uncertainty (see especially Altman, 1975; Boje, 1971; Hall & Hall, 1975, Moleski & Lang, 1982).

With this in mind, businesses that foresee the necessity to increase their office space and decide to utilize the open-plan design would do well to involve employees in the process. A model of the process of change for employees working in enclosed offices to move to an open-plan office may be as follows:

1. The company begins to prepare the employees for the change by notifying them well in advance of the company's impending move.
2. The company meets with employees to explain the necessity for the relocation.
3. The company solicits employee input into the planning and designing of the future workplace.

4. Sufficient time is provided for the planning of the future office.
5. The company gives feedback to the employees concerning planning input.
6. Employees adopt new rules of behavior to insure a good working climate.
7. Given time, employees adjust to performing most tasks in the new open-plan office.

Discussion

In this study, employees from enclosed offices were most positive about their level of productivity, freedom to supervise their own activities, and the comfort and privacy their offices offer. They complained about interruptions but commented that very often that problem was more a job-connected than space-connected factor. While their offices gave them more privacy, this privacy also tended to isolate them and make communication with co-workers more difficult.

According to the related literature, those survey attitudes are typical. Workers in open spaces may feel less comfortable and less productive than workers in enclosed offices.

Contrary to the literature, however, the survey participants in open-plan offices in this study rated their freedom to supervise their own activities as the most positive element in their office environment. Employees in open offices sometimes feel less independence and are

unable to do their own work without feeling watched (Brookes & Kaplan, 1972; Sundstrom, Burt, & Kamp, 1980).

Employees in open offices were most negative about distractions, noise, interruptions and a lack of privacy. These are problems encountered in many open offices (Boje, 1971; Sundstrom et al., 1980, "The Trouble with Open Offices," 1978; Wineman, 1982).

Employees in both office designs said that they were unable to make ambient adjustments in their offices. Offices today are using central control systems that do not allow for individual control of air conditioning or heating. The enclosed-office employees did have control over their offices in other ways, such as being able to add personal accessories to their offices. The open-plan employees did not have as much freedom to personalize their work areas and experienced less satisfaction with their offices than the enclosed group. Marans and Spreckelmeyer (1983) said that there was a correlation between some control over one's space and the degree of satisfaction felt.

The survey participants claimed to have adjusted to their work spaces with little difficulty. The literature suggests that man can adapt, but the office environment does have an effect on employees (Hall & Hall, 1975; Sommer, 1969; Sundstrom et al., 1980). Those surveyed in open offices had adapted to an environment they considered to be unsatisfactory, but they were not very happy about it!

Boje (1971) said that people were more disturbed by the conversations of others than telephones ringing or machines making

noise, because people are more interested in conversations than machines. The current study bears this out; people did complain more about conversations than about other distractions.

Finally, in spite of the fact that employees are very willing to talk about their offices and are fairly perceptive as to the good and bad features, no one asks them to contribute their ideas. Lou Harris' poll ("The Open Plan Is Scrutinized," 1979) showed that only 19 percent of employees were involved in the planning of their offices; the current study showed that 18 percent were. Office workers are experts about their own work spaces and need to be consulted!

Recommendations

Companies should consider the type of work being done by their employees. The study found that female clerical workers were not as disturbed by noise and distractions as were their female supervisors. Some consideration should be given to the type of space allocated to female supervisors. Supervisory duties appear to require more peaceful work areas than clerical tasks. If the work requires a low level of concentration and if access to co-workers facilitates their work, then the open-plan design may be quite suitable. If the work organization is constantly changing and built-in flexibility is imperative, then the inclusion of enclosed rooms for occasional solitary work should be available for all employees.

All of the newest technology should be utilized in the control of noise. Acoustical panels on walls and bookcases would help absorb

noise in addition to such typical solutions as acoustical tile in ceilings, carpeting and sound-absorbent dividers. Ceilings should be designed for sound control and reflection of light but neither quality should be sacrificed for the other. None of the companies in the survey made use of "white noise" to mask auditory disturbances; this could be added to existing open-space areas. Soft music may be an alternative.

A cost analysis should be done by any company considering a move to open-plan offices. While the initial construction costs of an open office may be less than for permanent offices, the acoustical treatment and furnishings tend to be costly; and open-plan facilities may turn out to be more expensive than enclosed offices. If there is a way to analyze productivity and costs, this should be done.

Employees or representatives of employees should be involved in the planning and design of any new office, open or enclosed. Employees know their space and equipment needs more than anyone else.

Companies should utilize the experience of others by visiting various offices with different space designs and talking with the employees using those offices before making final decisions about their future offices.

An analysis of the type of space (enclosed or open) allotted to female employees with jobs comparable to male employees should be made to make sure that they are equitable. More male managers are in enclosed offices than females; this may create a morale problem.

Open-plan offices should be arranged so that communication between employees is enhanced and the work flow improved.

Further Research

Further research needs to be done in the area of employee productivity. If productivity could be measured in the various office designs, the information would serve office planners and architects well. In addition, before- and after-the-move-studies of employees would offer valuable information to other companies.

The sample for the study should include male and female employees in each of the office designs so that analyses are not limited due to insufficient numbers. Zeros in any of the cells places limits on the statistical analysis.

Studies of the type of tasks being performed in certain office designs (open or enclosed) coupled with productivity measurement, could assist office planners in designing an optimum office for certain tasks.

REFERENCES

REFERENCES

- Altman, Irwin. (1971). Ecological aspects of interpersonal functioning. In Aristide H. Esser (Ed.), Behavior and environment. New York: Plenum Press.
- Altman, Irwin. (1975). The environment and social behavior: Privacy, personal space, territory and crowding. Belmont, CA: Wadsworth Publishing Co., Inc.
- Anderson, Carl. (1973, April). A second look at Lady Godiva. The Education Digest, 38, 38-40.
- Arnold, John. (1975, January-February). Open spaces: Closed minds. Council of Educational Facility Planners Journal, 13, 6-7.
- Back to the cubbyhole. (1983, October 10). Forbes, 132, 8.
- Birdwhistell, Ray L. (1970). Kinesics and context: Essays on body motion communication. Philadelphia: University of Pennsylvania.
- Bockman, John T. (1975, April). Culture shock and the open-space school. The National Association of Secondary Principals, 59, 90-93.
- Boje, Axel. (1971). Open-plan offices. London: Business Books Limited.
- Bridgwater, Carol Austin. (1981, April). Productivity: Cold water for the office fishbowl. Psychology Today, 15, 29.
- Brookes, Malcolm J., & Kaplan, Archie. (1972). The office environment: Space planning and affective behavior. Human Factors, 14, 373-391.
- Campbell, David E. (1979). Interior office design and visitor response. Journal of Applied Psychology, 64, 648-653.
- Caplan, Ralph. (1983, February). How chairs behave. Psychology Today, pp. 46-52.
- Carson, R. B., Johnson, F. T., & Oliva, F. D. (1974, November). Supervision and evaluation of instructional activities in open area, quasi-open area and traditional schools. Journal of Education, 156, 18-27.
- Case, Barbara J. (1981, April). Lasting alternatives: A lesson in survival. Phi Delta Kappan, 62, 554-557.

- Chamberlin, Leslie. (1975, October). What to do when the walls come down! Clearing House, 49, 71-74.
- Clearwater, Yvonne Alice Wathem. (1979). Social-environmental relationships in open and closed offices. (Doctoral dissertation, University of California, Davis). Dissertation Abstracts International, 40, 10B.
- DeLong, Alton J. (1973). Coding behavior and levels of cultural integration: Synchronic and diachronic adaptive mechanisms in human organization. In J. Archea & E. Eastman (Eds.), EDRA, 2. Stroudsburg, PA: Dowden, Hutchison and Ross, Inc.
- DeLong, Alton J. (1978). Context, structures and relationships. In Aristide H. Esser & Barrie B. Greenbie (Eds.), Design for communality and privacy. New York: Plenum Press.
- Farrenkopf, T., & Roth, Vicki. (1980, December). The university faculty office as an environment. Environment and Behavior, 12, 467-477.
- Gaskie, Margaret F. (1980, Mid-August). Toward workability of the workplace. Architectural Record, 168, 70-75.
- Gissen, Jay. (1982, November 8). Furnishing the office of the future. Forges, 130, 78.
- Glazer, Nathan, & Moynihan, Daniel Patrick. (1963). Beyond the melting pot. Cambridge, MA: The MIT Press and the Harvard University Press.
- Goffman, Erving. (1959). The presentation of self in everyday life. Garden City, NY: Doubleday and Company, Inc.
- Guenther, Robert. (1983, November 2). Growth of computers causes some office design problems. The Wall Street Journal, p. 33.
- Hall, Edward T. (1966). The hidden dimension. New York: Doubleday and Company, Inc.
- Hall, Edward T. (1969, March). Listening behavior: Some cultural differences. Phi Delta Kappan, 50, pp. 379-380.
- Hall, Edward T. (1959). The silent language. Garden City, NY: Doubleday and Company, Inc.
- Hall, Mildred & Edward. (1975). The fourth dimension in architecture: The impact of building on man's behavior. Santa Fe, NM: The Sunstone Press.

- Hanson, Lady Alice. (1978). Effects of a move to an open landscape office. (Doctoral dissertation, Claremont Graduate School). Dissertation Abstracts International, 39, 06B.
- Hardy, Clifford A. (1972, November). Societal change and the open classroom. The Clearing House, 47, 139-141.
- Hundert, A. T., & Greenfield, N. (1969) Physical space and organizational behavior: A study of office landscape. Proceedings of the 77th Annual Convention of the American Psychological Association, 1, 601-602.
- ✓ Jones, Hester S. (1982, January). Interior planning is a designer's challenge. The Office, 95, 101-102.
- Korda, Michael. (1975). Power! How to get it, how to use it. New York: Ballentine Books Inc.
- Leggett, Stanton. (1973, August). Ten ways to open your schools to disaster. American School and University, 45, 23-27.
- Letters of Lord Chesterfield to his son. (1929). Everyman's Edition. New York: Dutton.
- × Lowrey, Jack. (1982, January). Effective work environment is designer's ultimate goal. The Office, 95, 119.
- ✓ Marans, Robert W., & Spreckelmeyer, Kent F. (1983, May). Evaluating open and conventional office design. Environment and Behavior, 14, 333-351.
- Marlin, William. (1979, February). Excellence attracts excellence. Architectural Record, 165, 85-92.
- McBride, Glen. (1971). Theories of animal spacing: The role of flight, fight and social distance. In Aristide H. Esser (Ed.), Behavior and environment: The use of space by animals and men. New York: Plenum Press.
- McLain, Sybil. (1983, July-August). Office options: Innovations are in store for tomorrow's work environment. Knoxville Lifestyle, pp. 39-41.
- Mehrabian, Albert. (1976). Public places and private spaces: The psychology of work, play and living environments. New York: Basic Books, Inc.
- Mehrabian, Albert. (1971). Silent messages. Belmont, CA: Wadsworth Publishing Co., Inc.

- Metropolitan Toronto School Board. (1975, September). E6: Academic evaluation. A report on SEF open plan schools. Toronto, Ontario: Metropolitan Toronto School Board. (ERIC Document Reproduction Service No. ED 112 474).
- + Moleski, Walter H., & Lang, Jon T. (1982, May). Organizational needs and human values in office planning. Environment and Behavior, 14, 319-332.
- Nemecek, Jan, & Grandjean, Etienne. (1973, April). Results of an ergonomic investigation of large space offices. Human Factors, 15, 111-124.
- The new green look in office layouts. (1973, August 11). Business Week, pp. 135-136.
- Newmark, Norma L., & Thompson, Patricia J. (1977). Self, space and shelter: An introduction to housing. San Francisco: Canfield Press.
- Nie, Norman H., Hull, C., Hanlai, Jenkins, Jean G., Steinbrenner, Karin, & Bent, Dale H. (1975). SPSS: Statistical package for the social sciences (2nd ed.). New York: McGraw Hill Book co., Inc.
- Oldham, G. R., & Brass, D. J. (1979). Employee reactions to an open-plan office: A naturally occurring quasi-experiment. Administrative Science Quarterly, 24, 267-284.
- The open plan is scrutinized in a pioneering survey on offices. (1979, January). Architectural Records, 165, 141-144.
- Ouchi, William G. (1981). Theory Z: How American business can meet the Japanese challenge. Reading, MA: Addison-Wesley Publishing Co., Inc.
- Pile, John. (1976). Interiors 3rd book of offices. New York: Watson-Guptill Publications.
- Rowland, G. Thomas, & Boeker, Kenneth W. (1973, April). Open concept schools: Potentials and pitfalls. Kappa Delta Pi Record, 9, 108-109, 111.
- Sanders, Stanley G., & Wren, Jean P. (1976, September). The open-space school: How effective. Elementary School Journal, 77, 57-62.
- Sartore, Richard L. (1972, November). A principal with a new outlook is needed for the open school. The Clearing House, 47, 131-134.

- Shoshkes, Lila. (1976). Space planning: Designing the office environment. New York: Architectural Record Books.
- Sommer, Robert. (1969). Personal space: The behavioral basis of design. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Sundstrom, Eric, Burt, Robert E., & Kamp, Douglas. (1980, March). Privacy at work: Architectural correlates of job satisfaction and job performance. Academy of Management Journal, 23, 101-117.
- Taggart, Robert J. (1974, March). Open education without professional autonomy. The Elementary School Journal, 74, 336-343.
- Toffler, Alvin. (1970). Future Shock. New York: Random House.
- The talk of the town: Office workers. (1979, January 8). New Yorker, 54, 25.
- The trouble with open offices. (1978, August 7). Business Week, pp. 84-85.
- Tuckman, Bruce W., Cochran, David W., & Travers, Eugene J. (1974, Fall). Evaluating open classrooms. Journal of Research and Development in Education, 8, 14-19.
- Watson, O. Michael. (1970). Proxemic behavior: A cross-cultural study. The Hague: Mouton and Company Publishers.
- Westin, Alan F. (1967). Privacy and freedom. New York: Atheneum Press.
- Weinstein, Carol S. (1979, Fall). The physical environment of the school: A review of the research. Review of Educational Research, 49, 577-610.
- Wineman, Jean D. (1982, May). Office design and evaluation: An overview. Environment and Behavior, 14(3), 271-298.

APPENDIXES

APPENDIX A

LETTER AND QUESTIONNAIRE

Dear Participant:

The management of your company has given me permission to distribute this questionnaire to you. The attached questionnaire is part of a research study being undertaken for a doctoral dissertation. I am attempting to find out how people feel about their work place and whether or not it supports them in performing their tasks. While your cooperation with this study is entirely voluntary, your efforts to complete this questionnaire will certainly be appreciated. Your anonymity and that of your organization will be respected.

To familiarize you with two of the terms used in the questionnaire, the following definitions will apply:

An open-plan office has no permanent walls to separate work areas. There may be partitions, but they do not go to the ceiling.

An enclosed office has permanent, full-height walls on all four sides with one or more doors. An enclosed office is usually occupied by one or two persons.

For your convenience and to insure the confidentiality of your responses, please place the completed questionnaire in the attached envelope. It will be collected by the person who provided you with this questionnaire.

Thank you very much for your assistance.

Marlene C. Bradshaw

Marlene C. Bradshaw
University of Tennessee
Doctoral Student

ID # 1-3

Please mark with a check (✓) the appropriate response to the following:

- ✓ 1. Total number of years you have worked in your present office space:
 (a) 0-2 yrs. 64 (b) 3-5 yrs. 77 (c) 6-10 yrs. 29 (d) 11 or more yrs. 12
- X 2. Your age?
 (a) 30 or less 57 (b) 31-40 62 (c) 41-50 44 (d) over 50 19
- X 3. Your sex?
 (a) Male 56 (b) Female 126
- ✓ 4. How much of your working experience has been in an open-plan facility?
 (a) None 26 (b) 1-2 yrs. 28 (c) 3-4 yrs. 29 (d) 5 or more 98 N/R 1
- ✓ 5. How much of your working experience has been in a facility with enclosed work areas?
 (a) None 65 (b) 1-2 yrs. 26 (c) 3-4 yrs. 27 (d) 5 or more 64
- X 6. How open is the working area where you spend most of your day?
 (a) Open-plan with no dividers 23.
 (b) Open-plan with dividers 4' high or lower 22.
 (c) Open-plan with dividers taller than 4' 67.
 (d) Enclosed office 70.
- ✓ 7. Which type of work area do you prefer?
 (a) Open-plan with no dividers 11.
 (b) Open-plan with dividers 4' or lower 7.
 (c) Open-plan with dividers taller than 4' 14.
 (d) Enclosed office 107.
 (e) Combination of an open-plan with access to an enclosed room for conferences or work in solitude 42. N/R 1
8. Did you assist in any way in the planning or design of your present work space?
 (a) Yes 33 (b) No 149
9. Are you in a supervisory position? (a) Yes 59 (b) No 123. If so, how many people do you supervise? _____. 1 to 6: 34 7 to 15: 15 OVER 15: 10
10. What is your job title?
 Describe briefly the major function of your work:
 CLERICAL 83
 MANAGER 42
 PROFESSIONAL 36
 SUPERVISOR 20

Please rate the following items (1 to 5) according to your assessment of your work place. Circle the response you feel is most appropriate.

	1	2	3	4	5
	No, never				Yes, all of the time
11. You are able to perform your duties without being distracted by noise.	1	2	3	4	5
12. You are able to work without the distraction of passers-by.	1	2	3	4	5
13. You have sufficient space in your work area.	1	2	3	4	5
14. You are able to display items of personal interest.	1	2	3	4	5
15. You are able to adjust the atmosphere (heating, ventilation, air conditioning) in your work area.	1	2	3	4	5
16. You have sufficient privacy in your work area to perform necessary tasks.	1	2	3	4	5
17. If necessary, alternate quiet spaces are readily available to you for work in solitude.	1	2	3	4	5
18. You are able to concentrate in your work area.	1	2	3	4	5
19. You are able to perform your duties without a lot of interruptions.	1	2	3	4	5
20. Tasks requiring creative thought are easily performed in your work area.	1	2	3	4	5
21. You feel comfortable and relaxed in your work area.	1	2	3	4	5
22. Your work environment supports your work performance rather than hinders it.	1	2	3	4	5
23. Your office space helps you to be more productive.	1	2	3	4	5
24. You are able to work without feeling watched or "on display."	1	2	3	4	5
25. You prefer your work environment to any other work environment.	1	2	3	4	5
26. The arrangement of your work space facilitates communication between employees.	1	2	3	4	5
27. You are given freedom to supervise your own work activities.	1	2	3	4	5
28. The employees in your organization work as a cohesive group.	1	2	3	4	5
29. You were able to readily adjust to your present work space.	1	2	3	4	5
30. Overall, you are satisfied with your work space.	1	2	3	4	5

Please rate your work space by circling an assessment number (1 to 5) that you feel is most appropriate. For example, if you feel your work space is neither roomy nor crowded, you would circle #3. Treat each response separately; any apparent repetition is for statistical control.

Your work space is:

- (31) CROWDED 1 2 3 4 5 ROOMY
- (32) NOISY 1 2 3 4 5 QUIET
- (33) PUBLIC 1 2 3 4 5 PRIVATE
- (34) DISTRACTING 1 2 3 4 5 PEACEFUL
- (35) DREARY 1 2 3 4 5 CHEERFUL
- (36) UNCOMFORTABLE 1 2 3 4 5 COMFORTABLE
- (37) BUSTLING 1 2 3 4 5 CALM
- (38) INEFFICIENT 1 2 3 4 5 EFFICIENT
- (39) WORST POSSIBLE 1 2 3 4 5 BEST POSSIBLE

ADDITIONAL COMMENTS:

If there are any positive or negative comments about your workspace that you would like to include, please use this space to share them with me: (If necessary use the back of the page.)

APPENDIX B

TABLES

Table B-1
Raw Data from the Office Environment Study, Tennessee, 1984

Item	Open					Enclosed					Product					Service								
	1	2	3	4	5	N/R	1	2	3	4	5	N/R	1	2	3	4	5	N/R	1	2	3	4	5	N/R
11	17	26	36	21	9	3	1	8	16	26	16	3	8	3	23	15	8	4	10	31	29	32	16	3
12	20	19	36	17	17	3	3	3	13	33	15	3	8	4	18	14	13	4	15	18	31	36	18	3
13	21	21	20	31	16	3	3	5	8	16	35	3	5	7	13	15	17	4	18	19	15	32	34	3
14	24	18	21	20	25	4	2	3	10	16	36	3	12	8	6	14	17	4	14	12	25	22	44	3
15	51	17	17	11	13	3	18	11	17	7	14	3	19	7	8	9	14	4	50	20	26	9	13	3
16	28	25	31	16	9	3	0	4	8	22	33	3	7	11	11	10	18	4	21	18	27	28	24	3
17	56	23	12	7	11	3	14	13	15	4	20	4	28	8	8	2	10	5	40	21	13	9	12	3
18	6	21	46	22	13	4	0	3	14	26	24	3	0	7	17	17	16	4	6	17	39	19	13	4
19	17	40	32	16	3	4	2	6	24	25	10	3	3	9	23	18	4	4	15	37	33	23	9	4
20	16	36	38	10	7	5	1	7	17	29	12	4	6	11	19	12	8	5	11	32	35	27	11	5
21	4	17	42	29	17	3	0	1	7	32	27	3	1	4	13	22	17	4	3	14	35	39	27	3
22	4	20	53	20	11	4	1	0	15	27	24	3	1	3	22	18	13	4	4	17	45	29	22	4
23	16	27	40	15	9	5	0	3	15	24	25	3	3	7	21	14	12	4	13	23	33	25	22	5
24	15	28	21	29	16	4	3	2	1	22	38	3	5	14	1	18	18	5	12	16	21	33	36	3
25	26	25	37	13	7	4	0	8	11	25	23	3	7	7	16	17	10	4	19	25	32	21	20	4
26	7	8	31	41	21	4	7	6	17	24	13	3	8	3	17	20	9	4	5	11	31	45	25	4
27	4	4	19	48	34	3	0	3	8	24	32	3	1	4	7	22	23	4	3	3	20	50	42	3
28	2	6	38	35	28	3	1	3	17	32	14	3	2	3	17	21	14	4	1	6	37	46	28	3
29	1	5	32	47	24	3	1	2	10	26	28	3	0	0	13	22	22	4	0	7	28	51	30	3
30	8	22	42	25	12	3	0	0	9	26	32	3	0	4	20	19	14	4	8	18	30	32	30	3
31	21	30	45	9	7	0	3	9	22	17	19	0	4	17	26	6	8	0	19	22	41	20	18	1
32	30	31	36	11	3	1	1	14	24	21	10	0	7	15	25	9	4	1	23	30	35	23	9	1
33	29	33	31	13	6	0	5	2	12	31	20	0	8	11	18	16	8	0	25	24	25	28	18	1
34	26	40	34	8	3	1	2	7	19	29	13	0	8	17	16	15	5	0	19	30	37	22	11	2
35	15	21	47	21	8	0	1	4	25	26	14	0	4	7	27	15	8	0	12	17	45	32	14	1
36	3	27	46	28	7	1	2	2	16	29	21	0	2	11	15	24	9	0	2	18	47	33	19	2
37	17	25	49	18	3	0	4	7	15	25	19	0	5	4	27	17	8	0	15	28	37	26	14	1
38	5	17	45	30	14	1	1	3	14	33	19	0	2	3	18	25	13	0	4	15	42	38	20	2
39	3	18	60	24	6	1	0	1	24	30	14	1	0	5	30	18	7	1	3	13	54	36	13	2

*N/R = No response

Table B-2

Dimensions Eliminated Due to Lack of Interrelation of Items;
Office Environment Study, Tennessee, 1984

Dimension 7 Control Over Environment				Dimension 8 Cohesive Group			
Item	14	15	30	Item	26	27	28
14	1.00	.17	.42	26	1.00	.12	.19
15		1.00	.10	27		1.00	.35
30			1.00	28			1.00

Note: Items 17 and 29 were eliminated due to lack of correlation at .5 with any other item within their dimension.

Table B-3

Summary of t-Test Results Between Employees in Open and Enclosed Offices
and Product and Service Companies

Questionnaire Item #		N	$\bar{X}$	SD	T val	DF	Prob.	Descriptor*
11	C1**	67	3.72	1.01	5.27	174	.00	Noise
	Op	109	2.81	1.17				
	Pr	57	3.21	1.19	.44	174	.66	
	Ser	119	3.13	1.20				
12	C1	67	3.81	.99	4.75	174	.00	Passers-by
	Op	109	2.93	1.30				
	Pr	57	3.35	1.30	.65	174	.52	
	Ser	119	3.21	1.25				
13	C1	67	4.12	1.16	5.59	174	.00	Sufficient Space
	Op	109	3.00	1.36				
	Pr	57	3.56	1.28	.89	174	.38	
	Ser	119	3.36	1.45				
14	C1	67	4.21	1.05	5.66	173	.00	Display Items
	Op	109	3.04	1.48				
	Pr	57	3.28	1.54	-1.31	173	.19	
	Ser	118	3.58	1.39				
15	C1	67	2.82	1.48	2.55	174	.01	Adjust Atmosphere
	Op	109	2.25	1.44				
	Pr	57	2.86	1.62	2.49	174	.01	
	Ser	119	2.28	1.37				
16	C1	67	4.25	.89	9.62	174	.00	Privacy
	Op	109	2.57	1.25				
	Pr	57	3.37	1.42	1.04	174	.30	
	Ser	119	3.13	1.38				
17	C1	66	3.05	1.53	4.60	173	.00	Quiet Spaces
	Op	109	2.03	1.34				
	Pr	56	2.25	1.54	-.98	173	.33	
	Ser	119	2.49	1.48				
18	C1	67	4.06	.87	6.03	173	.00	Concentrate
	Op	108	3.14	1.05				
	Pr	57	3.74	1.01	2.12	173	.04	
	Ser	118	3.37	1.09				
19	C1	67	3.52	.96	6.48	173	.00	Interruptions
	Op	108	2.52	1.02				
	Pr	57	3.19	.97	2.44	173	.02	
	Ser	118	2.76	1.15				
20	C1	66	3.67	.95	6.74	171	.00	Creative
	Op	107	2.59	1.06				
	Pr	56	3.09	1.20	.71	171	.48	
	Ser	117	2.96	1.13				
21	C1	67	4.27	.71	6.38	174	.00	Comfortable
	Op	109	3.35	1.04				
	Pr	57	3.88	.98	1.60	174	.11	
	Ser	119	3.61	1.04				
22	C1	67	4.09	.85	6.73	173	.00	Supports
	Op	108	3.13	.96				
	Pr	57	3.68	.95	1.68	173	.09	
	Ser	118	3.41	1.06				
23	C1	67	4.06	.89	8.01	172	.00	Productive
	Op	107	2.76	1.13				
	Pr	57	3.44	1.12	1.36	172	.18	
	Ser	117	3.17	1.26				

Table B-3 (continued)

Questionnaire Item #		N	$\bar{X}$	SD	T val	DF	Prob.	Descriptor
24	C1	66	4.36	1.00	7.18	173	.00	Not on Display
	Op	109	3.03	1.29				
	Pr	56	3.54	1.40	.03	173	.98	
	Ser	119	3.53	1.34				
25	C1	67	3.94	1.00	8.14	173	.00	Prefer Environment
	Op	108	2.54	1.17				
	Pr	57	3.28	1.25	1.46	173	.15	
	Ser	118	2.97	1.32				
26	C1	67	3.45	1.21	-.66	173	.51	Communication
	Op	108	3.56	1.09				
	Pr	57	3.33	1.23	-1.52	173	.13	
	Ser	118	3.61	1.08				
27	C1	67	4.27	.85	2.17	174	.03	Freedom
	Op	109	3.95	.99				
	Pr	57	4.09	.99	.13	174	.89	
	Ser	119	4.07	.93				
28	C1	67	3.82	.87	.54	174	.59	Cohesive Group
	Op	109	3.74	.97				
	Pr	57	3.74	1.01	-.35	174	.72	
	Ser	119	3.79	.89				
29	C1	67	4.16	.90	2.62	174	.01	Readily Adjust
	Op	109	3.81	.87				
	Pr	57	4.16	.77	2.23	174	.03	
	Ser	119	3.84	.93				
30	C1	67	4.34	.71	8.37	174	.00	Satisfied
	Op	109	3.10	1.08				
	Pr	57	3.75	.912	1.47	174	.14	
	Ser	119	3.49	1.21				
31	C1	70	3.57	1.15	5.98	180	.00	Crowded/ Roomy
	Op	112	2.56	1.08				
	Pr	61	2.95	1.09	.00	180	1.00	
	Ser	121	2.95	1.27				
32	C1	70	3.36	1.00	6.43	179	.00	Noisy/ Quiet
	Op	111	2.33	1.07				
	Pr	60	2.80	1.05	.58	179	.56	
	Ser	121	2.69	1.20				
33	C1	70	3.84	1.10	8.31	180	.00	Public/ Private
	Op	112	2.41	1.15				
	Pr	61	3.08	1.23	.87	180	.39	
	Ser	121	2.90	1.38				
34	C1	70	3.63	1.00	8.76	.79	.00	Distracting/ Peaceful
	Op	111	2.30	1.00				
	Pr	61	2.87	1.18	.46	179	.65	
	Ser	120	2.78	1.20				
35	C1	70	3.69	.91	5.19	180	.00	Dreary/ Cheerful
	Op	112	2.88	1.09				
	Pr	61	3.26	1.05	.66	180	.511	
	Ser	121	3.15	1.12				
36	C1	70	3.93	.95	5.97	180	.00	Uncomfortable/ Comfortable
	Op	112	3.05	.97				
	Pr	61	3.44	1.06	.48	180	.63	
	Ser	121	3.36	1.05				

Table B-3 (continued)

Questionnaire Item #		N	$\bar{X}$	SD	T val	DF	Prob.	Descriptor
37	C1	70	3.69	1.15	6.17	180	.00	Bustling/ Calm
	Op	112	2.69	1.01				
	Pr	61	3.31	1.06	1.99	180	.05	
	Ser	121	2.95	1.20				
38	C1	70	3.94	.88	4.56	180	.00	Inefficient/ Efficient
	Op	112	3.25	1.06				
	Pr	61	3.72	.97	1.88	180	.06	
	Ser	121	3.41	1.08				
39	C1	70	3.77	.89	5.13	180	.00	Worst Possible/ Best Possible
	Op	112	3.08	.88				
	Pr	61	3.39	.92	.48	180	.63	
	Ser	121	3.32	.96				

*The complete questionnaire appears in Appendix A.

** C1 = Closed
Op = Open
Pr = Product
Ser = Service

Table B-4

Frequency of Percents of Positive and Negative Responses by Office-Space Type
(Open or Enclosed), Office Environment Study, Tennessee, 1984

Questionnaire Item	DF	Chi ²	Sig.	Negative		Positive	Descriptor
				Open	(Open 1 + Open 2)	Enclosed	
11	4	23.48	**	83	(31-52)	58	Noise
12	4	29.98	**	87	(38-49)	59	Passers-By
13	4	19.99	**	84	(30-54)	52	Sufficient Space
14	4	25.75	*	89	(32-57)	54	Display Items
15	4	6.82	NS	70	(26-44)	47	Adjust Atmosphere
16	4	60.56	**	91	(39-54)	69	Privacy
17	4	17.40	**	74	(28-46)	57	Quiet Spaces
18	4	31.17	**	90	(37-53)	59	Concentrate
19	4	36.10	**	88	(39-49)	65	Interruptions
20	4	44.20	**	87	(30-57)	71	Creative
21	4	37.26	**	95	(36-59)	56	Comfortable
22	4	40.96	**	96	(36-60)	62	Supports
23	4	48.46	**	94	(35-59)	67	Productive
24	4	44.78	**	90	(40-50)	57	Not on Display
25	4	51.80	**	86	(30-56)	71	Prefer Environment
26	4	4.92	*	53	(21-32)	37	Communication
27	4	5.89	*	73	(18-55)	41	Freedom
28	4	4.17	*	67	(17-50)	42	Cohesive Group
29	4	5.23	*	67	(22-44)	43	Readily Adjust
30	4	50.07	**	100	(43-57)	61	Satisfied
31	4	34.06	**	81	(30-51)	69	Crowded
32	4	32.95	**	80	(28-53)	69	Noisy
33	4	68.74	**	90	(45-45)	73	Public
34	4	59.90	**	88	(33-55)	79	Distracting
35	4	24.38	**	88	(34-54)	58	Dreary
36	6	34.86	**	88	(44-44)	59	Uncomfortable
37	4	46.13	**	79	(43-36)	68	Bustling
38	6	24.36	**	85	(35-50)	54	Inefficient
39	6	31.99	**	96	(27-68)	60	Worst

* = $\leq .05$

** = $\leq .01$

See questionnaire in Appendix A for the complete item.

Open 1 = Open with no dividers and open with dividers lower than 4'.

Open 2 = Open with dividers higher than 4'.

VITA

Marlene Margaret Bradshaw was born to Earl and Margaret Christensen in Detroit, Michigan, on April 2, 1936. She received her public education in Detroit and her Bachelor of Science degree from Michigan State University.

She taught elementary school for several years in South Bend, Indiana. She received her Master of Arts degree from the University of New Mexico in 1972. While teaching Art in a high school in Albuquerque, she served as Art Department Chairperson.

She taught in the Home Economics Department at the University of Tennessee, Chattanooga, as a member of the Adjunct Faculty. While working toward the Doctor of Education degree, she served as a graduate assistant for two years in the Department of Educational Administration and Supervision at the University of Tennessee, Chattanooga. She was awarded a Fellowship for the school year 1982-1983. She received the Doctor of Education degree with a major in Educational Administration and Supervision in August 1984.

She is married to Dale T. Bradshaw of Norman, Oklahoma, and has three children, Michael Eugene, Thomas Hadley and Kevin Earl.