

EMPLOYEES' SATISFACTION AS INFLUENCED BY ACOUSTIC AND
VISUAL PRIVACY IN THE OPEN OFFICE ENVIRONMENT

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DEDICATION

This thesis is dedicated to my parents, Robert and Norene Monhollen. They were both educators and dedicated to the development and encouragement of young minds. They taught in the public school system in Monroe Michigan, but their impact reached far beyond the classroom. I can only hope that I will be able to share my love for education with my students and community someday as they did. I hope to never stop learning from their example, and I will never stop missing them.

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ABSTRACT

The purpose of this study was to examine the relationship between employees' acoustic and visual privacy issues and their satisfaction with their open office work environments. Because the practice of interior design deals with the relationship between the occupant and the built environment, employees' satisfaction with their privacy while in focus work mode was investigated.

The study examined the Science Teaching Student Services (STSS) building located along the East Bank of the University of Minnesota (UMN), Minneapolis campus. The building houses instructional classrooms and administrative offices that service UMN students. The areas of interest for the study are floors 2, 4, and 5, which contain both office areas and classrooms. However, only the office workplaces and the office full-time and part-time employees were studied. The Sustainable Post-Occupancy Evaluation Survey (SPOES) was used to collect data on overall privacy conditions, acoustic and visual privacy conditions, and employees' perceived privacy conditions while in their primary workplace.

Paired T-tests were used to analyze the relationships between privacy conditions and employees' satisfaction with their privacy. All hypotheses were supported indicating that employees are satisfied with their overall privacy, acoustic privacy, and visual privacy within their primary workplace.

The findings are important because they can be used to inform business leaders, designers, educators, and future research in the field of office design.

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CHAPTER 1 INTRODUCTION

Purpose of the Study

The purpose of this study was to examine the relationship between employees' acoustic and visual privacy issues and their satisfaction with their open office work environments. Privacy has several contextual definitions in the work environment. This study will examine acoustic and visual privacy issues in proximity to the employee. Studying the relationship between employees' privacy and their satisfaction with the open office environment is particularly timely. The current economic trend in businesses is to increase workplace density and collaboration among employees, both of which may influence employees' privacy and their ability to perform focused work. At the same time, employers are interested in increased employee satisfaction and thus, profitability. These trends may have implications for open office design.

Rationale

As we have moved from a manufacturing society to a knowledge-based society, the focus for interior designers of office space has been to support the knowledge employee. The evolution of commercial office design began in the 1960s with the introduction of the modular office panel system by Herman Miller Inc., which was replicated by all other major office furniture manufacturers. It changed the design of the office environment from a 'bull-pen' design, which was many desks aligned in rows with no barriers and surrounded by enclosed, private offices, to small compartmentalized workplaces surrounded by panel systems, which gave employees a sense of visual privacy. The separation of employees' workplaces from private offices still remained.

This evolution was due in part to advances in building engineering, which accommodates larger open floor plans with fewer structural obstructions (i.e., columns) and allows for the modification of the interior of a space with little change to the existing architecture. Subsequently, businesses can be more flexible in terms of their space utilization and provide an open work environment for employees, which can contribute to their collaboration. Although this is a positive advancement for office design, it comes with some drawbacks.

The first drawback is that the cost of real estate is based on square footage, that is, businesses pay rent for the number of square feet they lease in a building. Open floor plans are typically found in class “A” office buildings, which command higher rent rates, so tenants want the design to optimize use of their leased space. Part of the leasing process is to calculate a cost per square foot per employee and a density factor for space utilization. The application of a modular office panel system in an open floor plan means that floor plans have increased in density. The result is an increase in employees' complaints that the lack of visual and acoustic privacy affects their ability to focus (Gensler, 2013a).

Another drawback is that economic conditions influence utilization of space. During a thriving economy, businesses are in a position to increase staff, but do not have the ability to rent additional space, so the most frequent option is to increase workplace density (Gensler, 2013b). With a sluggish economy, businesses downsize their workforce and reduce the amount of leased space beyond the downsizing requirements. This solution also increases density and reduces privacy for the remaining employees.

Perceived and actual satisfaction of employees who work in this high density / low privacy open office environment is an issue.

Another factor that influences employees' satisfaction and privacy is the nature of today's business interaction that supports collaboration among employees. Collaboration as a work mode has become the dominant trend in businesses (Gensler, 2006; 2008; 2012). As the size of individual work areas (i.e., workstations) has become smaller in their footprint, employees' have less space within their workplaces to collaborate. Therefore, employees are utilizing alternate work settings (i.e., common areas, meeting areas, and training areas) beyond their own workstations for the purpose of increased collaboration (Steelcase, 2012; Gensler 2008). This is in contrast to the more conventional approach to open office design, which historically has been on maximizing employee workplace density to minimize the cost of leased space. As collaboration has become a common work mode in offices, more space is being allocated to collaborative work settings and less to individual workplaces (Steelcase, 2012), both of which affect individual employees' privacy.

Research has shown that loss of privacy can result in increased distraction and the inability to concentrate on individual job responsibilities. Therefore, there is a point where the advantage in higher employee density, often brought about by the need to decrease real estate costs, is outweighed by the loss in employees' productivity (Arieff, 2012; Murphy-Paul, 2012). Research completed by Gensler, a major global design firm, found that top-performing businesses have higher performing work environments than average companies. Gensler (2008) defines a high performing work environment as one

that supports the four work modes that are used in open office environments: "Focus, Collaborate, Learn, and Socialize" (p. 4). Although all four work modes require a degree of privacy for the employee, the Focus mode requires the highest amount of privacy and also has been identified as the mode employees are engaged in the most. Employees identified Collaboration as the second most utilized work mode followed by Socialize and Learn modes (Gensler, 2012). A deeper look at work modes is warranted to provide context to employees' privacy issues.

Background

Furniture manufacturers such as Haworth Inc., Herman Miller Inc., and Steelcase Inc. engage in research on workplace design trends (Haworth, 2011; Herman Miller 2013; Steelcase 2012). They have identified various work modes used in the open office environment and how office design can support these work modes.

Haworth's (2011) *Competing Values Framework* defines four factors used in organizational culture in an open office: Collaborate, Create, Control, and Compete. These four factors all define how employees work, and why they need collaboration. Herman Miller's (2009) *Adaptable Spaces* model identifies four constructs for work environments: Basic Human Needs, Teaching, Learning and Engagement. Steelcase (2012) has similar findings in their report on *The Interconnected Workplace* using the four concepts of I-owned, I-shared, We-owned, and We-shared to define who uses space and how that space is used in a collaborative work environment (Steelcase, 2012).

Gensler (2008) took the study of work modes further in their *Workplace Performance Index* (WPI) to study the evolution of employees' performance in office

environments. The WPI identifies four work modes currently being used by employees in open office work environments. The four modes are: Collaborate, Learn, Focus, and Socialize and are defined as follows:

1. Collaborate work mode: Working with another person or group - in person, via technology, or a combination of both - to achieve a goal.
2. Learn work mode: Acquiring knowledge of a subject or skill through education or experience.
3. Socialize work mode: Interactions that create trust, common bonds and values, collective identity, collegiality, and productive relationships.
4. Focus work mode: Individual work involving concentration and attention devoted to a particular task or project.

As can be seen in Figure 1, Gensler (2008) has found the focus mode to be central to the other modes and occupies up to 55%, in the work day and was the activity people considered the most critical to performing their jobs. This is a surprising finding given the emphasis on collaboration by many businesses.

But as distractions have increased and privacy has decreased since 2007, individual's focus work has become more important for the success of collaborative environments as well (Gensler, 2012). Distractions have

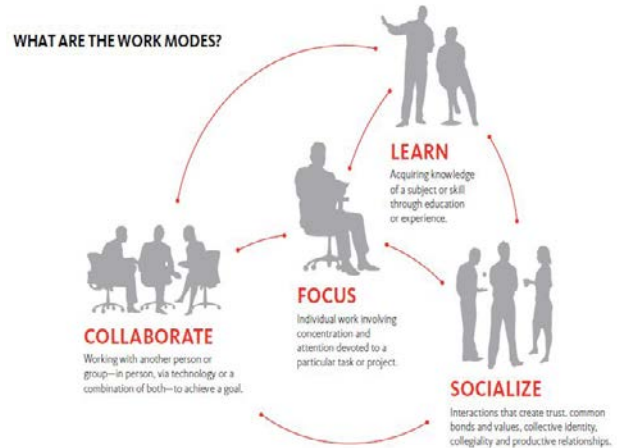


Figure 1. Four work modes (Gensler 2008)

increased as mobile technology and social media have become more accessible and workplace size continues to shrink. Further, collaboration has increased and longer work days can be expected in a weak economy.

Of Gensler's four work modes, the focus mode is the least supported by today's office design despite being the mode in which employees spend the most time. One trend Gensler anticipates is that as businesses pursue more collaboration at the cost of reduced focus for the individual, there will be a decrease in effectiveness for both. Gensler's (2012) report concludes that this is "not a repudiation of collaboration, but rather an embrace of focus. When it can be achieved, good things happen" (pp. 4-5). The research by Gensler, Haworth, Herman Miller, and Steelcase shows that an open office design that encourages and supports collaboration among employees is a trend that is being implemented by businesses and needs to be supported by the workplace design.

Importance of privacy in the workplace. Privacy concerns exist in many fields and thus, have many contextual definitions. Pedersen's (1999) perspective of privacy recognizes that privacy is not just a withdrawal from other people, but involves controlling the amount and type of contact one has with others. His research defines privacy regulation as a function of both personal and situational factors. Pedersen suggests there are six types of privacy: solitude, reserve, isolation, intimacy with family, anonymity, and intimacy with friends. The five types of privacy function are autonomy, confiding, rejuvenation, contemplation, and creativity (Pedersen, 1999). Discussion on these perspectives will continue in Chapter 2.

Margulis' (2003) findings present privacy through two research perspectives as a social issue and as a behavioral concept. His psychological concept emphasizes privacy as control over regulation of, limitation on, or exemption from scrutiny, surveillance, or unwanted access. As a social issue, privacy has three manifestations: interpersonal communication and social interaction; how we experience, understand, react to, and enact privacy; and lastly, that privacy is an attribute not only of individuals but also of groups and organizations (Margulis, 2003).

Westen's (1967) privacy theory focuses on the states or types of privacy and the function of privacy much in the way Pedersen does, but puts more emphasis on informational privacy. From Westen's perspective, privacy protects personal autonomy and supports healthy functioning by providing needed opportunities to relax, to be one's self, to emotionally vent and escape the stress of daily life, and to support stable interpersonal relationships and personal development (Westen, 1967).

Altman's (1976) definition of privacy implies similar themes when he states that privacy is "selective control of access to the self or to one's group" (p. 3). Altman uses six constructs in his theory of privacy and includes units of privacy, dialectic nature of privacy, nonmonotonic nature of privacy, privacy as a boundary regulation process, desired and achieved privacy, and bidirectional process. These constructs and their definitions will be discussed in Chapter 2.

The common themes in these privacy theories are the elements of control and access. Each theorist applies these elements differently. Privacy between individuals,

groups, or with information, demonstrates that privacy issues are not limited in scope or environment.

This study will attempt to determine the relationship between employees' perceived satisfaction and their privacy in the open office environment. Because the practice of interior design deals with the relationship between the occupant and the built environment, employee perceptions of their privacy while in Focus work mode will be investigated.

Research Question

What is the relationship between employees' satisfaction and privacy in their primary workplace when performing focused work in an open office design?

Significance of the Study

Improving our understanding of the relationship between employees' privacy and their satisfaction can inform the future of office design. High-performing office environments will support employees' physical needs such as acoustic privacy and their social needs such as visual privacy, while increasing their satisfaction and thus profitability of the company.

Summary

Due to the change in office design, work modes, and importance of employees' satisfaction to the business economic success, it is important to understand the relationship between employees' satisfaction and privacy issues in the open office environment. Greater understanding of this issue could improve the future of office

design and provide a physical environment that supports improving employees' satisfaction and business profitability.

CHAPTER 2 LITERATURE REVIEW

In this chapter, the relevant literature on several topics related to employees' privacy in open office work environments will be reviewed. First, conceptual definitions and key terminology are provided. Next, a brief history of commercial office design provides a contextual understanding of the current spatial design strategies. Then, work modes being utilized in today's open office environment will be defined and discussed. Privacy in the work environment will be reviewed including research findings that relate privacy to employees' satisfaction. Contextual definitions for various modes of privacy and satisfaction issues and possible measurement criteria are presented. To help understand privacy and satisfaction issues, a theory of privacy used by social scientists will be explored.

Contextual Definitions and Key Terms

For the purpose of this study, acoustics will be addressed within the following contextual definitions as it relates to privacy.

- Collaborate: To work jointly with others or together especially in an intellectual endeavor (Collaborate, 2011).
- Distraction: Something that makes it difficult to think or pay attention (Distraction, 2011).
- Open Office: Work environments that are equipped with barriers such as panels and bookshelves to provide the perception of a private workplace and exposes employees to situational factors while engaging in knowledge work (Smith-Jackson & Klein, 2009)..

- Performance: A measure of goals achieved, including but not limited to tasks or can be measured at multiple levels from personal to corporate (Smith-Jackson & Klein, 2009).
- Privacy: The regulation of interaction between the self and others and environmental stimuli, which is a dynamic, boundary-regulating process that changes depending upon the particular situation and circumstances at the time (Kupritz & Haworth, 2009)
 - Acoustic privacy: Includes speech or conversational privacy and freedom from noise distractions (Bellinger & Kupritz, 2011)
 - Visual privacy: Maintains the optimal level of social contact that each person needs (Kupritz & Haworth, 2009)
- Proxemics: A measure of distance zones that define various levels of interaction between people (Hall, 1982). All of these proxemic zones address the issues of territoriality and the relationships of the individuals who are interacting with each other within each zone (pp. 116-123). Discussion on the four zones continue in this chapter.
- Satisfaction: An employee's overall evaluation of his or her job as favorable or unfavorable (Spector, 1997). Satisfaction also includes ones behaviors and attitudes toward his or her job (Eagly & Chaiken, 1993)

History of Commercial Office Design

The first large-scale office buildings appeared in the late 19th-century in the United States when there was rapid industry growth and the subsequent need to house a large number of office employees in the same building. At the same time, steel frame construction was introduced, which allowed large open expansive floor plates and elevators to bring about vertical growth (Kopec, 2012). These office buildings were particularly prevalent in Chicago, known as the home of the American skyscraper, and New York's Sky buildings (Aardex, 2004).

The history of office design before the 21st-century can generally be categorized by four distinct trends: Taylorism (early 1900), Bürolandschaft (1950), Cubicles (1968), and Virtual Office (beginning 1994) (The Office History - Taylorism, n.d.). The Taylorist trend of office space originated from his concept of Scientific Management that included principles like rationalization of work processes to achieve maximum of efficiency, clear-cut functional hierarchies, and division of labor into repetitive tasks. This approach to office management was mirrored in the design and construction of office buildings (The Office History - Taylorism, n.d.). Figure 2 shows the linear layout of an office where a Taylorism approach to management occurs. The desks support the individual tasks; all is quite rigid.



Figure 2. The Taylorist office (The office history – Taylorism, n.d.)

Before these changes in the physical work environment were occurring, research on employees' environmental working conditions, performance, and satisfaction started in the 1920s with the Hawthorne studies (Franke, 1978). The Hawthorne studies analyzed the effects of lighting on workers' performance and hypothesized that increased lighting in the room would correlate with increased productivity. Initially, the hypothesis was supported, but when lighting levels were reduced and productivity did not decline, the experiment was considered a failure. However, the study taught us the importance of controls (referred to as the Hawthorne Effect) in research. The Hawthorne study produced these three main findings:

1. The effect of the physical environment is buffered by perception, beliefs, preferences, experiences, and personality.
2. One environmental variable turned out to be more important than the subtler variations.
3. The physical environment changed the social dynamics (i.e., subjects were happier)

(Snow, 1927). Although the original hypotheses were never sufficiently supported, the Hawthorne studies opened the door for continued interest and further research on the physical work environment and its effect on employees' performance and productivity. While skyscrapers continued their dominance in the first half



Figure 3. The hub office (Ross 2012)

of the 20th-century, it wasn't until the 1950s that new designs in office interiors or planning emerged when a new office plan was introduced. In Germany, the Eberhard and Wolfgang Schnelle's Quickborner team of management consultants (Ross, 2012) developed a new office layout that was viewed as highly radical and deviated from the Hub layout that had been the norm for the past several decades. As shown in Figure 3 (Ross, 2012), hub offices were recognized for their uniform, linear grid-like arrangement of desks and chairs in an open room with no physical separation. As most of the office work being performed at that time was clerical in nature, this arrangement also supported the function of the task and the Taylorist theory of workplace management (Ross, 2012). The Quickborner team recognized that the Taylorism method was better suited to line or factory work, and that a white collar office environment needed to address an organizational theory called Bürolandschaft or office landscape. This theory addressed human relations as an integral part of office plans. This movement was popular in European offices designed by the end of the 1960s (Caruso St John, 2013). It was during this time that designers and employers became cognizant of the effect of office design on productivity in the white collar office environment.

In support of the office landscape movement, office landscape furnishings



Figure 4. Osram offices: Bürolandschaft layout (Caruso St John Architects 2013)

systems were able to be configured in non-linear ways, which promoted employees' interaction and perhaps influenced their performance (see Figure 4).



Figure 5. 1970s: the open office plan (wordpress.com, n.d.)

In 1964, Robert Propst developed the first modular office furniture system, called Action Office, for Herman Miller using freestanding furniture as space dividers (see Figure 5) (wordpress.com, n.d.). In 1968, this system evolved to include upholstered panels for modular walls to further divide space and provide vertical privacy (Aardex, 2004; Kopec, 2012). Other manufacturers such as Haworth and Steelcase followed with their own versions of what is now known as systems furniture. The unfortunate consequence to this development was it allowed companies to select a la carte the space-saving aspects, eliminate any humanizing benefit (Kopec, 2012), and provide a complete, holistic design solution.

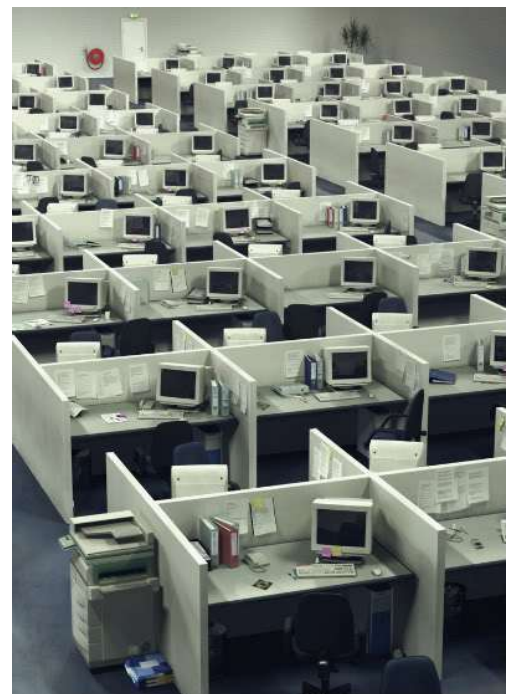


Figure 6. 1990s: the cubicle jungle (wordpress.com, n.d.)

This led to negative perceptions of open office design; they became known as cubicles and are shown in Figure 6 (wordpress.com, n.d.).

By the 1980s, modular office workstations were standard elements in office environments and became the symbol of corporate culture that mandated uniformity over individual needs of the employees. In the 1990s, rapid changes in technology, the need for a more mobile workforce, and the desire for increased employee collaboration forced more change to the office environment. Kupritz (1998) found that open office design resulted in employees' increased acoustic and visual distractions and decreased productivity. This study supported the notion that open offices were insufficient to meet employees' privacy needs. One conclusion was that although open office environments were cheaper to build, this loss in employee productivity was an inherent cost that counteracted the initial savings of increased density (Kupritz, 1998).

Until the 1980s, the workplace was viewed as a means to support businesses' goals and objectives (Gensler, 2008). Today, business culture is moving toward understanding employees' needs because employers recognize the relationship between employees' satisfaction and their performance (Lee & Guerin, 2009).

Further, continued advancements in technology since the 1990s and the changing demographics of the modern workforce have greatly influenced how office space is developed today. Technology advancements have eliminated the need for large, fixed computer server rooms, freeing up some physical space. Additionally, mobile technology such as laptops, tablet computers, and smartphones allow employees to work remotely or in alternate environments (Gensler, 2008). A large percentage of baby boomer (born after 1945) employees are on the verge of retirement, while at the same time, members of Generation X (born between 1965 to 1980) are increasing their presence in the work

force. The physical, psychological, and social needs of these generational differences mean that employers need to evolve their office space to reflect the technology and evolving needs of their diverse employees. The question for interior designers, then, is how this change will affect employees' privacy and satisfaction.

Economic conditions also influence how office space is utilized. During a thriving economy, businesses are in a position to increase staff, but do not have the ability to rent additional space, so the most frequent option is to increase workplace density (Gensler, 2013b). With a sluggish economy, businesses downsize their workforce and reduce the amount of leased space. This solution also increases density for the remaining employees. Perceived and actual satisfaction of employees who work in this high density / low privacy open office environment then becomes an issue. It has also been shown that higher density decreases both acoustic and visual privacy (Brennan, Jasdeep, & Kline, 2002) which, in turn, affects satisfaction. Next, a review of privacy issues as related to changing employees' work modes will be discussed.

Employees' Work Modes

In the last decade, several furnishing manufacturers and design firms have begun to understand that the office work environment must support several types of employees' work modes. They have completed studies and developed language that describes these work modes.

Haworth's (2011) *Competing Values Framework* suggests there are four work cultures in today's office environment. Collaborate, create, control, and compete - each have four elements of social interaction, creating a 4 x 4 matrix of competing values (see

Figure 7). The Collaborate culture is evident by employees being engaged in a high social element and includes strategic thinking. Create culture suggests employees utilize strategic thinking more strongly, but also has a high social element.

Control culture is evident in a presentation

environment where

employees also

require an element of

tactical execution. Compete culture ranks highest on employees' tactical execution with an element of presentation (Haworth, 2011).

In Steelcase's (2012) *Interconnected Workplace* model, the goal is to provide a "supportive work environment for the work being done today, while anticipating the needs of the work that will be done tomorrow" (p. 1). By creating a workplace environment that offers choice and control over the environment, employees can capitalize on opportunities presented by social, spatial, and

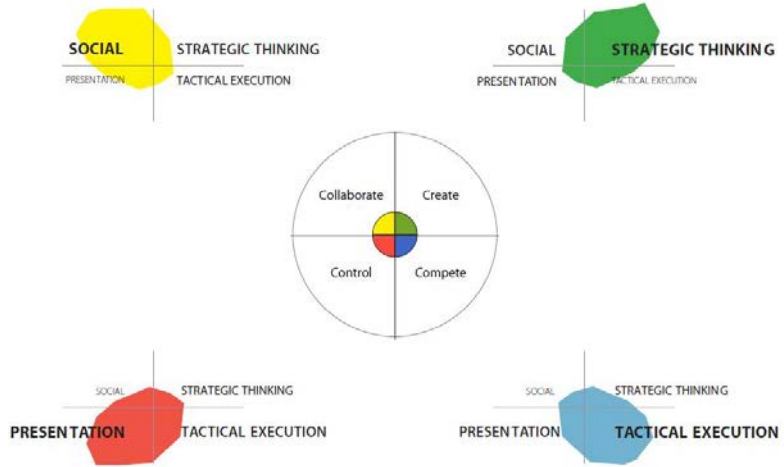


Figure 7. Haworth's competing values framework (2001)

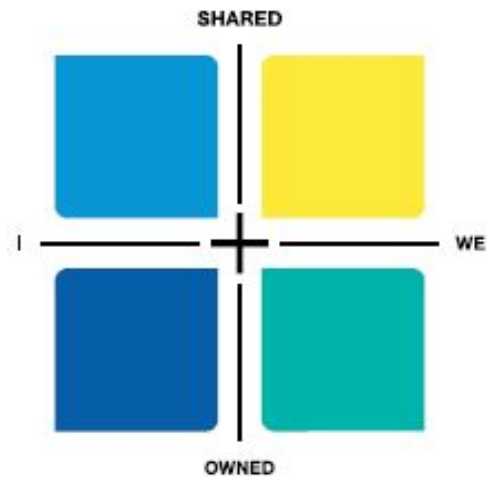


Figure 8. Steelcase's interconnected workplace model (2012)

informational interactions. This is illustrated in the "I-owned, I-shared, We-owned, We-shared" model of collaboration and social interaction (Steelcase, 2012).

Although Haworth and Steelcase both address work types and culture in the open office environment, work modes are presented in a more comprehensive model by Gensler's Workplace Performance Index (WPI). The WPI was introduced in 2006 with their first comprehensive survey that covered eight industries with equal regional representation across the continental United States. Gensler repeated this survey in 2008 and again in 2013.

Part of Gensler's contribution to defining work modes and the knowledge work inherent in them was shown when they introduced management expert, Peter Drucker's, definition of knowledge work. Drucker (1959) introduced the term "knowledge work" to describe work that occurs because of mental processes rather than physical labor. Gensler (2008) expands on this definition by saying that knowledge work comprises "intangible assets such as ideas, information, and expertise" (p. 4). It is also estimated that knowledge workers outnumber all other workers in America by four to one. Hence, the importance of studying the work modes of these employees and the social issues that influence their satisfaction, such as privacy in the workplace (Gensler, 2008).

Because companies that engage in knowledge work do not produce a tangible product, the capital for the company must be defined differently than for a company engaged in manufacturing. Becker (1993) gives us this definition, "Human Capital is the stock of competencies, knowledge, social and personality attributes, including creativity,

cognitive abilities, embodied in the ability to perform labor so as to produce economic value" (p. 87).

Gensler (2008) elaborates on this definition in each work mode to address knowledge work. For Focus mode, human capital becomes productive capital, which includes people involved in thinking, reflecting, analyzing, writing, problem-solving, quantitative analysis, creating, imagining, reviewing, and assessing. Human capital in Collaborate mode is defined as innovative capital, which includes people involved in sharing knowledge and information, discussing, listening, co-creating, showing, and brainstorming interactions that may be face-to-face, by phone, video, or through virtual communication (Gensler, 2008).

As stated in Chapter 1, Gensler's WPI identifies four work modes used in open office environments; Collaborate, Focus, Learn, and Socialize. A comparison of employees' time spent in Collaborate and Focus work modes is shown in Table 1 as they were reported in 2008 and 2013. These two modes have been identified as being most influenced by privacy in the office environment. Although there are two other work modes, Learn and Socialize, they are not being investigated in this project so these findings are not reported.

Table 1 illustrates that between 2008 and 2013, focus work increased and collaborative work decreased for knowledge workers, indicating a shift in work modes over the course of five years.

Some of the key findings in the 2013 study show that employees' increase in time spent in focus work mode can be attributed to an increase in workplace density.

Increasing workplace density suggests a possible loss of acoustic and visual privacy for the employees. From 2010 to 2012, the average square footage per person dropped from 225 to 176. This trend is expected to continue, with an estimated decrease to 100 sf/person by 2017 (Gensler, 2013).

Table 1. Work mode comparison from 2008-2013 (Gensler, 2008)

Work Mode	Type of Capital	Definition and Traits of Work Mode	Time Spent 2008	Time Spent 2013
Focus	Productive Capital	Work involving concentration and attention to a particular task or project; thinking, reflecting, analyzing, writing, problem-solving, quantitative analysis, creating, imagining, reviewing, assessing	Average of 48% in Focus mode	Average of 54% in Focus mode
Collaborate	Innovative Capital	Working with another person or group to achieve a goal; sharing knowledge and information, discussing, listening, co-creating, showing, brainstorming; interactions may be face-to-face, by phone, video, or through virtual communication.	Average of 32% in Collaborate mode	Average of 24% in Collaborate mode

Gensler (2013) also found that 53% of employees are disturbed by others when trying to focus, and 42% use makeshift solutions to block out distractions in the workplace. This finding is corroborated by Johnson Controls (2011) through their *All in a Day's Work* workplace strategy survey. The findings show that of the 3,885 employees surveyed, employees report just over half the work day is spent focusing, that noise distractions and a lack of privacy are the top barrier to productivity, that less time is spent in collaborative work due to the amount of distraction it presents, and that 14% of the workday cannot be accounted for and is logged as unproductive. The importance of these findings is not to say that employees are collaborating less, but that focus work mode is

not being supported in the office environment, and collaboration that is not supported by the proper work environment interferes with focus work (Gensler, 2013).

Satisfaction

It must be noted that in this study, employees' satisfaction will be investigated. The ability to measure actual employee satisfaction is limited and especially difficult when investigating knowledge work (Maarleveld, Volker, & Van der Voordt, 2009). Therefore, employees' perception of their own work satisfaction will be investigated as it relates to privacy issues.

Kopec (2006) identified several factors that compose a workplace environment and therefore, affect employees' satisfaction. Workplace culture, organizational structure, and environmental conditions like ergonomics, sick building syndrome, office layout, office personalization, design, and decor can all influence employees' satisfaction and productivity. Further, Kopec suggests that noise pollution and other environmental distractors in the built environment contribute to a loss of productivity and perceived satisfaction (Kaplan & Dana, 2001).

Hua, Loftness, Heerwagen, and Powell's (2011) research found that individual workstations and workplace spatial characteristics that are perceived by employees to support their dynamic interactions and concentrated work contribute to their perceived satisfaction and performance. One of the goals of their research was to determine what combination of factors would inform the design of effective workplaces, not only for individuals, but to maximize corporate efficiencies as well. The five workstation variables included in their study were the workstation size, the level of enclosure

(partition height), interpersonal distance to the nearest co-worker, the workplace spatial density (number of co-workers within 25 feet), and if the workstation had a door. Six floor plan variables were also studied: distance from the individual work station to the nearest meeting space, the nearest copy/print area, the nearest kitchen/break area, the floor plan openness (ratio of vacant: occupied stations), percentage of usable floor space dedicated to meeting rooms and open meeting space, and the percentage of usable floor space dedicated to shared services and amenities. The findings showed that the primary sources of employees' distractions in the work environment are from equipment areas, kitchen and break areas, high traffic or circulation areas, a reluctance to talk in kitchen areas and common equipment areas, and other distractions from meeting areas (Hua et al. 2011). All of these distractions are related to acoustic and visual privacy.

These findings were supported by Oldham, Kulik, and Stepina (1991). They found that there are three spatial characteristics related to job satisfaction and performance. Those factors are spatial density, the number of enclosures that surround an employee's work area, and the interpersonal distance around that employee. Again, all of which reflect privacy issues. High density may increase acoustic and visual distractions; the number of enclosures are an indicator of how much social interaction may occur in the office environment; and interpersonal distance around an employee may also be an indicator of the level of distraction.

Heerwagen, Kampschroer, Powell, and Loftness's (2004) research studied the collaborative work environment, the knowledge worker, and the social and individual aspects of knowledge work. By its very nature, knowledge work requires individuals to

have time alone to think and develop ideas, which is time for non-conscious processing that aids creativity and imagination. Yet, to be useful for an organization, that knowledge must be shared in a collaborative way through social constructs. They continued by examining the links between physical space, focused individual work, and interactive work, and how attributes of space support or inhibit both the ability to concentrate or engage with others. Their findings on collaborative work were similar to Gensler's (2008) earlier findings in that 35% of employees' time was spent in interactions with colleagues, but also included informal and unintentional interactions in their definition of collaboration. Heerwagen et. al. (2004) continue with descriptions of various collaborative physical spaces and types of collaboration that these spaces are intended to support. A common finding across all these collaborative spaces were the elevated levels of distraction, mental fatigue, and reduced privacy that inhibited perceived satisfaction of employees in these spaces resulted in what psychologists call cognitive overload syndrome (Heerwagen, Kampschroer, Powell, & Loftness, 2004).

Kim and deDear's (2013) study highlights the problems of perceived satisfaction in the open office environment based on the level of enclosure of the individual workstation. Their findings showed that the highest levels of Indoor Environmental Quality (IEQ) dissatisfaction were with acoustic and visual privacy in all levels of enclosure except the private, fully enclosed office. The actual percentage levels of dissatisfaction were between 40 - 60% in both IEQ categories of privacy. This study also made a determination between the level of acoustic privacy and the level of noise. Interestingly, the amount of space available for each employee work area was identified

as the most significant IEQ factor of employee workplace satisfaction and perceived improved performance.

Theoretical Framework: Altman's Theory on Privacy

Altman's research (1976) introduces two fields of thought regarding privacy. First, that privacy is defined by terms emphasizing seclusion, withdrawal, and avoidance of interaction with others. The other school of thought is one that puts more emphasis on control, opening and closing of the self to others, and freedom of choice. This position is shared by Westin (1970); Rapoport (1972); and Proshansky, Ittelson, and Rivlin (1970). For the purpose of this study, Altman's (1976) definition of privacy will be used as part of the framework: "Selective control of access to the self or to one's group" (p. 3).

Altman's privacy constructs. Altman's privacy constructs will be introduced to lay the framework for further exploration of each element of privacy and how those elements are manifest in the open office environment. There are six constructs in this theory: Units of privacy, Dialectic nature of privacy, Nonmonotonic nature of privacy, Privacy as a boundary regulation process, Desired and achieved privacy, and Bidirectional process.

Units of privacy. Privacy is usually considered an interpersonal event between two individuals, an individual and a group, or between groups. Therefore, the various units are defined as follows:

- Solitude: One person seeking privacy from an unspecified number of others,
- Intimacy: A group of people seeking privacy from one other or another group,
- Anonymity: One person seeking separation from many others, and

- Reserve: Psychological separation by one person from one or more other persons.

Because of the differences in these units, there must also be differences in analysis based on the social unit being considered.

Dialectic nature of privacy. This social unit uses freedom of choice to use the environment to regulate interaction. A more generic definition of dialectic is found in the Merriam Webster dictionary as "the tension of opposition between two interacting forces or elements" (Dialectic, n.d.). These two definitions illustrate the concept that there are times when people want to be alone, and times when others are sought out. Privacy is a continually changing process that reflects a momentary ideal level of interpersonal contact. This factor is important in that it emphasizes that privacy is not just a withdrawal or avoidance concept.

Nonmonotonic nature of privacy. Nonmonotonic means to have an optimal level of social interaction, that is, homeostasis or equilibrium between crowding and isolation. This is a corollary to the dialectic idea in that either too much or too little privacy is unsatisfactory, thus ideal privacy is a position on a continuum of desired interaction with deviations in either direction being unsatisfactory. Examples of too much privacy would be sensory deprivation, isolation, or confinement. Hyper-stimulation conditions would include crowding or intrusion (Wohlhill, 1974).

Privacy as a boundary regulation process. Privacy as a boundary regulation process implies a flexible barrier or boundary between the self and non-self. It also implies that it is an interpersonal boundary process, whereby the openness-closedness from others shifts depending on the circumstances. This construct would include

concepts of territoriality and proxemics. While Altman does not discuss these concepts directly in his theory, they are present in the literature and warrant being discussed at this point.

Territoriality was first recognized in animal behavior as a means to control space, but carried over with its associated concepts of boundary regulation in human interactions (Newell, 1995). It is interesting to note that in a laboratory situation, Edney and Buda (1976) found that territoriality and privacy could be differentiated. Privacy led to enhanced feelings of freedom, and privacy plus territoriality encouraged feelings of security.

Proxemics is an invisible area surrounding the body that is variable according to circumstance (Newell, 1995). Or, to put it more simply, a measure of distance zones that define various levels of interaction. Each zone has a close and far phase. Hall (1982) defines the four zones as follows:

- **Intimate Distance:** The presence of another person is unmistakable and may be at times overwhelming. The range is between physical contact and 18 inches in proximity.
- **Personal Distance:** Originally used by Hediger to designate the distance consistently separating the members of non-contact species. The range is between 18" and four feet.
- **Social Distance:** The distance where interpersonal business occurs; the distance of collaboration between people in the workplace. The range is between four and seven feet for 1:1 interactions, and between 7 and 12 feet for groups. The distance

used in more formal business interactions such as meetings, training, or situations where hierarchy must be established. This distance is also discretionary based on cultural norms, so conflict could be introduced based on cultural differences and understanding.

- **Public Distance:** The distance well outside the circle of involvement. At the close range of twelve to twenty feet, one could take evasive or defensive action if threatened. The range of twenty-five feet or greater is the distance automatically set around public figures.

All of these proxemic zones address the issues of territoriality and the relationships of the individuals who are interacting with each other within each zone (Hall, 1982).

Desired and achieved privacy. To achieve an optimal workplace for all employees, the regulation of social inputs and outputs involves relationships between desired and achieved privacy. Desired privacy is an ideal state that reflects what a person or group desires regarding social interaction. Achieved privacy is the outcome of social input and output. When achieved privacy and desired privacy are the same, optimum control of privacy exists. When achieved privacy is less than desired privacy, intrusion occurs. When achieved privacy is greater than desired privacy, isolation occurs.

Bidirectional process. Another means of controlling privacy is a two-way process involving control over social inputs and outputs. Boundary regulation includes control input from others to self, i.e., when one wishes to be left alone. Examples of privacy outputs from self to others would include when one wishes to include others in an activity or to include others to help solve a problem.

While all six constructs are of interest, this study will concentrate on *desired and achieved privacy*. This construct takes into consideration the employees' perceptions of privacy in relation to satisfaction levels and will be the basis for the research model discussed in Chapter 3.

Privacy in the Office Environments

Research has shown that privacy disruptions created by acoustic and visual distractions are major problems when trying to evaluate workplace satisfaction. Understanding what constitutes privacy and how these and other privacy issues relate to the work environment are critical to designing effective workplaces (Bellinger & Kupritz, 2011).

Pedersen's (1999) privacy model (see Figure 9) illustrates the relationship between Privacy Types and Privacy Function. All of these Privacy Types; solitude, reserve, isolation, intimacy with family, anonymity, and intimacy with friends, involve opening and closing boundaries in an attempt to optimize access to others. The unit of privacy is one's self for all of the Privacy Types except the two involving intimacy; for those, the unit is one's group. All six Privacy Types involve a variety of privacy

	Privacy Function				
	Autonomy	Confiding	Rejuvenation	Contemplation	Creativity
Solitude	5	3	4	2	1
Reserve	2		1		
Isolation	2	4	3	1	
Intimacy with Family		1	2		
Anonymity			1		
Intimacy with Friends		1	2		

Figure 9. Diagram of privacy types by privacy function (adapted from Pedersen, 1997, 1999)

mechanisms for boundary control to achieve one's desired level of privacy. In the table, 1 = a high correlation, 5 = low correlation and no response equates to no significance between the Privacy Type and Privacy Function (Pedersen, 1997). So, one of the findings show there is a strong correlation between the Solitude Privacy Type and the Solitude Privacy Function and a low correlation with Autonomy. This model is related to Altman's privacy constructs of desired and achieved privacy.

Acoustic and Visual Privacy

Gensler's first workplace survey in the United Kingdom found that improved workplace design that addressed privacy issues could increase employee productivity by 19% and corporate productivity by 17% (Gensler, 2005). Desired and achieved privacy levels relate to the acoustic and visual privacy investigated in this study.

This section will discuss how acoustics are defined in the context of a privacy index; how acoustics are measured in the open office environment; and the standards used to measure four physical elements of acoustics.

Even though Altman is recognized as a pioneer in research of privacy in the office environment, there are very few published measurement instruments based on his theoretical concepts of people's privacy needs. More common are assessments of privacy preferences. In contrast to privacy needs, which reflect the discrepancy between achieved and desired privacy, preferences reflect a trait-like inclination for desired levels of privacy (Haans, Kaiser, & de Kort, 2007). Privacy needs represent the motivational basis for achieving the proper amount of social exchange, which then affects the ability to get one's work done and make social connections, contemplation, or recover from

stressful events. Furthermore, Altman believes there is a single process to explain both extremes of social exchange, the subjective need for more or less privacy (Altman, 1976; Haans et.al. 2007).

Acoustic privacy. Acoustic privacy includes speech or conversational privacy and freedom from noise distractions (Bellinger & Kupritz, 2011). Speech privacy becomes a concern when employees feel like they no longer have confidentiality when having a conversation on the phone or with a co-worker (Bellinger & Kupritz, 2011). Examples include not feeling like one can speak privately on the phone or in person, being overheard by someone in another workplace when talking in a normal voice in one's own workplace, and lack of confidential spaces for meetings in personal office work areas and conference rooms.

Acoustic distractions can come from many sources. The most common are from overhearing conversations by others; environmental background noises such as radios, ventilations systems, piped-in music or white noise systems; background levels that are too quiet so any sound made in the office stands out too much; and physical proximity to a vending area, noisy equipment area, or a high traffic circulation zone (Bellinger & Kupritz, 2011). These examples demonstrate privacy theory in context with privacy applications in the open office environment. Although acoustics are not actually measured in this study, it is important to include a discussion on acoustic measurement because it is part of industry standards.

Acoustic measures. Acoustic testing standards for the open office environment have been developed by the American Society for Testing and Materials (ASTM

International, 2013). In 1984, ASTM sub-committee E33.02 was created to consolidate open office testing efforts. By 1990, that consolidation was complete and the sub-committee issued Standard Guide E1374 (ASTM International, 2008; Herbert, 2013). Another ASTM standard, E1130, defines four levels of speech privacy in a Privacy Index (PI) which is based on the Articulation Index (AI). The Articulation Index (AI) is a signal-to-noise ratio assessment. In an open office, it reflects the degree to which intruding speech from adjacent workplaces exceeds the ambient sound pressure level at the listener's ear. AI is defined in ANSI S3.5 as a range from 0.00 to 1.00 with 0.00 representing zero intelligibility and 1.00 complete intelligibility (Anderson & Chigot, 2004). Although the AI was developed to rate general communication, the Privacy Index (PI) rates privacy. However, AI was adopted by ASTM E 1130 dealing with objective measurement of speech privacy (2002). The formula to calculate PI is exhibited as: $PI = (1 - AI) \times 100\%$ where PI = Privacy Index, AI = Articulation Index.

Four levels identified in the PI.

- Confidential privacy: PI of 95% or better. Speech can be detected but not understood; less than 10% word and 5% sentence intelligibility; recommended level for exam rooms and doctors' offices.
- Normal privacy: PI from 85 - 95%. Effort is required to understand speech; not an acceptable privacy level for healthcare environments.
- Transitional privacy: PI from 60 - 80%. Speech is mostly understood and can be distracting.

- No privacy: PI less than 60%. Speech is clearly understood (ASTM International 2008, 2011).

Definitions of four primary acoustic measures. It is important to understand fundamentals of acoustics and its measures. Interior design professionals address acoustic factors as part of the design solution as they address indoor environmental quality (IEQ) for their clients. The four primary physical acoustics measures are reverberation, reflection, noise reduction coefficient, and sound transmission class. Definitions and examples of these measures are as follows:

- Reverberation: In an enclosed space, when a sound source stops emitting energy, it takes time for the sound to become inaudible. This prolongation of the sound in the room is called reverberation (Acoustics, 2013). High reverberation causes a room to feel "live" and low reverberation feels "flat."
- Reflection: Reflected sound strikes a surface or several surfaces before reaching the receiver. Reflection refers to the shape of the space as well as the material on that surface. Domes and conical shapes will focus sound whereas absorptive surfaces will eliminate them (Acoustics, 2013).
- Noise reduction coefficient (NRC): The NRC is a single-number index for rating how absorptive a particular material is; the higher the NRC, the more sound is absorbed by that surface (Acoustics, 2013).
- Sound transmission class (STC): The STC is also a single-number rating of a material's or assembly's barrier effect. Higher STC values are more efficient for reducing sound transmission. In addition, the ceiling attenuation class (CAC)

reading can be included. The CAC is similar to the STC value, but for ceilings (Acoustics, 2013). This rating assumes that sound energy passes through the ceiling plane twice - once to get out of the source room and again to enter the receiver room (Haworth, 2011).

Interior designers are educated in these basic acoustic principles as there is evidence that acoustics affect the health and welfare of occupants (CIDA, 2012). For example, when they design an open office workplace, they space plan and specify materials and furnishings and include office systems' panels that have the appropriate NRC and STC ratings. However, as is shown in many post-occupancy evaluations, having the appropriate acoustic ratings does not always provide the desired level of acoustic privacy. Therefore, this demonstrates that acoustic privacy can be influenced by being overheard, outside noise, one-on-one conversations and lack of acoustic control within one's workplace. Interior designers specify all these components that impact acoustics, in addition to developing the physical space plan and relationship between the interior materials and furnishings. It is the employees' perception of privacy that influences the PI, so the physical measures of acoustics only demonstrate one segment of the data. Additionally, this evidence provided measures of acoustic privacy for the privacy module questionnaire used for data collection (see Chapter 3).

Social privacy. Social privacy includes interruptions and distractions by co-workers that are present in a work environment (Bellinger & Kupritz, 2011). For example, Brennan, Jasdeep, and Kline (2002) suggest that employees who find their jobs boring may find that contact with other people provides a source of stimulation.

However, Sundstrom (1978) found that social contact can exceed an optimum level, causing employees to feel crowded, especially in areas with minimal privacy. As a result of crowding, discomfort may occur, which can cause decreased job performance. This supports the Altman theory of privacy and also provides evidence that privacy is related to job satisfaction. Social privacy issues are closely related to visual privacy issues, so for the purpose of this study, the two constructs will be addressed together under visual privacy.

Visual privacy. Visual privacy allows employees to maintain the optimal level of social contact that each person needs (Kupritz & Haworth, 2009). Bellinger and Kupritz (2011) further define visual privacy in two elements: 1) being visible to coworkers and 2) seeing coworkers in the office, which ties in the social privacy issue as defined above. Being too visible to coworkers was found to cause stress because employees felt they were being watched. On the other hand, too much of seeing coworkers nearby and stopping to say hello proved to be a distraction. Predictors of visual privacy include having a door as an architectural characteristic, not having coworkers visible to each other as a crowding characteristic, and not having coworkers within 10 feet of one's workstation as a proxemic characteristic. Three factors that are prominent in describing visual privacy are distraction, intrusion, and isolation

Distraction. For the purpose of this study, distraction is defined as unwanted stimuli from social contacts, or loss of control of the physical environment, temperature, lighting, and work process (Lee & Brand, 2010). The authors generalize this definition by

saying distraction refers to “the degree to which employees feel distracted, disturbed or irritated by negative or otherwise unwanted stimuli within the workplace” (p. 327).

Intrusion. Intrusion relates to many factors in the physical environment such as physical density, personal space, privacy, and territory (Altman, 1976). Intrusion can include crowding (i.e., increase in physical density), violation of physical space as defined by proxemics, and disregard for territory (i.e., opening a closed door without permission or acknowledgement of the occupant) (Altman, 1976).

Isolation. Isolation has been shown to be correlated with territoriality (Brown & Robinson, 2011; Wollman, Kelly, & Bordens, 1994) and crowding behaviors. Out of fear that one’s territory may be infringed upon, one may self-isolate by establishing boundaries to limit access by others (Brown, 2009). Therefore, by investigating both acoustic and visual privacy factors, a more complete picture of the influence of privacy on employees’ satisfaction can be drawn.

Post-Occupancy Evaluation

One of the first steps in the design process is the programming or discovery phase. It is in this phase that the design team uses pre-design research to evaluate a client's requirements prior to the design, construction, or occupancy. As a final evaluation of the completed project, a post-occupancy evaluation (POE) should be performed to assess the criteria used in the design solution that influences human-environment relationship. A POE can determine if occupants have modified the completed built environment after having occupied the space for some time in a way that has changed the original intent of the final design solution. In short, it evaluates if the project was

successful or not, based on the satisfaction of occupants with IEQ (Kopec, 2012; Vischer, 2008). A POE is an appropriate method to capture these data and provides evidence if the correct solution for the client was achieved. By knowing the outcomes of a particular design solution, future work of a relative nature will have precedent to draw upon and will inform future solutions.

In a study conducted by Guerin, Kim, Kulman Brigham, Choi, and Scott (2011) a POE was administered to over 200 employees of a newly constructed and occupied building that was designed to comply with the current sustainable design guidelines adopted by the State of Minnesota. The purpose of this POE was to measure and analyze employees' satisfaction in relation to the IEQ of employees' workstations. The findings of this study suggest that employees in private offices and cubicles showed a negative effect of work performance from acoustic and privacy conditions.

In a 2009 study, the POE was administered to 52 employees in a medical office and laboratory building (Guerin, Bauer, Kim, & Asojo, 2009). The findings reported in these POEs were that there was a relationship between employees' perceived satisfaction and work environment.

Based on the occupant survey database from Center for the Built Environment (CBE), empirical analyses indicated that occupants assessed IEQ issues in different ways depending on the spatial configuration (classified by the degree of enclosure) of their workplace. Enclosed private offices outperformed open-plan layouts in most aspects of IEQ, particularly in acoustics, privacy, and the proxemics issues. These are just a few of

the POE studies that show the POE is a useful tool for data collection in office environments.

Summary

It has been shown that there is more Focus work done in open offices today than in the past. Even with the trend toward collaborative work, employees still spend the majority of their time in their primary workstations in Focus work. It has also been shown that not achieving desired privacy can affect employees' satisfaction. As work environments increase in employee density, more Focus work is executed and profit is linked to employee satisfaction, it is important to identify privacy factors that contribute to employees' perception of their work satisfaction. From this research, the research question and hypotheses for this study were developed.

Research Question

- Is there a relationship between employees' satisfaction with their primary workplace and satisfaction with privacy when performing focused work in an open office design?

Hypotheses

1. There is a significant difference between employees' satisfaction with their primary workplace and overall privacy in an open office when doing focused work.
2. There is a significant difference between employees' satisfaction with their primary workspace and acoustic privacy in an open office when doing focused work.

3. There is a significant difference between employees' satisfaction with their primary workspace and visual privacy in an open office when doing focused work.

This study is important because the findings will inform interior designers about design solutions that address employees' privacy issues. By addressing privacy issues that improve the welfare of the employees, the likelihood of a developing a successful solution is increased.

CHAPTER 3 METHODS

This chapter describes the process and methods used to collect employees' data to test the hypotheses. A post-occupancy evaluation (POE) was conducted of employees in an office building to determine the relationship between their perceived satisfaction and acoustic and visual privacy in their workplace when in focus work mode. The building characteristics and sample description are discussed in this chapter. Development of the POE instrument, additional question development, and procedures for data collection also are included. Data analysis methods used to extract variable factors and test the hypotheses related to relationships between variables of this study are presented. Finally, limitations are presented.

The Sustainable Post-Occupancy Evaluation Survey (SPOES) was used as the foundation for the POE questionnaire with additional questions added that focus on privacy. The advantages associated with survey design are the low cost of creating and administering the questionnaires when distributed online, short turn-around of data collection, and ability to capture perceptions of several variables at once. The data were collected from employees whose offices are in the Science Teaching and Student Services (STSS) on the University of Minnesota campus in March 2014. SPOES protocol and instruments were developed by a research team funded by the Center for Sustainable Building Research (CSBR), University of Minnesota.

Building Characteristics

The building used in this study was the STSS building located on the University of Minnesota (UMN) Twin Cities campus. Built in 2010, the 5-story, 118,000 square-foot building houses instructional classrooms and administrative offices that service UMN students. It was designed according to the Buildings, Benchmarks and Beyond: Minnesota Sustainable Building Guidelines (B3-MSBG). The building also received Leadership in Energy and Environmental Design - New Construction (LEED-NC) Version 2.2 Gold Certification. The building is located on the East Bank campus along the Mississippi River in the heart of the University of Minnesota Twin Cities campus (see Figure 10).

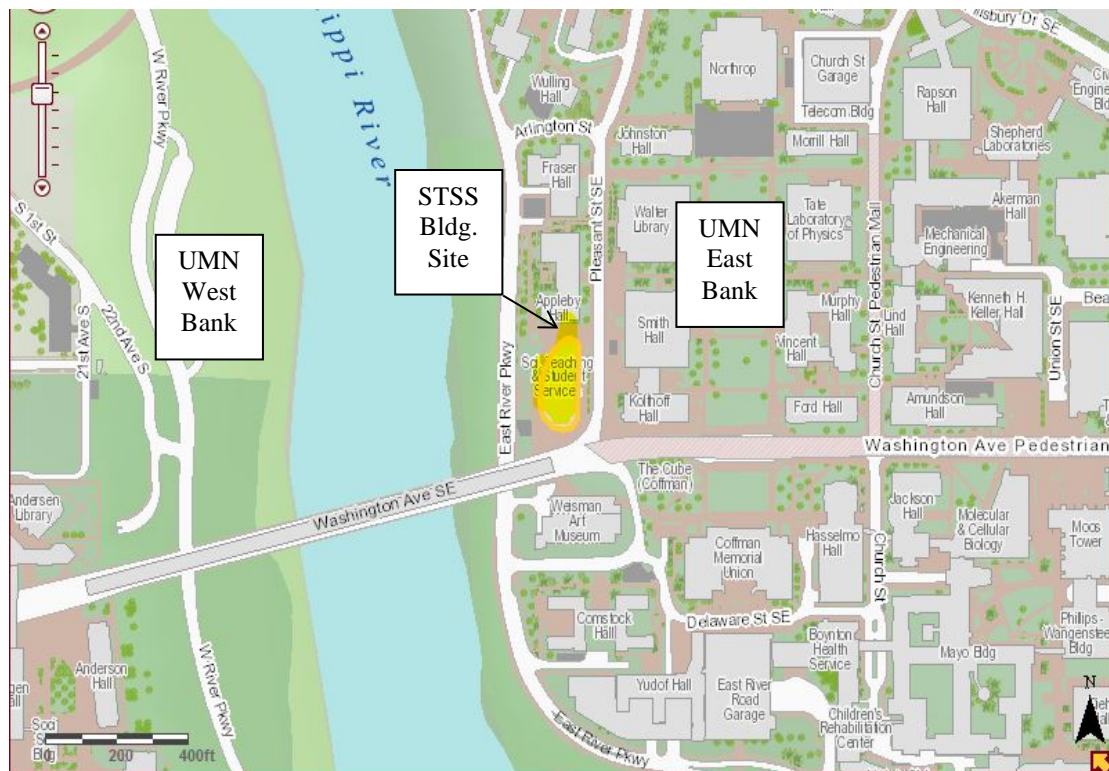


Figure 10. STSS Building Location Map

Floors 2, 4, and 5 have both classrooms and office areas. Floors 1 and 3 house only classrooms, therefore the floors of interest for the study are floors 2, 4, and 5; these are shown as shaded areas of the floor plans (see Figures 11- 13). Only employees who occupy office environments (workplaces) were studied.

Description of the physical work environment. The workplace environment was comprised of primarily an open office configuration or systems furniture work stations as the primary work environment for most employees. Some private offices and transaction workplaces were also included. Table 2 shows the number of employees on each floor and the type of workplaces occupied. Over half of the employees work in panel-based cubicles and over one-third are located in enclosed offices.

Table 2. Employees per floor and workplace type

Floor	Desks with no partitions	Cubicles with partitions	Enclosed offices	Total Employees
2	02	38	10	50
4	03	06	13	22
5	01	12	13	26
TOTAL	06	56	36	98

Floor 2 Office Area. The office area on floor 2 is shaded in Figure 11 and supports Student Account Assistance. It consists of 10 enclosed offices, 38 cubicles with partitions, and 2 desk areas with no partitions. There are also two large auditorium classrooms and student study areas on the floor, which were not included in the study.

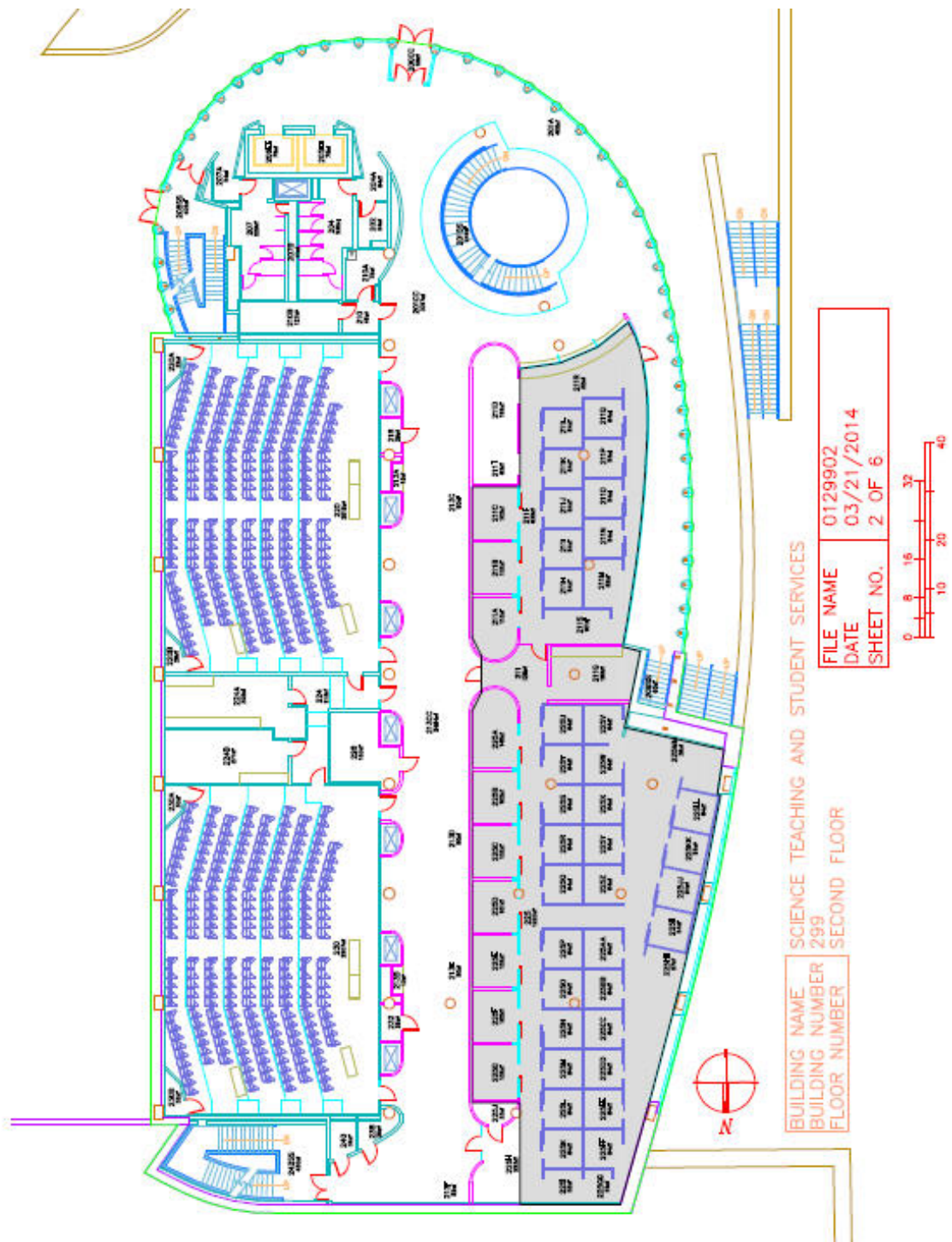


Figure 11. SPSS floor 2 floor plan

Floor 4 Office Area. The office area of floor 4 is shaded in Figure 12 and supports the Career Services Center office. It consists of 13 enclosed offices, six cubicles with partitions, an open desk reception area and waiting area. The floor also has an area with six round tables for student group meetings, 10 individual student computer stations, three classrooms and student study areas, which were not included in the study.

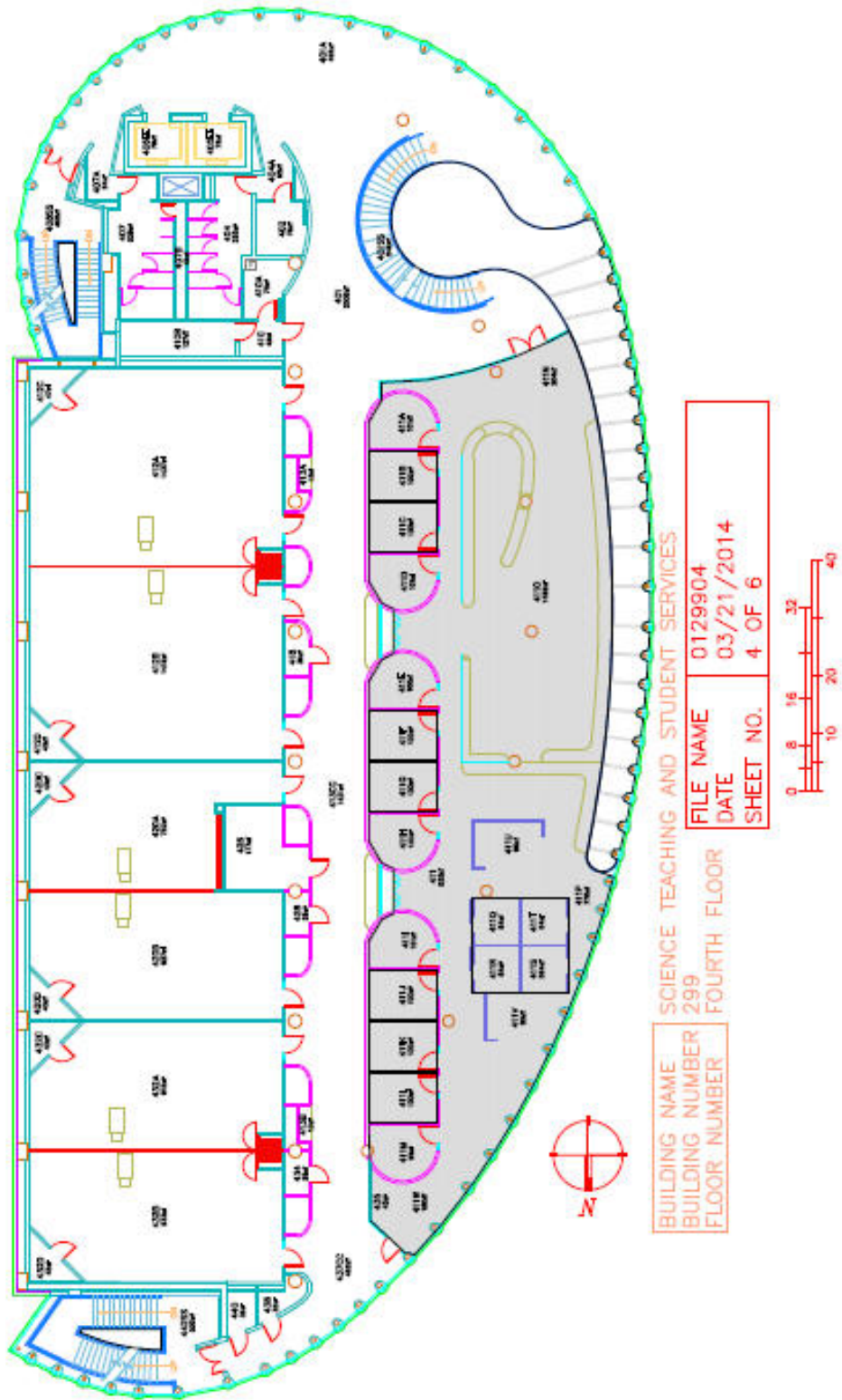


Figure 12. SPSS floor 4 floor Plan

Floor 5 Office Area. The office of floor 5, which is shaded in Figure 13 supports Student Services. It consists of 13 closed offices, 12 cubicles with partitions and an open desk with no partitions. Floor 5 also has two small waiting areas, seven individual student computer stations, two classrooms and a support area for student counseling, which were not included in the study.

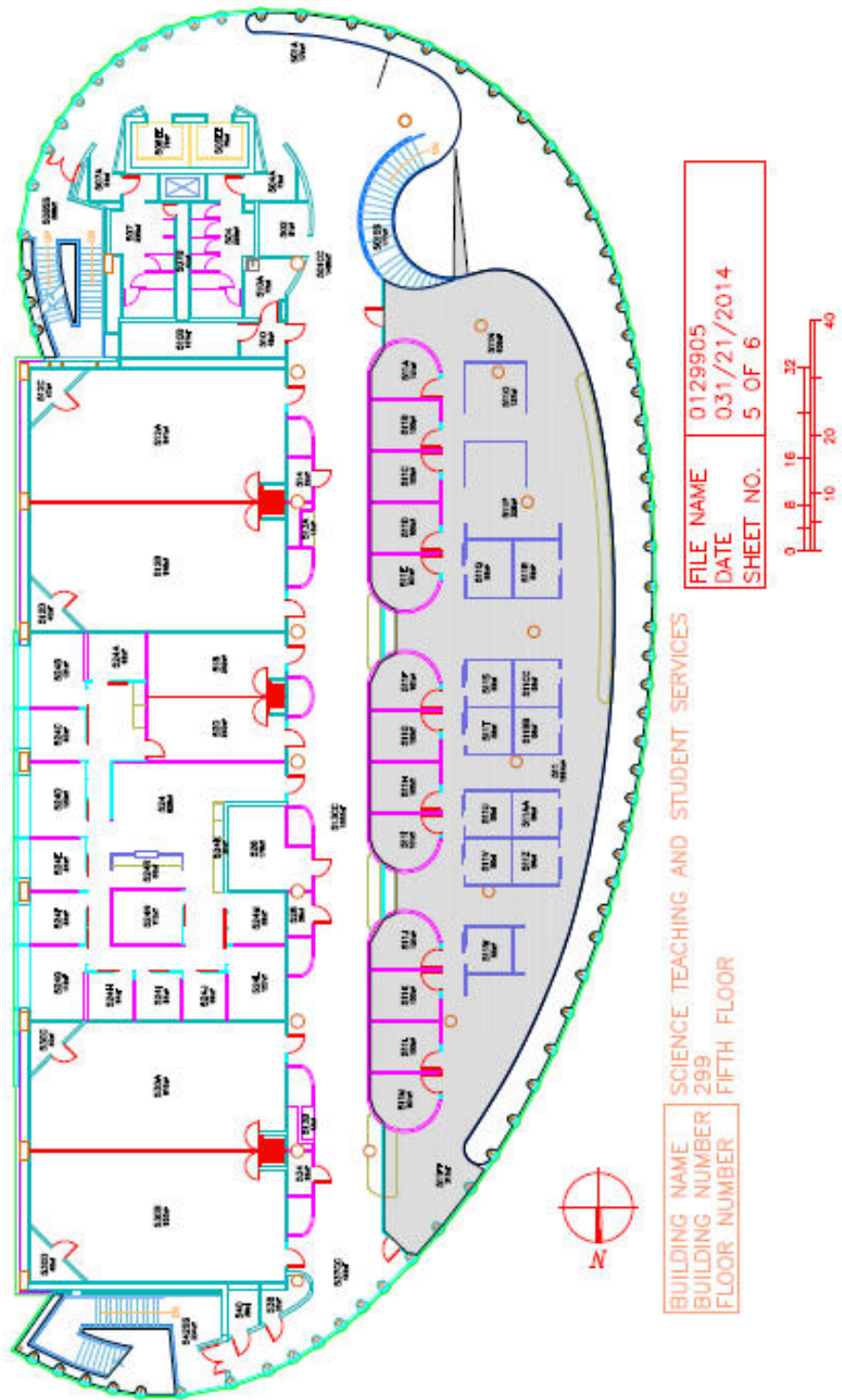


Figure 13. SPSS floor 5 floor plan

Description of the transaction counter characteristics. The transaction counter areas on each floor are comprised of millwork counters of various configurations and are identified as desks with no partitions in this study.

Description of the closed office workplace characteristics. As shown in Figure 14, the size of the majority of the closed workplaces on floor 2 are 12'-0" x 10'-0" (120 sq. ft.). They have a full opaque glass wall with a glass sliding door that faces the internal office corridor. The size of a majority of the closed workplaces on floors 4 and 5 are 11'-0" x 8'-6" (93 sq. ft.). They each have a 9'-0" wide, full height opaque glass panel next to the butt side of the hinged entry door.

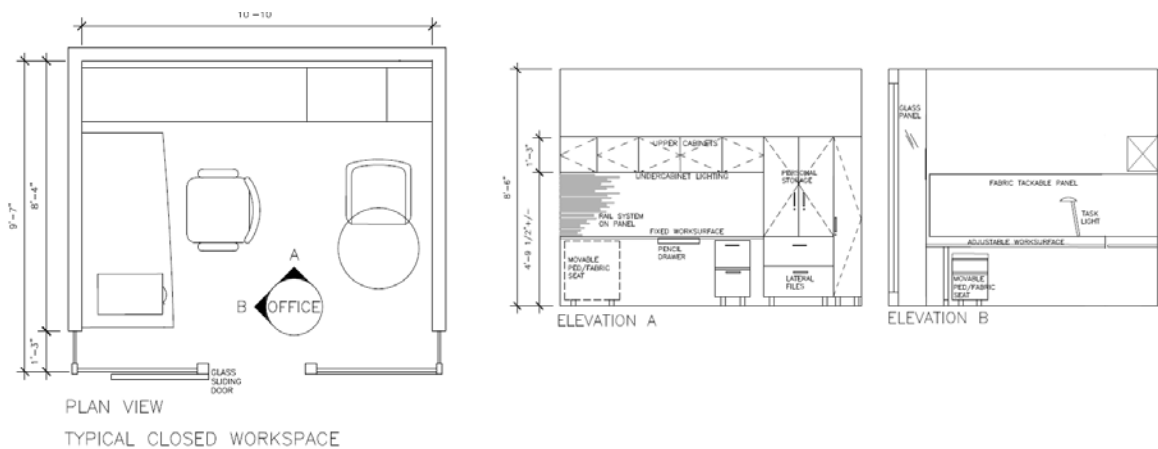


Figure 14. Typical closed workspace; plan view and elevations

The closed workplaces typically consist of a desk with a computer and monitor, task light, office chair, two to four filing cabinets, two to three upper cabinets above the work surface with under-cabinet task lighting, a full height storage cabinet, and a small round table with two chairs.

Description of the open office workplace characteristics.

As shown in Figure 15, the open workplaces are 8'-0" x 8'-0" x 7'-3". The top 30" of the partial height partition walls that do not have upper cabinets, have glass panels (clear glass panels for floors 2 and 5, opaque glass panels for floor 4). The partition walls with upper cabinets have a 16" top glass panel. All workplaces have a desk with a computer and monitor, task light, office chair, two to four filing cabinets, two upper cabinets above the work surface with under-cabinet lighting, a full height storage cabinet, and a chair.

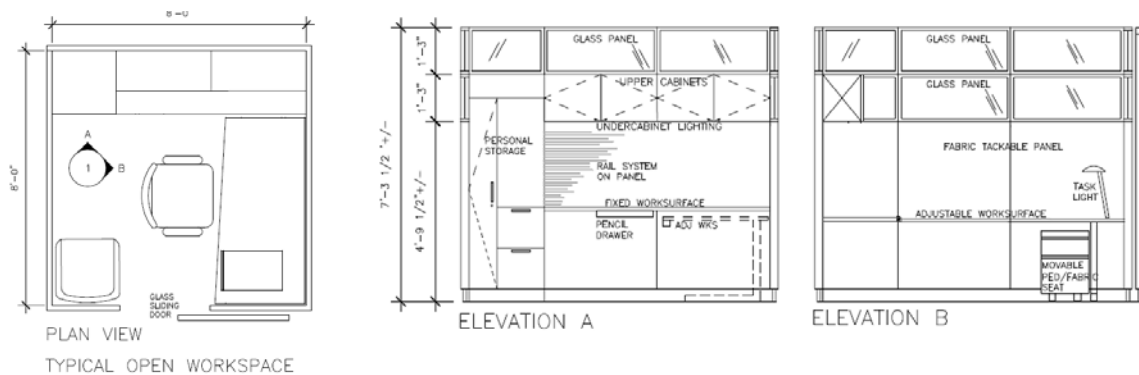


Figure 15. Typical open workspace; plan view and elevations

Population and Sample Characteristics

The target population for this study was the employees working in an office environment. The sample was part-time and full-time employees who occupied offices on floors 2, 4, and 5 in the STSS Building. It was also important that all respondents had been employed in the same primary workplace environment for a minimum of six months. This time period was determined to allow employees to acclimate to their

working environment and workplace culture to avoid any bias or stressors employees may have to new work environments.

Sample Description

Out of the potential 98 employees who have primary workplaces in the STSS building, 51 completed the survey. This is a response rate of 52%, which is considered a good response rate for this method of data collection. Five non-respondents were removed from the sample to avoid non-respondent error in the data. Of the respondents who completed the survey and were included in the analysis, the demographics are shown in Table 3. Not all respondents answered all questions, so the frequency of responses do not necessarily equal to the number of total respondents.

Table 3. Sample description

Survey Question	Measure	Frequency N = 51	Percent of Total
Gender	Male	13	26.5%
	Female	36	73.5%
Years worked at STSS	Less than 1 year	9	18.4%
	1-2 years	7	14.3%
	2-3 years	12	24.5%
	More than 3 years	21	42.9%
Hours spent in the STSS building in a typical week	Less than 20	0	0.0%
	21-30 hours	5	10.0%
	31-40 hours	23	46.0%
	More than 40 hours	22	44.0%
Percentage of time spent in primary workplace in a typical week	Less than 25%	0	0.0%
	25-50%	3	6.0%
	51-75%	15	30.0%
	More than 75%	32	64.0%
Percentage of work day spent in focused work	Less than 25%	0	0.0%
	25-50%	5	9.8%
	51-75%	16	31.4%
	More than 75%	30	58.8%
	N/A	0	0.0%

The majority of respondents were between the ages of 25 to 34 (40.8%) followed by 35 to 44 (26.4%). There were no respondents 75 or older. The mean age was 23.9 years with a range from 19 to 75. There were 13 male (26.5%) and 36 female (73.5%) that chose to disclose gender. The mean for years of employment in the STSS building is 2.9 years, which is a sufficient length of time to eliminate the risk of the Hawthorne effect.

Time spent working. Approximately 43% of the respondents have worked in the STSS building for three years or more, followed by 24.5% who had worked in the STSS building for 1 to 2 years. A majority of respondents (64%) spent more than 75% of their time in their primary workplace, followed by 30% who spent between 51-75% of their time at their primary workplace.

Time spent in focus mode. Focus mode, identified in the survey as “focused work,” occupied more than 75% of the work day for 58.8% of the respondents, followed by 31.4% of the respondents spending between 51-75% of the workday in focus mode. Only five respondents (9.8%) spent less than 50% of the work day in focused mode.

Where focus mode is performed. As shown in Table 4, all 51 respondents indicated that they spent at least 50% of their time doing focused work at their primary workstation, with 38 respondents (75%) indicating 80% of their time or more. This was followed by 19 respondents (37%) somewhere else within the building, 15 respondents (29%) at home or telecommuting, and 14 respondents (27%) somewhere outside of the building. One respondent indicated that s/he performed focused work in a social space

70% of his/her time, and another indicated 60% of his/her time was spent somewhere else in the building.

Table 4. Focus mode locations

Answer Options	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Response Count
Primary workplace	0	0	0	0	4	3	6	7	15	16	51
A quiet, unassigned workplace	9	1	2	0	0	0	0	0	0	0	12
A quiet room in my dept. or floor	11	1	0	0	1	0	0	0	0	0	13
A social space in my dept. or floor	9	1	0	0	0	0	1	0	0	0	11
Somewhere else in the building	13	2	1	2	0	1	0	0	0	0	19
Somewhere outside the building	12	0	0	2	0	0	0	0	0	0	14
At home / telecommuting	12	3	0	0	0	0	0	0	0	0	15
Other	The Resource Center										2
	we have two workplace locations (personal desk/cube, and communal counter)										

Workplace location and type. Overall, 26 (51%) of the respondents' workplaces were open. Open workplaces were classified as a cubicle with 5+ feet high partitions or a desk in an open office with no partitions, which were located in the reception areas. The remaining 25 (49%) respondents indicated they worked in enclosed offices; 23 were in private offices, and two shared an enclosed office with another person.

Table 5. Descriptive statistics: Description of primary workplace

Type of primary workplace	Frequency N = 51	Percent
Enclosed office, private	23	45.1%
Enclosed office, shared with another person	2	3.9%
Cubicle with high partition walls	18	35.3%
Cubicle with low partition walls or desk in open office	5	9.8%
Other	3	5.9%

Research Methods

The Sustainable Post-Occupancy Evaluation Survey (SPOES) consists of a self-administered, internet-based questionnaire submitted to and completed by the employees. The SPOES questionnaire has been tested for validity (measures what it is intended to measure) and reliability (repeatability or replicability of findings) in studies involving similar facilities and employees. Employees rate their level of satisfaction on a Likert-type scale (measurement scale) scale from 1 (very dissatisfied) to 7 (very satisfied) on overall questions on the facility, their primary workplace, and the IEQ categories. They also rate the influence of their physical environment on their perception of their work performance and health on a scale from 1 (hinders) to 7 (enhances). SPOES also included eight items pertaining to employees' general demographics.

Data collection took place approximately 18 - 24 months post-occupancy to eliminate effects related to occupants being satisfied with the building because it was new and different. This mediates the Hawthorne Effect (Franke & Kaul, 1978). Permission to conduct the survey was obtained from all office managers and supervisors of each floor. The study was found exempt by the UMN Institutional Review Board: Human Subjects Committee.

Instrument Development

The SPOES questionnaire was developed by the Center for Sustainable Building Research (CSBR), UMN. The questionnaire has previously been used to evaluate occupants' satisfaction with IEQ components of other B3-MSBG buildings (Center for

Sustainable Building Research, 2011). The questionnaire items were developed to reflect the sustainability criteria of the B3-MSBG.

Questionnaire description. The questionnaire items reflect the IEQ categories and used an occupant satisfaction scale. The IEQ categories include (in alphabetical order): acoustic conditions, appearance, cleaning and maintenance, daylighting conditions, electric lighting conditions, function and furnishings, indoor air quality (IAQ), lighting conditions, personal adjustability, privacy, technology, thermal conditions, vibration and movement, and view conditions. SPOES was developed to assess employees' satisfaction with these categories in the overall facility and their primary workplaces. A Privacy Module was developed for this study and includes questions relating to employees' perceived performance and satisfaction as affected by acoustic and visual privacy when doing focus work.

Employees first rate their level of satisfaction with the facility and the influence of their physical environment on their perception of their work performance and health. Then they respond to questions about their satisfaction with their primary workplace in relation to the IEQ categories. These data were collected but not analyzed in this study as the IEQ and satisfaction data are part of a larger study by the CSBR. The researcher appreciates the use of the SPOES instrument, method, sample and opportunity to add the privacy module

The SPOES questionnaire has been tested for validity (measures what it is intended to measure) and reliability (repeatability or replicability of findings) in studies involving similar facilities and employees. Respondents rate their level of satisfaction on

a Likert-type scale (measurement scale) scale from 1 (very dissatisfied) to 7 (very satisfied) on overall questions on the facility, their primary workplace, and the IEQ categories.

The privacy module was developed to be used with the SPOES satisfaction questionnaire. Privacy questions were developed from the social theory and research studies reviewed in Chapter 2, such as workstation size, the level of enclosure (partition height), and if the workplace had a door (Hua, Loftness, Heerwagen, & Powell, 2011). The privacy questions were pre-tested by office employees not related to this test building and piloted in a separate open office environment for clarity, language, accuracy, and bias. Appropriate revisions were made that reflected test subjects' comments. This study continued the testing and development of the privacy module. The focus of the questions in the privacy module was on employees' perceived performance in their primary workplace while performing focused work. The privacy module consisted of a total of nine questions. The complete questionnaire is included as Appendix A.

Questionnaire distribution procedure. The questionnaire was distributed on March 4, 2014, to full-time and part-time office employees of the STSS Building via email. The online survey tool Survey Monkey (www.surveymonkey.com) was used to collect the data. The researcher formatted an email invitation to respondents to participate in the study and sent it to the office managers of each floor of the STSS building. The

managers forwarded the email with a link to the questionnaire onto the employees, who were told they could complete the questionnaire during work time; they were given nine work days to respond. A reminder email was sent two days prior to closing the link. All communication is included in Appendix B and was also approved by the IRB prior to any communication with the participants. The invitational email briefly explained the research purpose and method, the amount of their time required to complete the questionnaire (10 minutes), their voluntary participation, assurance of their anonymity, and confidentiality of their responses. When the questionnaire link was opened by a participant, a formal information page appeared. This page served as the consent form, and it briefly described participation details and the study again. Continuing with the questionnaire indicated their consent.

Theory as Related to Variables and Measures

As shown in Figure 15, if desired acoustic privacy (DAP) is greater than achieved acoustic privacy (AAP), isolation is the result. Conversely, if DAP is less than AAP, then intrusion is the result. Lastly, if DAP is equal to AAP, then optimal privacy is achieved. Next, if desired visual privacy (DVP) is greater than achieved visual privacy (AVP), isolation is the result. Conversely, if DVP is less than AVP, then intrusion is the result. Lastly, if DVP is equal to AVP, then optimal privacy is achieved.

From Altman's constructs, this study utilizes the *desired and achieved privacy* constructs. Figure 15 shows a theoretical model that was developed to show the relationship among the theory constructs of desired and achieved privacy. The situational

factors in the model are the overall acoustic privacy conditions (OAPC) and the overall visual privacy conditions (OVPC) as defined in Figure 16.

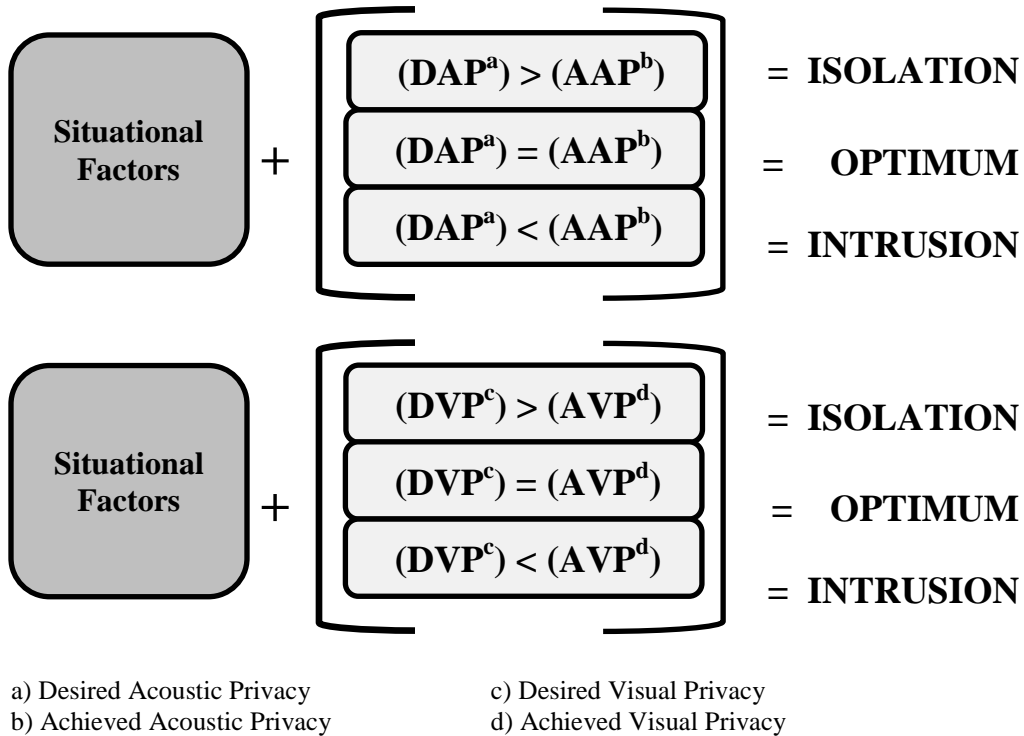


Figure 16. Theoretical model

A Research Model was developed to show the relationship of the theoretical constructs of privacy with the way the variables were measured in the POE (see Figure 17). Employees' perceived satisfaction is dependent upon the type of workplace they have. This workplace, i.e., private, shared, semi-private or panel height, influences the amount of acoustic or visual privacy they have. In this study, the independent variables are acoustic privacy and visual privacy. The dependent variable is satisfaction. The model also shows the measures of acoustic and visual privacy, which were the questions asked in the POE. The questions were measured on a 7-point Likert-type scale

with 1 = hinders performance and 7 = enhances performance. The model shows the proposed relationship among the variables and the hypotheses to be tested.

Hypotheses

1. There is a significant difference between employees' satisfaction with their primary workplace and overall privacy in an open office when doing focused work.
2. There is a significant difference between employees' satisfaction with their primary workspace and acoustic privacy in an open office when doing focused work.
3. There is a significant difference between employees' satisfaction with their primary workspace and visual privacy in an open office when doing focused work.

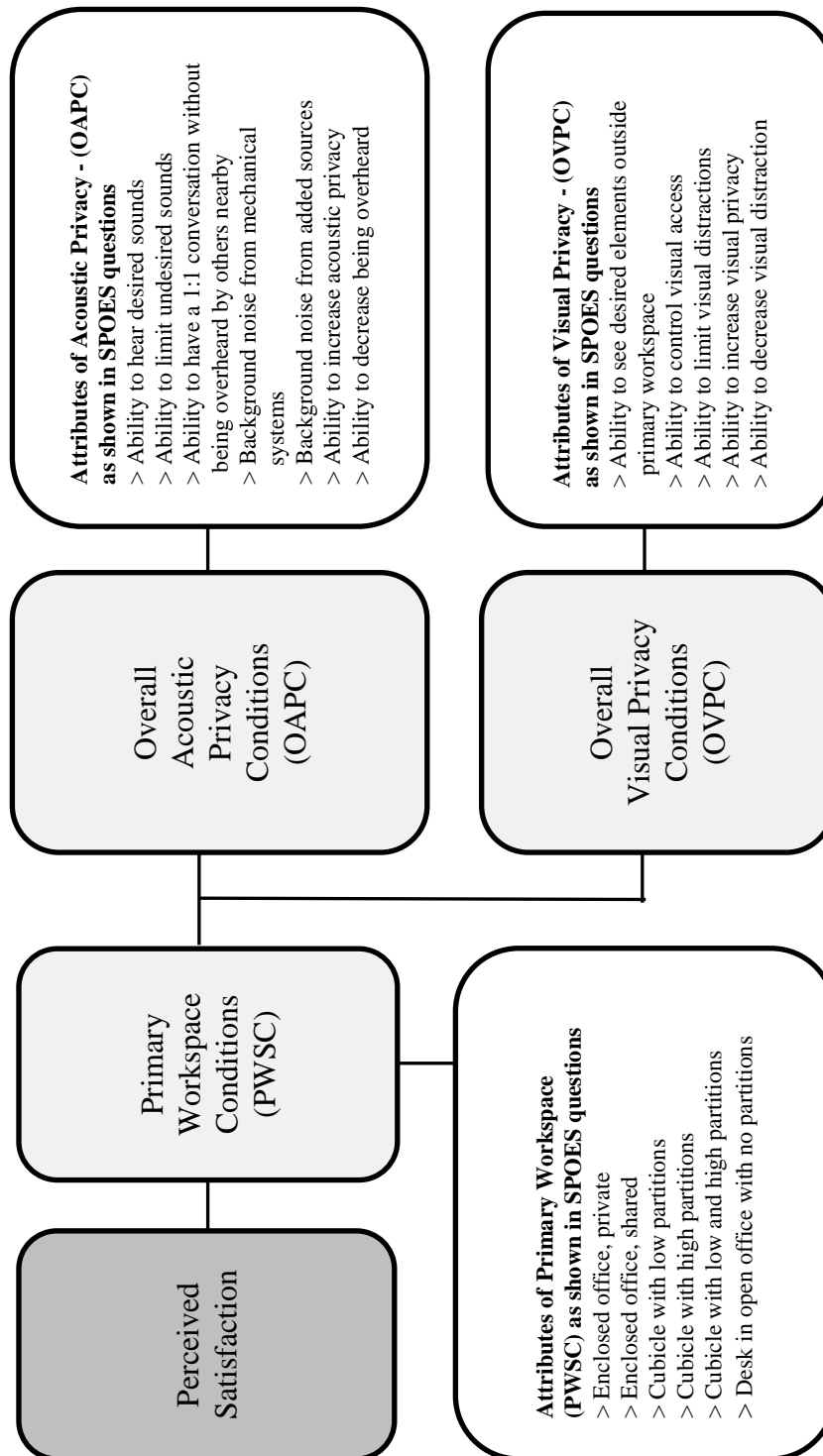


Figure 17. Research Model of Theory and Variables

Data Analysis

The results were analyzed in three parts. First, A Cronbach's alpha analysis was conducted to check the reliability of the questionnaire items for each condition and with all items combined. A reliability coefficient of 0.70 or higher was used as an acceptable standard. Next, descriptive statistics (mean, frequency, and standard deviations) were used to describe respondents' demographics and overall occupant satisfaction with the facility and with privacy factors.

To test the hypotheses, paired T-tests were conducted of respondents' satisfaction with the physical environment in the primary workplace and acoustic privacy, visual privacy, and overall privacy. They were also conducted of satisfaction levels with the overall physical environment of the facility and satisfaction with the overall physical environment of the primary workplace.

Limitations

Employee participation is voluntary, and responses are self-reported. As is true with all survey research, the responses indicate employees' perceptions. Limitations for this study include use of a self-administered questionnaire through an online database. There was no way to know who exactly responded to the questionnaire. Also, the subjective, self-reporting format of the questionnaire limited responses to occupants' personal perceptions of satisfaction and performance level. Although there were open-ended responses requested so respondents could elaborate or explain their responses, there was no additional follow-up to the survey. There was also no opportunity for respondents to add data to the survey. The sample size was small, and only one building

was included in the survey, which means the findings may not be generalizable to the population of other office buildings.

The questionnaire focused on the satisfaction levels of the occupants; however the direction of the attributes were not fully assessed. For example, occupants may have found hindrance with the control of acoustics in their workplace, but it is uncertain if the acoustics were too loud or too quiet; it would be valuable to also understand the direction of the conditions. Adding more items does lengthen the time needed to complete to the questionnaire, which could discourage occupants from participating or completing the questionnaire because too much time is taken away from their required work responsibilities.

Also, researchers should understand from the analysis portion of the research that there could be differences with respondents' satisfaction depending on their primary workplace being an open or closed, private space.

Summary

The SPOES was conducted with employees in an office building to determine the relationship between their satisfaction and acoustic and visual privacy in their workplace when in focus work mode. The building characteristics and sample description were discussed in addition to the development of the instrument and discussion of the data collection, analysis, and limitations. The next chapter presents and discusses the results of the data analyses.

CHAPTER 4 RESULTS

This chapter presents the results of the data analysis from the SPOES questionnaire including the privacy module. The purpose of the analyses is to examine the relationship between employees' privacy issues and their satisfaction with their open office work environment, specifically their primary workplace. The research targeted acoustic and visual privacy questions in the SPOES privacy module.

Paired *t*-test analyses were conducted to determine if there is a relationship between respondents' satisfaction with the physical environment in the primary workplace and acoustic privacy, visual privacy, and overall privacy as well as satisfaction levels between the overall physical environment of the facility and the primary workplace.

The hypotheses tested include:

1. There is a significant difference between employees' satisfaction with their primary workplace and overall privacy in an open office when doing focused work.
2. There is a significant difference between employees' satisfaction with their primary workspace and acoustic privacy in an open office when doing focused work.
3. There is a significant difference between employees' satisfaction with their primary workspace and visual privacy in an open office when doing focused work.

Descriptive analyses were conducted to describe findings that might help clarify employees' responses to overall privacy in the facility and satisfaction, acoustic privacy and satisfaction, and visual privacy and satisfaction.

A Cronbach's alpha analysis was conducted to check the reliability of the questionnaire items for each acoustic and visual privacy condition and with all items combined. This analysis was to verify that the questionnaire items are acceptable and reliable measures. The reliability coefficient of the Cronbach's alpha should be 0.70 or higher to be an acceptable standard. The coefficient for acoustic privacy (.927) and visual privacy (.889) conditions were greater than the accepted standard of 0.70. The coefficient for all items combined was high (.953). The results indicate that the questionnaire items are valid and reliable measures.

Findings

The *t*-test findings show that all three hypotheses were supported. Descriptive analyses provide further support of the findings, and open-ended responses provide clarification of the responses in the survey.

Satisfaction and Privacy in the Primary Workplace

Paired *t*-tests were computed to test the three hypotheses. First, overall satisfaction with the physical environment of the primary workplace and the extent of acoustic privacy. Overall satisfaction with the physical environment of the primary workplace and the extent of visual privacy was also calculated as well as overall satisfaction with the physical environment of the primary workplace and the overall

privacy (sound and visual privacy) conditions of the primary workplace. The results are shown in Table 6.

Table 6. Paired t-test results

		Mean	N	Std. Deviation	Sig. (2-tailed)	95% Confidence Interval of the Difference	
						Lower	Upper
Pair 1	Overall satisfaction with the physical environment of the primary workplace	5.00	51	1.62	.00	.34	1.11
	The overall privacy conditions of your primary work place	4.28	51	2.03			
Pair 1	Overall satisfaction with the physical environment of the primary workplace	5.00	50	1.64	.00	.77	1.71
	The extent of acoustic privacy	3.76	50	2.11			
Pair 1	Overall satisfaction with the physical environment of the primary workplace	5.00	51	1.62	.03	.05	.93
	The extent of visual privacy	4.51	51	1.78			
Pair 1	Overall satisfaction with the physical environment of the facility	5.06	51	1.58	.74*	-.30	.42
	Overall satisfaction with the physical environment of the primary workplace	5.00	51	1.62			

*Significant at $p = .05$

For Hypothesis 1, employees' ($N = 50$) responses indicated there was a statistically significant difference between the two variables at the $p = .05$ level. Overall satisfaction with the physical environment of the primary workplace had a mean of 5.0, which can be interpreted as satisfied on a 7-point scale. Employees' satisfaction with their overall privacy in their primary workplace showed a mean of 4.28, which is interpreted as a low level of satisfaction and is significantly different than their satisfaction with their physical environment. Therefore, the hypothesis is supported.

For Hypothesis 2, employees' ($N = 51$) responses indicated there was a statistically significant difference between the two variables at the $p = .05$ level. Overall satisfaction with the physical environment of the primary workplace had a mean of 5.0, which can be interpreted as satisfied on a 7-point scale. Employees' satisfaction with their acoustic privacy in the primary workplace showed a mean of 3.76, which is interpreted as dissatisfied and statistically less than 5.0. Therefore, the hypothesis is supported.

For Hypothesis 3, employees' ($N = 51$), responses indicated there was a statistically significant difference between the two variables at the $p = .05$ level. Overall satisfaction with the physical environment of the primary workplace had a mean of 5.0, which can be interpreted as satisfied on a 7-point scale. Employees' satisfaction with their visual privacy in the primary workplace showed a mean of 4.51, which is interpreted as a low level of satisfaction, but still is statistically less than 5.0. Therefore, the hypothesis is supported.

Satisfaction as Related to Privacy in the Overall Facility

Lastly, overall satisfaction with the physical environment of the facility and overall satisfaction with the physical environment of the primary workplace were analyzed by performing another paired *t*-test. Results shows no significant different between the two variables. Overall satisfaction with the physical environment of the primary workplace ($M = 5.06$) and the overall satisfaction with the physical environment of the primary workplace ($M = 5.00$) both showed employees rated them at the satisfied level. It is interesting to note that the means indicate satisfaction for both conditions, and there was no significant difference in the findings between overall satisfaction with the physical environment of the facility and overall satisfaction with the physical environment of the primary workplace.

After looking at the results and determining that the primary workplace results are similar to the overall results, a comparison of facility privacy to primary workplace privacy might offer more explanation. Some of the open-ended responses provided by the employees offer some insight. Those responses are included later in this chapter.

Descriptive Analysis

Overall privacy and performance. The descriptive statistics for the primary workplace indicate a high frequency response in respondents' ability to close off their primary workplace, which does provide overall privacy. Of the 51 respondents, 41 (80.4%) indicated that they had the ability to close off their primary workplace with a door, a panel, or another device. Of the 41 who indicated they could close off their workplace, 24 respondents (47.1%) indicated they closed their workplace several times a

day, only one said s/he closed it all day; and 18 respondents (34.3%) seldom, rarely, or never closed off their workplace. One respondent indicated s/he was not allowed to close off the workplace except on a break. As there was only one respondent with this comment, it cannot be determined if this is a personnel issue or department policy.

As shown in Table 7, the primary reason respondents indicated the need for closing off their primary workstations was to decrease overall distraction (70.6%). This was followed closely by 30 respondents (38.8%) indicating the need to increase acoustic privacy, 28 respondents (54.9%) need to decrease being overheard, and 25 respondents (49.0%) need to increase visual privacy.

Table 7. Frequency of responses for closing off primary workplace

Reason for closing off workplace	Frequency N=51	Percent
To decrease distraction	36	70.6%
To increase acoustic privacy	30	58.8%
To decrease being overheard	28	54.9%
To increase visual privacy	25	49.0%

*Note: respondents were asked to identify all reasons

Acoustic privacy and performance. Respondents were asked eight questions related to acoustic privacy within their primary workplace. These results are reported to further identify what specific acoustic conditions influence employees' responses. As shown in Table 8, five conditions reported a mean below 4.0. Responses of 1.0 to 3.9 = hinders performance, 4.0 to 4.25 = neither hinders nor enhances, and 4.3 to 7.0 = enhances performance.

Table 8. Performance influence by specific acoustic privacy conditions

Question	N	Mean	Std. Deviation	Interpretation
The ability to limit undesired sounds in your primary workplace	50	3.18	2.03	Hinders
The overall acoustic quality (ability to hear desired sounds and limit undesired sounds) in your primary workplace	51	3.41	2.00	Hinders
Your ability to have a one-on-one conversation without being overheard by others nearby	51	3.71	2.38	Hinders
The extent of acoustic privacy	50	3.76	2.11	Hinders
The effect of overall acoustic privacy on your work performance	51	3.90	1.92	Hinders
Background noise from added sources (radio, phone, background music, desktop equipment, etc.)	50	4.00	1.91	Neutral
Background noise from mechanical systems (fans, air conditioning, vents, radiators, etc.,)	51	4.22	1.96	Neither Hinders nor Enhances
The ability to hear desired sounds in your primary workplace	51	4.57	1.89	Enhances

The conditions were the ability to limit undesired sounds, overall acoustic quality (ability to hear desired sounds and limit undesired sounds), ability to have a one-on-one conversation without being overheard by others nearby, extent of acoustic privacy, and effect of overall acoustic privacy.

One condition, background noise from added equipment, had a result of 4.0 indicating performance was neither hindered nor enhanced. Two conditions indicated their performance was enhanced by the acoustic privacy, background noise from mechanical systems (fans, air conditioning, vents, radiators, etc.) and ability to hear desired sounds in your primary workplace. However, the means were still in the low range (4.57) of Enhances.

Visual privacy and performance. The respondents were also asked five questions related to visual privacy within their primary workplace environment. As shown in Table 9, all questions resulted in a mean response of 4.0 or greater, indicating

employees' performance was enhanced by visual privacy. All of the conditions can be seen in Table 9; it is interesting to note that they were all between 4.06 and 4.84, neither greatly hindering nor enhancing performance.

Table 9. Performance influenced by specific visual privacy conditions

Question	N	Mean	Std. Deviation	Interpretation
Ability to control visual access (be seen by others when they pass by your workplace)	51	4.06	2.08	Neither Hinders nor Enhances
Ability to see desired elements outside your primary workplace, (co-workers in the distance, technology, view out of a window, etc.)	51	4.29	1.89	Enhances
Ability to limit visual distractions (co-worker interruptions because they can see me)	50	4.46	1.99	Enhances
The extent of visual privacy	51	4.51	1.78	Enhances
The effect of overall visual privacy on your work performance (Hinders / Enhances)	50	4.84	1.49	Enhances

Open-ended Responses

Several questions in the SPOES survey allowed respondents to provide additional comments to provide their opinions of the privacy conditions. Some of the responses are included to illustrate the perceptions of the employees in the STSS building. Regarding acoustic privacy concerns, the respondents had several opinions. As the data for visual privacy indicated a neutral response (4.06) or a low response for Enhance (4.29 to 4.84), there were no open-ended responses addressing visual privacy:

- “This is not a user-friendly environment for noise... Our offices are open at the top for approximately 18 inches. This means I intimately hear people on phone calls in the hallway... I have to turn my head inward keep my voice very soft and low so my conversation does not bounce off the hard scape interior glass and enter the hallway.”

- “What affects my satisfaction the most is the lack of privacy. Our space is so open so you can really hear everything that is going on in the large office space. This makes it difficult when you have a private meeting.”
- “It is impossible to regulate sound which is a big distraction in the building as a whole.”

Summary

The research findings indicate that there is a correlation between the perception of performance in the primary workplace and overall privacy, acoustic privacy, and visual privacy. The findings also show overall acoustic privacy conditions generally hinder and overall visual privacy conditions minimally enhance satisfaction within the primary workplace. The next section will discuss how these findings address the hypotheses and the research model, as well as implications for business, designers, and future research.

CHAPTER 5 CONCLUSION

This chapter summarizes and discusses the main findings of the study. This study 1.) identified overall privacy conditions and acoustic and visual privacy conditions within the primary workplace and 2.) determined if those conditions were significant to employees' satisfaction within the primary workplace when in focus work mode. The method of data collection used in this study included the SPOES questionnaire that examined employees' perception of their satisfaction as it was affected by the privacy conditions of their primary workplaces.

Significant findings were interpreted from the data analyses and can be applied to future research designs of similar building and occupant types. This chapter includes a summary of results and hypotheses testing; the study's fit to the research model; limitations of the study; and implications from the study for business, design, education, and future research.

Summary of Findings

The study examined the Science Teaching Student Services (STSS) building located along the East Bank of the Mississippi River in the heart of the UMN Minneapolis campus. Built in 2010, the five-story, 118,000 square-foot STSS Building was sustainably designed according the B3-MSBG guidelines. The building also houses instructional classrooms and administrative offices that service UMN students. The areas of interest for the study are floors 2, 4, and 5, which contain both office areas and classrooms. However, only the office environments (workplaces) and the offices of full-time and part-time employees were studied. Among these three floors, there were a total

of 98 workplaces (62 open; 36 closed), although some were shared among part-time employees. The sample size was relatively small ($n=51$), but the response rate was 52%, which is considered good with this method of data collection.

The research question of the study asked: *Is there a relationship between employees' satisfaction with their primary workplace and satisfaction with privacy when performing focused work in an open office design?*

The following three hypotheses were developed to answer the question. They stated:

1. *There is a significant difference between employees' satisfaction with their primary workplace and overall privacy in an open office when doing focused work.*
2. *There is a significant difference between employees' satisfaction with their primary workspace and acoustic privacy in an open office when doing focused work.*
3. *There is a significant difference between employees' satisfaction with their primary workspace and visual privacy in an open office when doing focused work.*

The data collection was carried out during March, 2014. First, the online SPOES questionnaire was distributed via email to all employees in the STSS building. The questionnaire inquired about their level of satisfaction with the overall privacy conditions of the facility as well as their perceived perception of performance in relation to acoustic privacy and visual privacy conditions within their primary workplace. Employees were

also asked about their perceived perception of satisfaction performance in their primary workplace while in focused work mode.

Discussion of hypotheses testing. A Cronbach's alpha analysis was conducted to verify the reliability of the questionnaire items for each condition. The results for all items were above the accepted standard of 0.70 indicating that the questionnaire items were acceptable and reliable measures.

Next, paired *t*-tests were conducted to determine if there is a relationship between employees' satisfaction and overall privacy in the facility and between employees' satisfaction and privacy in their primary workplace. The findings show that all three hypotheses were supported. Descriptive analyses provide further support of the findings and open ended responses provided clarification of the responses within the survey.

Fit to Research Model

In the study, situational factors were defined as Overall Acoustic Privacy Conditions (OAPC) and Overall Visual Privacy Conditions (OVPC). Also, as shown in Figure 16 in Chapter 3, Primary Workplace Conditions (PWSC) were also analyzed. The research model developed as shown in Figure 18 was based on Altman's privacy construct of desired and achieved privacy. This research model was used to understand employees' perceived perception of satisfaction in relation to the privacy conditions at their workplace.

When analyzing the satisfaction data between the overall facility and the primary workplace, 22.3% of employees stated some level of dissatisfaction with the overall physical environment of the facility and 66.6% stated some level of satisfaction. Then,

when asked the same question about their primary workplace, 18.8% stated some level of dissatisfaction with their primary workplace and 68.6% responded satisfaction. These percentages were calculated from a 7-point scale with 1 representing “Very Dissatisfied” and 7 representing “Very Satisfied.” A mean response of 4.0 to 4.25 is considered a neutral opinion.

When analyzing the performance data between the overall facility and the primary workplace, 22.3% of employees stated that the overall physical environment hindered performance and 63% stated that it enhanced performance. Then, when asked the same question about their primary workplace, 13.7% stated that their primary workplace hindered performance and 68.6% responded that it enhanced performance. These percentages were calculated from a 7-point scale with 1 representing “Hinders Performance” and 7 representing “Enhances Performance.” A mean response of 4.0 to 4.25 is considered a neutral opinion. The literature and these findings support that there is a strong correlation between satisfaction and performance.

If the primary workplace is assigned to the construct of desired privacy and the overall physical environment of the facility is assigned to the construct of achieved privacy, the findings suggest that perceived satisfaction and performance is very similar and could be interpreted as equal. How this is shown in the model is that achieved privacy satisfaction with the facility is equal to satisfaction with the primary workplace, so desired privacy is equal to achieved privacy ($DAP = AAP$) and ($DVP = AVP$) then an optimum workplace is the result. While the findings show that all three hypotheses were

supported, acoustic privacy was more highly correlated to satisfaction and performance than visual privacy.

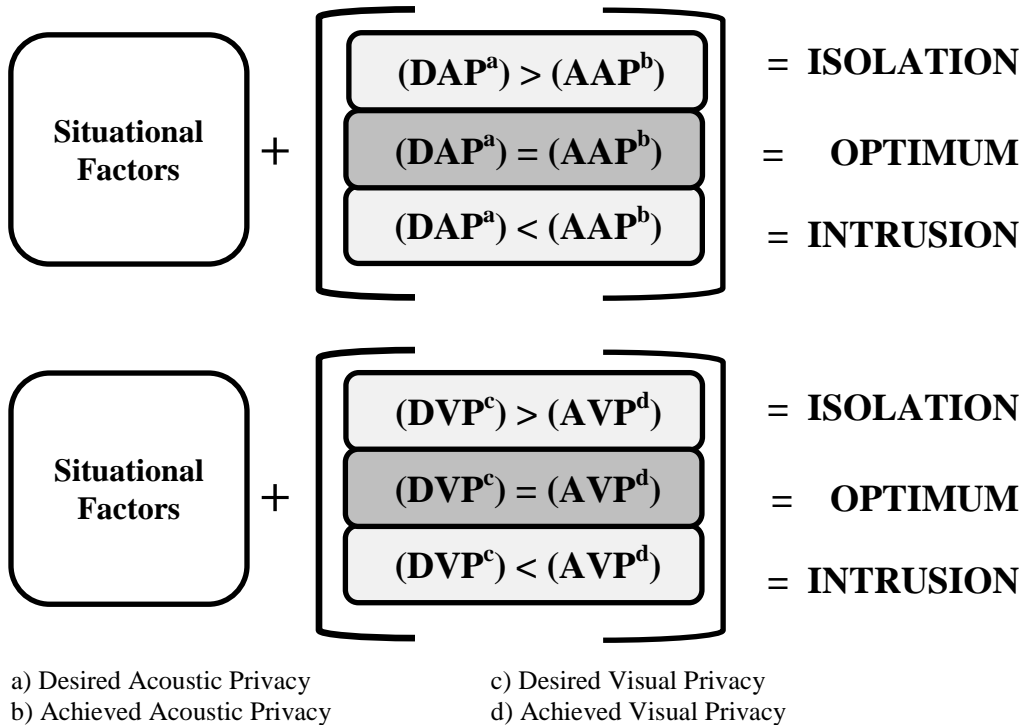


Figure 18. Theoretical Model

Discussion of the Results

The findings of this study are supported by past research by Kupritz (1998) that found open office design that utilized systems furniture in the late 1980s resulted in employees' increased acoustic and visual distraction and decreased productivity Kupritz (1998). As this loss of productivity became more evident, business culture began to shift to support not just the business goals and objectives, but also to understand and support employees' needs and the relationship between employee performance and satisfaction (Lee & Guerin, 2009).

This study also found that the 58.8% of employees spent greater than 75% of their time performing focused work in their primary workplace. Gensler's (2013) findings reported 48% in 2008, increasing to 54% in 2013. This would indicate an upward trend in focused mode work is continuing.

Because most employees' primary workplaces were built with higher panels and also had the ability to close off their workstation by some physical mean to limit or control visual privacy, the results for visual privacy indicate that the spatial characteristics also support perceived satisfaction. This relates to the findings from Oldham, Kulik and Stepina (1991) relating to acoustic and visual distractions. Those factors were spatial density, the number of enclosures that surround an employee's work area, and the interpersonal distance around that employee.

Also, the partition wall heights for the open workplaces in the STSS building are atypical of today's open workplace standards. The partition wall height of the open workplaces in the STSS building are 7'-3" (87") high with the lower 57" was constructed of fabric and the upper 30" was constructed of glazing. Typical partition heights of today's standards are much lower. This could explain why the results for visual privacy were lower than for acoustic privacy and overall privacy in the facility.

Implications of the Study

The following provides insight as to how the inferences of the study apply to business owners and personnel managers; design professionals including interior designers, architects, facility planners and facility managers; educators in the design

profession; and researchers studying performance, satisfaction, or privacy in the built environment.

Implications for business owners. Business owners and personnel managers are aware that the staffing is the second largest expenditure of most companies second only to the cost of real estate (Jex & Britt, 2008). Improving our understanding of the relationship between employees' privacy and their satisfaction can inform the future of office design and how business owners and managers work with designers to plan their office environment to optimize employee satisfaction.

Since the 1960s business owners become more aware of how the built environment impacts employee performance and satisfaction. By applying the findings of this research, they will be more informed to address privacy conditions within their office landscape that may have a negative impact on their business performance, and therefore satisfaction as a whole (Lee & Guerin, 2009).

Commercial furniture manufacturers can also benefit from this research. By utilizing the strength of modularity that is inherent to open office systems furniture, manufacturing could implement additional means within their product line to offer the end user a greater ability to control acoustic and visual privacy conditions within the primary workplace. This concept is shown in Altman's privacy construct of achieved and desired privacy (Altman, 1975).

Implications for design professionals. When analyzing data of an office setting that has a combination of both workplace types, the data should be analyzed and discussed separately to understand the attributes and characteristics of both workplace

types that are satisfying to occupants. Workstation space in many corporate environments is assigned hierarchically, that is, employees with greater status, seniority or administrative responsibilities are provided workplace with more amenities, more square footage, and more control over privacy, so that could factor in to perceived perceptions of achieved privacy.

One aspect of the study that the model does not address is the relationship between the type of primary workplace and employees' perceived satisfaction. No comparison was performed to determine if workplace type was significant in employee perception of satisfaction. Kim and deDear's (2013) study highlights the problems of perceived satisfaction in the open office environment based on the level of enclosure of the individual workstation. Their findings showed that the highest levels of Indoor Environmental Quality (IEQ) dissatisfaction were with acoustic and visual privacy in all levels of enclosure except the private, fully enclosed office. This is an area of research that warrants further examination.

Interior designers must understand that designing an interior environment according to sustainable guidelines that promotes satisfying environments may not always yield a satisfying or performance-enhancing environment. All of the constructs of the study's research model should be considered when making design decisions. The interior design discipline needs to develop acceptable standards and reliable measures to benchmark occupant perceived perception of satisfaction or adapt those already in use.

Furthermore, it is important that interior designers conduct comprehensive and unbiased post-occupancy evaluations to understand how their design decisions influence

occupants' satisfaction. High-performing office environments will support employees' physical needs such as acoustic privacy and their social needs such as visual privacy, while increasing their performance and satisfaction and thus profitability of the company.

Implications for education. Along with interior designers, educators must teach students that designing sustainably and meeting industry standards do not always result in satisfying or high performance environments. There are various attributes to all IEQ components that must be taken into consideration when designing interior environments and not all of them uphold sustainable qualities. To further understand the perceived satisfaction levels of occupants, the process of conducting post-occupancy evaluations must be taught to interior design students. Educators must discuss and demonstrate to students the information that can be obtained by conducting research studies and applying the findings to projects to help inform their design process and enhance their knowledge.

This also demonstrates to a client that the decisions being made by the designer and the design team as a whole are evidence-based and not simply a subjective choice. Guerin and Martin (2010) state in the *Interior Design Profession's Body of Knowledge* the importance of conducting, measuring, and documenting that interior designers decisions have on occupants' and the public's health, safety, and welfare to provide evidence to the BOK supporting the profession.

Implications for future research. Once students understand the research process and benefits, they will be able to continue implementing the process into their professional practice. Interior design students will find they are more desirable and valuable to employers because they possess a diversified skill that combines design *and*

research. Furthermore, students who go on to conduct research studies in practice will discover they will become more informed and knowledgeable interior designers. They will also establish better client relationships and develop marketing opportunities. Interior designers conducting research in practice demonstrates to their clients they want to learn about the outcome of their design decisions. Once the data are gathered and analyzed, they provide marketing opportunities present findings at conferences and client meetings.

Another opportunity for research would be to compare employees' perceived perceptions on acoustical and visual privacy to see if they align with acoustic measures of PI and AI as defined in chapter 2. Frieheffer (2012) found that even though acoustic measures were within accepted industry standards, employees were not satisfied with their environment. This could also be applied to visual privacy measures.

Summary

The impact that sustainable guidelines such as the B3-MSBG have made on the building industry have been very influential in our understanding of how effective a design solution is. Current studies focus on occupant satisfaction, but future studies could expand on this research by including a deeper analysis of performance in a wider variety of physical environments and comparing data for similarities or discrepancies.

The results of this study also provide evidence to designers and architects regarding design attributes and strategies that significantly contribute to employee satisfaction. The evidence gathered will help inform design professionals on future projects and increase the body of knowledge to further validate employees' need for privacy in their workplaces.

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APPENDIX A

SPOES Survey

Consent Form for Occupancy Evaluation of Workplace

You are invited to be in a research study because you have a workplace in a building designed to meet the Buildings, Benchmarks, and Beyond Minnesota Sustainable Building Guidelines (B3MSBG). This survey is part of the follow up required by the B3MSBG. Please read this form and ask any questions you may have before agreeing to be in the study. This study is being conducted by researchers associated with the Center for Sustainable Building Research (CSBR), University of Minnesota.

Background Information

The purpose of this study is to assess employees' perceptions of their facility and workplaces. The survey will take around 15 minutes to complete. The survey results can be used to inform adjustments or improvements to the facility and will inform the content and application of sustainable building guidelines in the future.

Procedures

If you agree to be in this study, please complete the online questionnaire, which will be submitted to the CSBR at the University of Minnesota for analysis. Your employer will receive a report of the overall analysis, but no data on individual responses will be included.

Risks and Benefits of Being in the Study

There are no risks or benefits to you for being in this study.

Confidentiality

The records of this study will be kept private and stored securely~only researchers will have access to the records. In any report we might publish, we will not include any information that will make it possible to identify any individual respondent in the results. Your employer will not have access to these records.

Voluntary Nature of the Study

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. You are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions

The CSBR is conducting this study, and you may ask any questions you have before you begin the survey or later. To do so, please contact Denise Guerin, Ph.D. at (612)626-1257.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455~(612) 625-1650.

All rights reserved.

1. Answer YES to provide your consent and complete the questionnaire.

Yes

No

Section 1: Overall Satisfaction

Directions:

There are several pages in this questionnaire, and completion of the entire questionnaire is important to understand how the physical environment of the Science Teaching Student Services (STSS) workplaces and the STSS (site, building, and interior) meets your needs.

2. Overall, how satisfied are you with the physical environment of STSS (site, building, and interior)?

Very Dissatisfied							Very Satisfied
1	2	3	4	5	6	7	

3. Overall, how does the physical environment of STSS (site, building, and interior) affect your work performance?

Hinders Work Performance							Enhances Work Performance
1	2	3	4	5	6	7	

4. Overall, how does the physical environment of STSS (site, building, and interior) affect your health?

Hinders Health							Enhances Health
1	2	3	4	5	6	7	

Section 2. Primary workplace

Please respond to questions about your primary workplace (private office, workstation, or other primary workplace).

5. Which of the following best describes your primary workplace, i.e., the one where you spend the most time?

- Enclosed office, private
- Enclosed office, shared with other people
- Cubicle with low partitions (less than five feet high)
- Cubicle with high partitions (five or more feet high)
- Cubicle with both low and high partitions
- Desk in open office with no partitions
- Work area within lab
- Other, please specify

6. Overall, how does the physical environment of your primary workplace affect your work performance?

Hinders Work Performance							Enhances Work Performance
1	2	3	4	5	6	7	

7. Overall, how does the physical environment of your primary workplace affect your health?

Hinders Health							Enhances Health
1	2	3	4	5	6	7	

8. Overall, how satisfied are you with the physical environment of your primary workplace?

Very Dissatisfied							Very Satisfied
1	2	3	4	5	6	7	

9. Please indicate how satisfied you are with each of the following aspects of your primary workplace:

	Very Dissatisfied						Very Satisfied
The overall thermal conditions [temperature (hot or cold), air velocity (drafty or stagnant), and humidity (dry or moist)] of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The temperature (hot or cold) of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The air velocity (drafty or stagnant) in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The humidity (dry or moist) in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The adjustability of the thermal conditions of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall indoor air quality (free of odors, staleness, chemicals or irritants) your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall acoustic quality (ability to hear desired sounds and limit undesired sounds) in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The ability to hear desired sounds in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The ability to limit undesired sounds in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall lighting conditions (electric and daylighting) of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The amount of electric light in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The adjustability of the electric lighting in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The amount of daylighting in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The adjustability of the daylighting in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Very Dissatisfied						Very Satisfied
The adjustability of your task lighting in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall view conditions (outdoor or distant interior views) of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall vibration and movement of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall privacy (sound and visual privacy) conditions of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall furnishings of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall function of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall appearance (aesthetics) of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The technology (computer, telephone, etc.) in your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The overall cleaning and maintenance of your primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Please let us know any additional comments regarding how your primary workplace affects your satisfaction.

Section 3. Primary Workplace, Work Activities and Privacy Conditions

The following questions pertain to your primary workplace, privacy (acoustic and visual) conditions and your ability to do focus work (concentrate on details).

11. Regarding your primary workplace, what percentage of a normal work day is spent performing focused work?

- Less than 25%
- 25% - 50%
- 51% - 75%
- Greater than 75%
- NA

12. During a normal work day, where do you perform your focused work? (Total must equal 100%)

	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
My primary workplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A quiet, unassigned workplace within my department or floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A quiet room in my department or floor, like a vacant office or conference room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A social space in my department or floor, like a break room or lounge area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Somewhere else within the building, outside my department or floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Somewhere else outside the building, like a coffee shop, library, car	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At home~telecommuting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify)

Acoustic Privacy and Focus Work

Acoustic privacy concerns your ability to hear desired sounds and limit undesired sounds. For the following questions, consider that you are doing focused work in your primary workplace.

13. Please indicate how the acoustic privacy in your primary workplace affects your work performance.

The effect of overall acoustic privacy on your work performance

Hinders Work							Enhances Work
Performance							Performance
	1	2	3	4	5	6	7

14. Please indicate how the acoustic privacy in your primary workplace affects your satisfaction.

	Very Dissatisfied						Very Satisfied
The extent of acoustic privacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your ability to have a one-on-one conversation without being overheard by others nearby	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Background noise from mechanical systems (fans, air conditioning, vents, radiators, etc.,)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Background noise from added sources (radio, phone, background music, desktop equipment, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Visual Privacy and Focus Work

Visual privacy concerns your ability to see desired elements outside of your workplace, be seen by others, and minimize visual access to your workplace. For the following questions, consider that you are doing focused work in your primary workplace.

15. Please indicate how the visual privacy of your primary workplace affects your work performance.

The effect of overall visual privacy on your work performance

Hinders Work Performance							Enhances Work Performance
	1	2	3	4	5	6	7

16. Please indicate how satisfied you are with the visual privacy in your primary workplace.

	Very Dissatisfied						Very Satisfied
The extent of visual privacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to see desired elements outside your primary work space, (coworkers in the distance, technology, view out of a window, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to control visual access (be seen by others when they pass by your workplace)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to limit visual distractions (coworker interruptions because they can see me)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. Do you have the ability to close off your primary workplace with a door or some other device?

- Yes
- No
- Other (please specify)

18. If you have the ability to close off your primary workplace, how often to do you close it off during a typical business day?

- All day
- Frequently~a few times per day
- Seldom~once a day
- Rarely~once a week
- Never

19. From the list below, please identify all of the reasons for closing off your primary workplace.

- To increase acoustic privacy
- To decrease being overheard
- To increase visual privacy
- To decrease distraction
- Other (please specify)

Section 4. Physical activity and commuting

Please respond to the following questions about your physical activities and commuting practices.

20. How does STSS (site, building, and interior) affect your overall physical activity (walking, stair use, etc.).

Hinders Physical Activity							Enhances Physical Activity	
1	2	3	4	5	6	7		

21. Approximately how many miles is your typical daily home-to-work commute, one way?

- 0-5 miles
- 6-15 miles
- 16-30 miles
- 31-45 miles
- 46-60 miles
- 61-75 miles
- 76 or more miles

22. What is your primary mode of transportation used for your daily commute?

- Drive alone (or with children under 16)
- Carpool or vanpool
- Motorcycle / moped
- Public transit
- Bicycle
- Walk
- Telecommute (work from home)
- Other (please specify)

23. How does the location of the STSS affect your ability to commute to work in an alternative way (e.g., walk, bicycle, public transit, van, or carpool, etc.)?

Hinders Alternative Commuting							Enhances Alternative Commuting	
1	2	3	4	5	6	7		

Section 5. Demographics

Finally, here are a few questions about you! Thank you very much for your time.

24. What is your age?

25. What is your gender?

- Male
- Female

26. How many years have you worked at STSS?

27. In a typical week, how many hours do you spend at STSS?

- Less than 20 hours
- 20-29 hours
- 30-40 hours
- More than 40 hours

28. What percentage of time per week do you spend in your primary workplace?

- Less than 25%
- 25-50%
- 51-75%
- More than 75%

29. Is your primary workplace located within 15 feet of an exterior window?

- Yes
- No
- I don't know

30. To what extent did you provide input for your physical environment needs during the planning and design process for STSS?

No Extensive
Opportunity Opportunity
1 2 3 4 5 6 7

31. Please let us know if you have any additional comments about the physical environment of STSS.

Thank you for completing the survey. Your responses will help assess the outcomes of sustainable design efforts in this building and help identify issues and concerns in your facility.

Thank you for your time.

APPENDIX B

Correspondence

Date: March 4, 2014

From: Theresa Bauer

To: zast0020, t-schm, rahrah, rude0044, fishe355, melin002, rstubble, Denise, soule053

Greetings

I am writing to introduce myself and the purpose of my correspondence with you. I am a research assistant with the Center of Sustainable Building Research and responsible for the administration of post occupancy evaluations for buildings designed and built referencing the MN B3 sustainable building guidelines (B3-MSBG). As a state funded building, we are required to administer surveys to occupants having office space in the STSS facility. We are also administering a similar survey with the students having classroom spaces in STSS.

We have attempted to isolate one individual with an STSS building wide email list but have been directed to the individual departments. Below is a list of contacts that reflects our current understanding of who to work with in this process.

I need to establish if you are the correct contact person to work with and can serve as a 'site survey coordinator'. What we need is your help sending out the survey link to your employees on Wed, March 5th. This should take less than 5 minutes, everything is prepared! We just need to have the enclosed message copied into a new email message (with survey link) and forwarded to the employees on your email list.

The first message is an invitation explaining the nature (with the survey link) and the second message is a reminder message. This is a great opportunity for employees to express concerns regarding the Indoor Environment Quality for the STSS facility!

Please confirm your ability to serve in this capacity and/or redirect this request to the correct person(s) and let me know of any questions that you might have.

Enclosed are copies of the email messages to the employees and a copy of the survey for your review.

Thank you for your anticipated help with this!

Building Contacts with Departments in STSS

225

Carrie Otto, Assoc. Dir. One Stop - Academic Support Resources (ASR)

Tom Schmidt, Office of Student Finance

411

Becky Hall, Coordinator, Office for Student Affairs (OSA)

511

Jennifer Endres, (Health & Natural Sciences (HNS))

Matt Fisher (Center for Academic Planning & Exploration (CAPE))

LeeAnn Melin. Dir. Campus/College Level — Undergrad Ed

Robin Stubblefield, Office of Student Engagement (OSE)

Theresa Rae Bauer (Terri) / t

SPOES Research Assistant

Center of Sustainable Building Research

portfolio-t.com

(2 Attachments)

To:	STSS Site Survey Project Coordinators
Purpose:	Information on Survey Process
Action:	NA – See next page
Date:	03.03.14

Greetings!

It has been sometime since the **Science Teaching Student Services (STSS)** was first occupied, and we need to conduct a post-occupancy survey of the building occupants. We are conducting this survey in compliance with the goals of Buildings, Benchmarks, and Beyond - Minnesota State Building Guidelines [B3-MSBG]. The Sustainable Post-Occupancy Evaluation Survey (SPOES) has been developed specifically to address the impact of indoor environmental quality [IEQ] on occupant and student perceptions.

Your assistance with this survey is important to the success of the evaluation process. All is ready for you! Attached, you will find two prepared email messages that *you or your designee* will send to the people who have a workplace in the **Science Teaching Student Services**. Please send the messages on the specific dates identified below.

- Message 1: The Invitation** Message should be sent on **03.05.14** to your employees inviting them to:
- a. complete the survey, on company time, between **03.05.14 - 03.14.14 / Midnight**
 - b. access the link for the SPOES survey
<https://www.surveymonkey.com/s/MCB59GR>

- Message 2: The Reminder Message** should be sent on **03.12.14** reminding employees to:
- a. complete the survey, on company time, by **03.14.14 / Midnight**
 - b. access the link for the SPOES survey
<https://www.surveymonkey.com/s/MCB59GR>

Please be assured that all conditions for the University of Minnesota’s Institutional Review Board (IRB) have been met. As indicated on the initial consent form, participation in this study is voluntary and responses are stored in a secure database and are available only to U of M researchers. Should any questions arise, contact information for the principal investigators for this study are included on the consent form and contained in the email messages.

Once the surveys are completed, CSBR will generate a report of the findings. The report will be available on request and is subject to future publication online through the CSBR website.

Thank you for your assistance with this survey! Please let us know if you have any questions!

Theresa Bauer
baue0003@umn.edu

Denise Guerin, Ph.D.
dguerin@umn.edu

To:	STSS Site Survey Project Coordinators
Purpose:	Survey Invitation (Message 1)
Action:	Copy and Paste the information provided below into a new email and send it to the employees having workplace in Science Teaching & Student Services (STSS)
Send Date:	03.05.14

Greetings!

In compliance with the goals established by the Buildings, Benchmarks, and Beyond - Minnesota State Building Guidelines [B3-MSBG], the Center for Sustainable Building Research (CSBR) is asking for your help in completing a post-occupancy evaluation (POE) survey for the Hanson Hall. The Sustainable Post-Occupancy Evaluation Survey (SPOES) has been developed specifically to address the impact of indoor environmental quality [IEQ] on occupant perceptions and to gather important feedback where building concerns exist.

The survey begins **today** and closes **03.14.14 at midnight**; it will take approximately 10-15 minutes for you to complete the survey. You can access the survey anytime during this period by clicking on the following link:
<https://www.surveymonkey.com/s/MCB59GR>

Please be assured that all conditions for the University of Minnesota's Institutional Review Board (IRB) have been met. All responses are stored anonymously in a secure database and available only to the researchers responsible for this study.

Once the surveys are completed, CSBR will generate a report of the findings. The report will be available on request and is subject to future publication on the CSBR B3MN website located at (<http://casestudies.b3mn.org/Projects.aspx>).

If you have any questions, you may contact Theresa Rae Bauer at baue0003@umn.edu or Denise Guerin, Ph.D., at dguerin@umn.edu for further information.

We look forward to your participation with this research.

Thank You!

To:	STSS Site Survey Project Coordinators
Purpose:	Survey Reminder (Message 2)
Action:	Copy and Paste the information provided below into a new email and send it to the employees having workplace in Science Teaching & Student Services (STSS)
Send Date:	03.12.14

Greetings!

Last week you were sent an invitation to participate in the post-occupancy evaluation survey that is being conducted of workplaces in **Science Teaching Student Services (STSS)**. This is a friendly reminder to complete the survey before the end of day, on **03.14.14** if you have not already done so.

The survey is accessible online through the following link **SURVEY LINK** and can be completed during your work time. The Sustainable Post-Occupancy Evaluation Survey (SPOES) has been developed specifically to address the impact of indoor environmental quality [IEQ] on occupant perceptions and to gather important feedback where building concerns exist.

Please give this your full attention so we have a comprehensive view of the workplace environmental quality.

If you have any questions, you may contact **Theresa Rae Bauer** at baue0003@umn.edu or **Denise Guerin, Ph.D.**, at dguerin@umn.edu for further information.

We thank you for your participation with this research!