Exploring the Influence of the Physical Environment of Workspace on Public Sector Employee Creativity

By

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Applied Research Project

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Chapter One: Introduction

Some of the most influential businesses today are founded on the principles of creativity. Steve Jobs, founder of Apple, utilized creativity in every aspect of Apple. As a result, Apple continues influencing other organizations to approach problems and business in a creative way.

Companies are interested in creativity because it is associated with innovation and success; it is the foundation of new ideas and solutions. Countless books,[1] articles, and seminars on creativity give proof that creativity is a desired part of any business. Google, 3M and Dream Works place creativity as one of their core values and encourage it by designing unique spaces where employees can interact with each other in a casual setting. Doing a simple internet search of "Google's office spaces" leads to number of videos on the unique office spaces that Google has created.

Public sector organizations, on the other hand, have certain stereotypical qualities that preclude them from being considered creative. (Rangarajan, 2008). Often, the public sector is seen as a rule-based organization with limited flexibility or space for creative action. Creativity, however, is defined by scholars as "the generation of products or ideas that are both novel and appropriate" (Hennessey and Amabile 2010, 570) and innovation is defined as "the successful implementation of creative ideas" (Hennessey and Amabile 2010, 585). If one considers the significance of the definition of creativity and its need in the workplace then the argument to incorporate conscious creativity in public sector organizations becomes compelling. As a tool,

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[1] Examples of these are Dul, J, and C Ceylan. 2011. "Work environments for employee creativity." *Ergonomics* 54, no. 1: 12-20.; Feliciter 58, no. 3: 116; 2010. "Fostering Creativity." *Harvard Business School Press Books* 1; Florida, Richard. 2002. "The Rise of the Creative Class." Washington Monthly 34, no. 5: 15-25; Humphrey, Ellen G. 2012. "Fostering Creativity and Innovation at Calgary Public Library." Wainwright, Hilary. 2012. "Unleashing the creativity of labour." Red Pepper Magazine no. 156: 30; Walter, Christian. 2012. "A Framework for Creating Creative Workspaces." *Proceedings of the European Conference on Knowledge Management* 2, 1267-1274.

the public sector works to solve some of the most important and pressing problems of the nation. Public administrators face problems on a daily basis: balancing budgets, hiring new employees, and even larger problems such as poverty, and natural crises (Shields, 2008). Remedying these concerns is why creativity is essential to the public sector (Albury, 2005) because creativity is the generation of not only novel ideas (solutions) but also appropriate ones.

A question employers may ask is how can the public sector encourage creativity and attract creative individuals? The most likely answer is a tailored combination of a few possible strategies. One tool used by creative companies is implementing a workplace design that encourages and supports the creative process. While there are a [2]number of studies on the physical environment of workspace in the private sector and its impact on creativity, there are few studies which focus on the public sector and the role of creativity in meeting its goals, challenges, and workforce needs (Rangarajan 2008). This applied research project (ARP) seeks to fill the gaps by exploring how the physical environment of the workspace impacts public sector creativity.

Research purpose

The purpose of this research is to explore how public sector employees' perception of the physical environment of their workspace influences or relates to their perception of their on-the-job creativity. Specifically, this research explores public employees' perceptions of two aspects

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[2] Examples of these are Boutellier, Roman, Fredrik Ullman, Jürg Schreiber, and Reto Naef. 2008. "Impact of office layout on communication in a science-driven business." *R&D Management* 38, no. 4: 372-391.; Haner, Udo-Ernst. 2005. "Spaces for Creativity and Innovation in Two Established Organizations." *Creativity & Innovation Management* 14, no. 3: 288-298.; Laing, Andrew, David Craig, and Alex White. 2011. "High-Performance Office Space." *Harvard Business Review* 89, no. 9: 32-33; Moultrie, James, Mikael Nilsson, Marcel Dissel, Udo-Ernst Haner, Sebastiaan Janssen, and Remko Van der Lugt. 2007. "Innovation Spaces: Towards a Framework for Understanding the Role of the Physical Environment in Innovation." Creativity & Innovation Management 16, no. 1: 53-65Weinstein, Margery. 2007. "A Tree-mendous Workspace." *Training* 44, no. 1: 11;

of their physical work environment and how they correlate with creativity, 1) personal work space and 2) shared work spaces.

This applied research project utilizes an empirical research process model as the guide for how it is organized (Shields and Rangarajan, 2013). As described above, the first chapter explains the research purpose. The second chapter explores the literature pertaining to the physical environment of the workspace and creativity. From the literature creativity is defined, influential aspects of the physical environment are identified, and two working hypothesis are developed. Chapter three describes the method of research, a survey performed to gain a greater understanding of the relationship between the physical environment of the workspace and employees' perceptions of their on-the-job creativity. Chapter four presents the results of the survey. Chapter five summarizes the information gained from this applied research project, provides conclusions and explores possible areas for future research.

Chapter Two: Literature Review

Chapter Purpose

Scholars from a wide variety of disciplines publish literature on creativity and how the physical environment impacts creativity. The purpose of this chapter is to review the literature on creativity, examining how the physical environment of the workspace, particularly in the public sector, impacts creativity.

This chapter is divided into three sections. The first section explores literature on the meaning of creativity and its importance within the workplace and public sector. The second section looks at ways creativity is measured and the applicable measures for this research. The third section looks at the phases of creativity and how the physical environment of the workspace impacts each phase. It then presents two working hypotheses with seven sub hypotheses on the impact of the physical environment on public sector employee creativity. Because of its exploratory nature, this project utilizes working hypotheses, (Shields and Tajali, 2006) and each section ends with the working hypothesis created from the information in the literature.

Creativity

Creativity is defined as "the generation of products or ideas that are both novel and appropriate" (Hennessey and Amabile 2010, 570). Innovation is defined as "the successful implementation of creative ideas" (Hennessey and Amabile 2010, 585). In terms of this definition creativity and innovation are intertwined. As Hennessey and Amabile describe in the article "Creativity" the concept of creativity works on levels as varied as: creativity of products, individuals, groups, and organizations. The focus of this research is to look at the creative

process of individuals and groups in the work environment and the impact that the physical elements of the workspace has on their ability to create and implement novel ideas.

Creativity is the cornerstone of many successful companies such as Apple, Pixar, 3M, and Google, but creativity is particularly important in government agencies in which a myriad of problems must be solved under tight fiscal restraints (Albany 2005). Creating a work environment in which creativity is supported can improve productivity by reducing stress levels and creating higher levels of job satisfaction (Stokols et al 2002). There is a point of view that creativity is a personal trait and, therefore, cannot be increased or affected by the employee's surrounding space. However a review of the literature on creativity shows that there is a strong argument that creativity is not limited to personal traits and can be stunted or improved by the work environment (Amabile 1996; Ceylan and Aytac 2008). For this reason, it is important to understand how public sector agencies can stimulate workplace creativity.

Measures of Creativity

Researchers have used a variety of ways to measure individual creativity and creativity at work. In "Measurement of Creativity: Review and Critique," Dennis Hocevar lists several ways researchers have measured and evaluated creativity. Hocevar identifies and critiques the following ways of measuring and evaluating creativity: 1) Tests of Divergent Thinking, 2)Attitude and Interest Inventories, 3) Personality Inventories, 4) Biographical Inventories, 5)Teacher Nominations, 6) Peer Nominations, 7) Supervisor Ratings, 8) Judgment of Products, 9) Eminence, 10) Self-Reported Creative Activities and Achievements, and 11) Discussion and Critique. In his review of the detailed literature on all these types of measurements, Hocevar found both positive and negative attributes of each measure, coming to the conclusion that

asking the person or group being researched, is a simple, useful, accurate, but rarely used measure of creativity (Hocevar, 1981, 459).

Hocevar finds that asking the person or group of interest has an advantage because, in most cases, they know the most about himself or herself and has a good idea of their creativity (Hocevar, 1981, 459). Using self perceived creativity as a measure is also useful because in many cases the creative process is not directly observable (DiLiello, et al 2011, 153). This measure asks the individual employee whether or not they feel they are being creative and if creativity is supported in their position. Researchers Zhou, Shin, and Cannella utilized self-perceived creativity in their article, "Employee Self-Perceived Creativity after Mergers and Acquisitions Interactive Effects of Threat-Opportunity Perception, Access to Resources, and Support for Creativity." Their research suggests that "understanding individuals' self-perception and subjective experiences of their creativity is the first step towards understanding the entire process of creativity" (Zhou, et al 2008, 400)   In "Narrowing the Creativity Gap: The Moderating Effects of Perceived Support for Creativity," DiLiello also utilized employees' perceptions of their own creativity but placed it in the context of perceived support for creativity (DiLiello, et al 2011, 153).

A common research technique utilized by creativity researchers is the use of pretested questionnaires that determine the employee's innate ability. Researchers appreciate these techniques because they limit the possibility that the person will try to manipulate the outcome in their favor. Jabri in "The Development of Conceptually Independent Subscales in the Measurement of Modes of Problem Solving" (1991) developed a scale to determine whether an individual approached problems in a creative way. Jabri developed two independent subscales which categories individuals into two innate styles of problem solving. A respondent who has a

higher score on the associate scale tends to follow established rules and common ways of addressing problems. Respondents who have a higher score on the bisociative scale tend to solve problems by making connections between seemingly unrelated items, utilizing imagery and intuition (Payne et al 1990, 47).

With the many options for measuring creativity, a researcher needs to determine which is best for her research question. Many times the best measuring technique is a combination of more than one technique allowing the researcher to establish the most practical results she needs. In this case, to understand the creative experience of public sector employees and how it is impacted by the work environment, it is appropriate to use both the employee's perception of their creativity and a standardized measure of creativity.

The Physical Environment of the Workspace's Impact on Creativity

The argument that the physical environment of the workspace influences creativity has led to new ways of viewing and creating office space. Companies such as Google, Pixar, IDEO, and Frog Design have created work settings that encourage creative thought and attract creative employees. Public sector agencies can learn from these organization's experiences and use similar strategies to attract creative minds and stimulate creativity in employees at any level. In fact, research illustrates that innovation comes mainly from those involved in the day-to-day activities of an organization, as well as newly educated employees bringing innovative techniques (Borins 2001). The public sector needs to attract and stimulate these employees that Florida refers to as the "creative class" because they bring with them creativity, education, and energy (Florida 2002). While the public sector always hopes to attract the brightest minds, it is currently losing these innovative individuals to the private sector because not only is the private

sector able to provide higher financial incentives, they are also providing more support for creativity. The public sector can get past this shortfall not only by improving the physical environment of the workspace to attract creative employees but also to stimulate creativity in the current employees.

The physical environment of the workspace stimulates creativity by supporting the four phases of the creative process: (1) the accumulation of a knowledge base (preparation); (2) incubation of that knowledge (incubation); (3) recognition or vision of an innovative solution (insight) and (4) the creation/ evaluation of a useful product from the vision (evaluation) (McCoy and Evans 2002, Kristensen 2004, Haner 2005). Additionally, the phases can be divided further by the thinking styles and behaviors that are associated with each phase. Phases 1 and 4 are convergent which entails a focused approach, and phases 2 and 3 are considered to be divergent which allows for more ambiguity and contradictory ideas (Haner 2005). These different phases and thought processes require different types of support from the physical work environment. Figure 2.1 shows an example of activities that occur during divergence and convergence with teams and individuals.

Figure 2.1 Sample Activities to be Supported in Creativity and Innovation Process (Haner 2005, 291)

	Divergence	Convergence
Team	Brainstorming	Deciding
Individual	Browsing	Analyzing

The physical environment of the workspace can support and impede the creative process in a variety of ways. Understanding the creative process and the thought processes involved,

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allows for the creation of workspaces that suit the different needs of each phase. Tore Kristensen's article "The Physical Context of Creativity," explains the general requirements of an effective physical environment to support each phase of the creative process. The first phase (preparation) requires easy flow of information to individuals and groups with private spaces to study and absorb the material. The second phase (incubation) states "the cognitive process of problem solving goes on implicitly" (Kristensen 2004, 90); therefore, being in a room where information is displayed, for example on white or cork boards, is helpful. The third phase (insight) can occur in any physical environment. The fourth phase (evaluation) is like the first phase in that both access to information and occasional access to private more focused spaces are important (Kristensen 2004).

The requirements of these creativity phases demonstrate that both individual and shared spaces are important to the creative process. According to Haner, "facilitating creativity and innovation means supporting convergent and divergent behaviors as well as sustaining individual and group activity. This in turn means that spaces for creativity and innovation need to support communication and interaction in times of collocation as well as allowing for privacy in other times" (Haner 2005, 292). As a result, when evaluating how workspace supports the creative process, it is important to consider the work environment as consisting of two different spaces: individual workspace and shared workspace. Following this logic, the working hypotheses for this project are split into individual and shared workspaces. Each aspect of the physical environment identified as factors that may impact employee perception of their on-the-job creativity is identified by a separate sub-hypothesis. For each sub-hypothesis there is an explanation of the supporting literature used to identify and include the variable used in this research.

Development of Hypotheses

Individual Workspaces

In order to be effective, certain activities and creative processes require individual workspace that allows employees a degree of privacy. Many employees no longer have their own desk and office space. Due to the increase in mobility and telecommunication, many employees work away from the office regularly creating a need for the office to become a location for learning and creative interaction (Elsbach and Bechky 2007). This change in office dynamics makes it more important for companies to create a space in which the employees' needs for privacy and belonging are enhanced. "Using office design to promote place attachment can make workers more satisfied with their office environment by generating emotional bonds to the workspace over time" (Elsbach and Bechky 2007, 90). Certain elements of a room in an individual workspace improve the employees' perceptions of support for creativity; elements such as plants, room color, lighting, and complexity of structural elements (Ceylan et al 2008). The research leads to the development of the working hypothesis:

WH1: Public employees' perceptions of the physical environment of their **individual workspaces** influence their perceptions of their on-the-job creativity.

Layout

Individual workspace layout need to take into account privacy and limiting distractions, while providing easy access to information. The preparation phase and the elaboration and evaluation phase frequently require individuals to have spaces with few distractions (Kristensen 2004). The office layout for individual space is also dependent on the jobs performed in the space. For instance, jobs that require a great deal of attention to detail will be better suited to

individual spaces that are more traditional and private. Jobs that welcome distractions and value

freedom of interaction and transfer of

ideas are better facilitated by an open

floor plan (Elsbach and Pratt 2007).

Picture 2.1 demonstrates an open floor

plan or bullpen style office layout.

Picture 2.1 Bull Pen style example

Open floor plans are helpful in

fostering communication, but providing

no private space can be detrimental.

"Consequently, work environments supportive to creativity and innovation will have to provide

for opportunities for (temporal) privacy, for example, through an appropriate office type mix"

(Haner 2005, 293). This mix of office space is not limited to the traditional setting of walls and

doors. In Haner's article, *Spaces for Creativity and Innovation in Two Established*

Organizations, he describes two types of innovative spaces that create individual spaces in

original ways: the 'Interactive Creativity Landscape' creates retreat zones for the phases of

creativity that requires privacy and seclusion. In this example, when private space is needed,

employees can utilize a "cocoon-like space that aims at providing privacy to the individual user"

(Haner 2005, 295). The research on having floor plans that encourage interaction with private

space when needed is the basis for the following working hypothesis.

WH1a: Interaction-promoting office layout of **individual workspaces** with areas of privacy

influences public employees' perceptions of their on-the-job creativity.

Décor

The use of décor, lighting, and personal artifacts in the individual workspace sends very specific messages to the users. The term décor for the purpose of this research refers to furniture, decoration, color and visual interest of the room. McCoy and Evans (2002) found that the furniture, visual details, and color of a room have an impact on perceptions of support for creativity. McCoy and Evans utilized photos of rooms that represent a variety of lighting, organization, surfaces, colors, textures, and transparency rated on their own scales. They then asked participants to group the rooms in the order in which they felt the rooms would support their creativity. Using this method they identified characteristics of rooms and the level of creative potential. The findings showed the decorative aspects of spaces influence perceptions of support for creativity.

Respondents perceived photos in which furniture was arranges for social interaction as supportive of creativity. Also rooms with a great deal of visual detail were perceived as supporting creativity. Natural elements such as wood were associated with creative potential. Cool colors, on the other hand, were found to be negatively correlated with creative potential (McCoy and Evans 2002, 424). This information shows that when creating individual workspaces to support creative work the décor needs to be considered. The use of visually detailed décor, natural materials, furniture arranged for social interaction, and warm colors can increase employees' perceived support for creativity. From this literature one can expect:

WH1b: Visually stimulating décor in **individual workspaces** influences public employees' perceptions of their on-the-job creativity.

Lighting

The importance of lighting, in particular natural light, and its ability to stimulate creativity has been viewed by researchers in different ways. When lighting was looked at by McCoy and Evans the authors emphasize that "the personal freedom of autonomy, openness to experience, and engaging in unconventional thought may be fostered in settings in which windows and natural view permit distraction" (McCoy and Evans 2002, 424).

Boyce, Hunter and Howlett have dedicated significant research into the benefits of daylight through windows. They find that daylight is stimulating on both a physiological and psychological level (Boyce et al 2003). For the purpose of creativity the most applicable aspect of Boyce's research is the finding that "psychologically, daylight and a view are much desired" (Boyce et al 2003, 2). Elsbach and Pratt (2007) also found windows that allow for natural light and views of the outside, particularly if it is of nature, can reduce stress therefore promoting higher creative performance. Mumin's research has also shown that reductions in stress can increase creativity (2010). The lack of studies on the direct impact of sunlight, windows and a view on creativity may be due to the fact that it is already a generally accepted concept. It is from this research and lack of strong statistical evidence that the below hypothesis was developed:

WH1c: An abundance of natural light with views of the outside in **individual workspaces** influences public employees' perceptions of their on-the-job creativity.

Personal Artifacts

The use of personal artifacts in the individual workspace is an important and simple environment enhancing tool that can benefit workspace creativity. Wels and Thelen define personalization as "the deliberate decoration or modification of an environment by its occupants to reflect their identities" (Wells and Thelen 2002, 302). Many companies have policies limiting

personalization because they value neatness and uniformity. Wells's research for the article "Office clutter or meaningful personal displays: The role of Office Personalization in employee and organizational well-being" showed that the ability to personalize the office space creates a positive social environment, reduces turnover, and has a positive correlation with creativity (Wells 2000). This simple policy provides support for creativity particularly as it pertains to individual spaces.

In individual spaces the ability to personalize is utilized differently depending on the individual traits of the employee. Females tend to personalize more than men and tend to display items that reveal individualism, emotion, and improve the feel of the workspace, while men personalize to show status (Wells 2000). Employees who have a high need for privacy tend to personalize less than those with a low need for privacy (Wells and Thelen 2002). Therefore allowing personalization of individual workspace impacts each employee meaningfully by allowing them to tailor the environment to their needs. Pictures 2.2 and 2.3 demonstrate the types of personalization that occur in individual spaces, note the display of awards, diplomas, and personal affects.

Picture 2.2 Personalization example 1
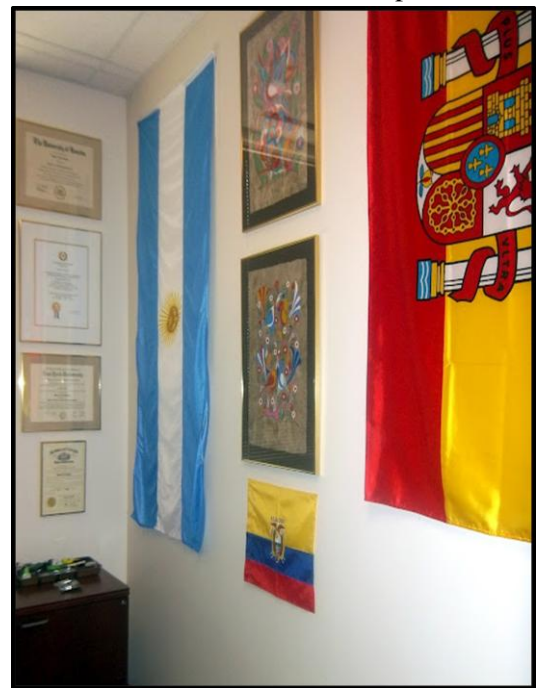
No matter the personal need and displays utilized by individual employees the ability to personalize the individual space is on a whole beneficial to employee creativity. Elsbach and Pratt showed in "It's More than a Desk: Working Smarter Through Leveraged Office Design"

Picture 2.3 Personalization example 2

that allowing employees the ability to personalize allows people to make themselves distinct, improve mood, and reduce stress, all of which have been linked to improving creativity (Elsbach and Pratt 2007). The ability to personalize also goes beyond supporting creativity and supports the employees' attachment and commitment to the company (Elsbach and Pratt 2007, Wells 2000). This understanding and literature supporting personalization as a way to promote creativity lead to development of the hypothesis below:

WH1d: The use of personal artifacts in **individual workspaces** influences public employees' perceptions of their on-the-job creativity.

Table 2.1 on page 20 summarizes these working hypotheses and the literature associated with them. Testing these hypotheses should help identify which aspects of the physical environment of personal workspaces are perceived as being supportive to creativity by public sector employees.

Table 2.1 Working hypothesis with supporting literature

Working Hypothesis	Supporting Literature
WH1: Public employees' perceptions of the physical environment of their **individual workspaces** influence their perceptions of their on-the-job creativity.	• Kristensen 2004 • Haner 2005 • Carnevale 1992
WH1a: Interaction-promoting office layout of **individual workspaces** with areas of privacy influences public employees' perceptions of their on-the-job creativity.	• Davis 1984 • McCoy and Evans 2002
WH1b: Visually stimulating décor in **individual workspaces** influences public employees' perceptions of their on-the-job creativity.	• Amabile 1983 • McCoy and Evans 2002 • Becker and Steele 1995
WH1c: An abundance of natural light with views of the outside in **individual workspaces** influences public employees' perceptions of their on-the-job creativity.	• Abkar, et al. 2010 • Boyce 2003 • Elsbach and Pratt 2007 • Kelley and Littman 2001
WH1d: The use of personal artifacts in **individual workspaces** influences public employees' perceptions of their on-the-job creativity.	• Wells 2000 • Wells and Thelen 2002

Shared Workspaces

Working in teams has become an important and effective tool for organizations. Team work allows for members with varying specialties and backgrounds to work together to create the best possible outcome. Many traditional workspaces however do not accommodate for effective team work because there are limited spaces that allow for large groups to meet (Becker et al 1995). This is why shared workspaces for interaction amongst team members are so important. Shared workspaces covers a wide variety of spaces, hallways, lunch rooms, meeting

rooms and any space in which employees can work as teams. These spaces allow for planned

work sessions and also spontaneous interaction which can lead to transfer of information and aid

in the creative process. Therefore one can expect:

WH2: Public employees' perceptions of the physical environment of their **shared workspaces**

influence their perceptions of their on-the-job creativity.

Layout

Developing shared spaces that encourage interaction, feedback, opportunities to learn, and a free flow of information are an essential area of study when looking at creativity and the physical environment of workspaces. Many researchers believe that office space design which creates opportunity for interaction is important in the support of creativity (Carnevale 1997, Elsbach 2007, Haner 2005, Streitz 1999). The layout of shared spaces should accommodate the flow of information and both convergent and divergent thought process.

Picture 2.4 A Shared Space Arranged so Groups Can Informally Gather

As Carnevale points out in "Physical Settings of Work: A Theory of the Effects of

Environmental Form," "spatial layout influences the social interactions that are necessary both

for effective task performance and the satisfaction of social needs in organizations. The work

environment can be understood as a stimulus field with certain catalytic properties that permit

some behavioral patterns to take place while restricting others" (Carnevale 1992, 429). Hence

creating shared spaces that encourage spontaneous interaction and spaces that are appropriate for

group work is necessary, picture 2.4 shows a shared space in which groups can informally gather for both social and do group work. If the shared spaces have a great deal of barriers they can limit informal communication particularly visual information and inhibit collaboration that requires a fast pace (Elsbach and Pratt 2007). From the literature review the below hypotheses was developed:

WH2a: Interaction-promoting office layout in **shared workspaces** influences public employee perceptions of their on-the-job creativity.

Décor

The use of references, models, prototypes, and examples can stimulate the creative process by creating a snowball effect for the creation of ideas (Bonnardel 2000). Therefore by equipping shared spaces with interactive decorative items such as white boards, computers, prototypes, and displays which display current projects and allow for spontaneous discussion and manipulation of the ideas enhances the creative process. Picture 2.5 shows a whiteboard in a shared workspace that can be used to display projects and encourage discussion. These items capitalize on the layout of an open shared workspace, without these interactive items the layout is not being used to its full potential.

Picture 2.5 Whiteboard Use in Shared Space

Research done by McCoy and Evans shows that workspaces that use decorative techniques that are visually stimulating and arranged for social interaction is perceived as being supportive of creativity (2002). Many creative minds have created spaces that utilize visually

stimulating décor, Walt Disney for example displayed ideas that were works in progress through story boards in spaces where all the employees can look and think about them regularly (Becker et al 1995). This use of décor that is interacting and stimulating employees in public workspaces allows employees to discuss, and work together which enhances the creative process. This interactions, cooperation, and flow of information that visually stimulating décor provides stimulate employee creativity. It is from this literature and train of thought that the below hypotheses was developed:

WH2b: Visually stimulating décor and furniture arranged for social interaction in **shared workspaces** influences public employee perceptions of their on-the-job creativity.

Lighting

Shared workspaces are the center for interaction and group creative work and utilizing natural light with view of the outside is one spatial aspect that has been found to stimulate creativity. The view of lighting should not be limited to its use to allowing employees the ability to see, natural light can also have positive psychological effect on employees (Boyce et al 2003). Elsbach and Pratt found windows that allow for natural light and views of the outside, particularly if it is of nature, can reduce stress therefore creating higher creative performance (2007). While there is limited research showing the effect of lighting and a view on creativity review of the literature shows that employees when asked overwhelmingly responded positively to access to natural light and a view (Kaplan, 1993). Therefore creating shared workspaces with an abundance of natural light and clear views of the outside is particularly important if employees lack those aspects in their personal workspace. Frequently building design limits the ability for every employee to have windows in their personal office space, therefore creating a

shared workspaces where employees can go to and experience the benefits of natural light can be

a reasonable solution. Therefore we can expect:

WH2c: An abundance of natural light with views of the outside in **shared workspaces** impacts

public employee perceptions of their on-the-job creativity.

Testing all the above hypotheses should help identify which aspects of the physical

environment of shared workspaces influences public sector employees' perceptions of their on-

the-job creativity. Tables 2.2 summarize these working hypotheses and the literature associated

with them.

Table 2.2 Conceptual Framework: Working hypothesis with supporting literature

Working Hypothesis	*Supporting Literature*
WH2: Public employees' perceptions of the physical environment of their **shared workspaces** influence their perceptions of their on-the-job creativity.	• Amabile 1983 • Kristensen 2004 • Carnevale 1992
H2a: Interaction-promoting office layout in **shared workspaces** influences public employee perceptions of their on-the-job creativity.	• Davis 1984 • Haner 2005 • McCoy and Evans 2002
WH2b: Visually stimulating décor and furniture arranged for social interaction in **shared workspaces** influences public employee perceptions of their on-the-job creativity.	• Amabile1983 • Becker and Steele 1995 • Davis1984 • McCoy and Evans 2002
WH2c: An abundance of natural light with views of the outside in **shared workspaces** influences public employee perceptions of their on-the-job creativity.	• Abkar, et al. 2010 • Boyce 2003 • Elsbach and Pratt 2007 • Haner 2005 • Kaplan 1993 • Kelley and Littman. 2001

Chapter Summary

This chapter looked at the literature on creativity in the workplace and the impact of the physical environment on employee's perceptions' of their creativity at work. The purpose of this chapter was to identify distinctive aspects of the physical environment of the workspace that influence employees' perceptions of their on-the-job creativity. Most of the research so far has been focused on the private sector and has had varying focus and results. However, scholars identify layout, décor, lighting and the use of personal artifacts as four possible characteristics that influence employees' perceptions of their on-the-job creativity. This scholarly literature has helped create the conceptual framework used for this study (Shields, 1998). Utilizing this information two working hypotheses with seven sub- hypotheses were presented. The following chapter describes the methodology utilized to test these hypotheses.

Chapter Three: Methodology

Chapter Purpose

This chapter demonstrates how the working hypotheses used explore the relationship between the workspace physical environment and creativity. A survey measures the employees' perceptions of their on-the-job creativity as well as measure key physical aspects of their workspace. This project utilized the survey as the method data collection as it was the simplest and most effective way to contact a large number of public sector employees. A convenient sample of public sector employees emailed was asked to participate in the survey.

Table 3.1and table 3.2 operationalizes the hypotheses and details how each variable is measured and the questions utilized in the survey. As explained in *A Playbook for Research Methods: Integrating Conceptual Frameworks and Project Management Skills,* "The operationalization table translates a declarative sentence hypothesis into critical information about testing the hypothesis. It clarifies the status of the variables (independent or dependent); which variables correspond to which hypothesis, the direction of the hypothesis and the measures used to capture the corresponding concept." (Shields and Rangarajan 2013, chapter 3) For the purpose of this project, the operationalization table is split into two sections: the dependent variable (Table 3.1) and the independent variables (Table 3.2). Following each operationalization table is an in-depth discussion of the variables displayed. After the variables are discussed, the survey method and description of respondents will be given.

Dependent Variable

Employee Perception of Their Level of Creativity at Work

Table 3.1: Operationalization of Dependent Variable

Dependent Variable	Survey questions: See Appendix A	Measurement
Employees' Perception of their on-the-job creativity	25	Scored out of 42, with 42 representing the highest possible positive perception of on-the-job creativity.

Measuring employee's perception of their on-the-job creativity is advantageous in most cases because the subject knows the most about herself and has a good idea of her creativity (Hocevar, 1981, 459). In this research, it is particularly useful because it is a simple and direct way to understand how the employee views her creativity at work. Using self perceived creativity as a measure is also useful because in many cases the creative process is not directly observable (DiLiello, et al 2011, 153) and, due to the time restraints and nature of this study, it would be difficult to identify observable outcomes of creative action.

To measure the employee's perception of their creativity at work, the participants were asked a series of questions measured on a likert type scale of 1 through 7, with 1 being "Strongly Disagree" and 7 "Strongly Agree." Participants were asked to indicate their level of agreement with a series of statements:

- "Creative work is not an aspect of my job"

- "I do creative work on a daily basis"

- "Creative work is not a part of my job description"

- "I do creative work on a weekly basis"

- " I rarely do creative work"

- "I do creative work in a monthly basis"

These questions allow the researcher to understand how creative at work the employees believe they are. The negative statement's numbers were reversed so that larger numbers represented the interpretation of being more creative.

Independent Variables

Table 3.2: Operationalization of Independent variables

Independent Variables		Survey questions: See Appendix A	Measurement
WH1a: Interaction promoting office layout of individual space	+	24	Question 24 (A, F, G) scores are summed and then divided by 3, to produce one score to represent general interaction-promoting office layout.
		29, 32, 33, 34	Questions 29, 32, 33, 34, 35 are scored from 1 to 5. The scores are then summed and then divided by 5 to produce one score to represent interaction-promoting office layout of their personal office space (private workspace score)
WH1b: Visually stimulating décor in individual workspaces	+	24	Question 24 (B, C, E) scores are summed and then divided by 3, to produce one score to represent stimulating décor in their general office.
		31, 37, 39	Questions 31, 37, and 39 are scored from 1 to 5. The scores are then summed and then divided by 3 to produce one score to represent stimulating décor of their personal office space
WH1c: An abundance of natural light with views of the outside in individual workspaces	+	24	Question 24 (D, H, I) scores are summed and then divided by 3, to produce one score to represent natural light with views of nature in their general office.
		30, 36, 38	Questions 30, 36, and 38 are scored from 1 to 5. The scores are then summed and then divided by 3 to produce one score to represent natural light with views of nature of the office their personal office space
WH1d: The use of personal artifacts in individual workspaces	+	24	Question 24 (J) is scored from 1 to 7 to represent the general policy on personalization
		40	Question 40 is scored from 1 to 5 to represent the personalization of their personal office space.

WH2a: Interaction promoting office layout in shared workspaces	+	24	Question 24 (A, F, G) scores are summed and then divided by 3, to produce one score to represent general interaction-promoting office layout.
		42, 43, 47, 50, 52	Questions 42, 43, 47, 50, and 52 are scored using a **semantic differential scale** from 1 to 5. The scores are then summed and then divided by 5 to produce one score to represent interaction-promoting office layout of their shared office space
WH2b: Visually stimulating décor, and furniture arranged for social interaction in shared workspaces	+	24	Question 24 (B, C, E) scores are summed and then divided by 3, to produce one score to represent stimulating décor in their general office.
		41, 46, 48	Questions 41, 46, and 48 are scored from 1 to 5. The scores are then summed and then divided by 3 to produce one score to represent stimulating décor of their shared office space
WH2c: An abundance of natural light with views of the outside in shared workspaces	+	24	Question 24 (D, H, I) scores are summed and then divided by 3, to produce one score to represent natural light with views of nature in their general office.
		44, 45, 49	Questions 44, 45, and 49 are scored from 1 to 5. The scores are then summed and then divided by 3 to produce one score to represent natural light with views of nature of the office their shared office space

Floor Plan (WH1a and WH2a)

Review of the literature shows that interaction promoting floor plans with areas for of privacy are supportive of creativity. A questionnaire determined whether respondents' work area fit this description by utilizing two types of questions in which the participants could describe their work environment. The first question (Question 24: a, f, and g) asked for a general description of their office environment utilizing a likert scale. The question asked, "Please indicate your level of agreement with the following statements in regards to the description of office environment with 1being "Strongly Disagree" and 7 being "Strongly Agree." The factors relating to floor plan were:

- a. "Has an open floor plan"

- f. "Allows for regular interaction with co-workers"

- g. "Allows for regular interaction with clients/ customers."

 The second form of questions asked two parts: first describe personal office spaces, and second shared office space, both utilizing a semantic differential scale of the same descriptions. The questions related to floor plan were questions: 29, 32, 33, 34, and 35 for personal office space and questions: 42, 43, 47, 50, and 52 for the shared office spaces. These questions were scored from 1 to 5, with 5 representing an open floor plan. The detailed description of each question is provided in Appendix A.

Décor (WH1b and WH2b)

 Previous research such as McCoy and Evans 2002, found that the furniture, visual details, and color of a room stimulate the creative process at work. Because previous research suggested visually stimulating décor stimulate creativity the survey utilized two types of questions for the respondents to describe their work spaces. The first question 24 (b, c, and e) asked for a general description of the employee's office environment, again utilizing a likert scale. The question asked "Please indicate your level of agreement with the following statements in regards to the description of office environment with 1 being "Strongly Disagree" and 7 being "Strongly Agree." The factors relating to stimulating décor were:

- b. "Uses collaborative technology"

- c. "Displays project prototypes"

- e. "Has furniture that can be easily rearranged."

 The second set of questions were asked in two parts, first to descried their personal office spaces and second their shared office space, both utilizing a semantic differential scale of the

same descriptions. The questions related to décor were questions: 31, 37, and 39 for personal office space and questions: 41, 46, and 48 for the shared office spaces. These questions were scored from 1to 5 with 5 representing the highest level of a stimulating décor. The detailed description of each question is provided in Appendix A.

Natural light with a View (WH1c and WH2c)

Access to natural light via a window with a view is another variable identified by the research as a possible resource that enhances creativity in employees. This project utilized two types of questions to measure the access to natural light and views of nature in the work spaces of the respondents. The first type of question utilized a likert scale (question 24 d, h, and i) which asked for a general description of their office environment. The question asked "Please indicate your level of agreement with the following statements in regards to the description of office environment with 1being "Strongly Disagree" and 7 being "Strongly Agree." The factors relating to natural light via a window with a view were:

- h. "Has views of nature"

- m. "Has large windows"

- n. "Has an abundance of natural light"

The second set of questions utilized a systematic differential scale scored from 1 to 5, with 5 representing the largest amount of natural light, and was separated into two parts. The first part asked the respondent to describe their individual work space (numbers 30, 36, and 38.) The second asked the respondents to describe their shared workspaces (numbers 44, 45, and 49). The detailed description of each question is provided in Appendix A.

Personalization (WH1d)

Previous research suggests the ability to personalize individual work space impacts creativity in the workplace (Wells 2000, Wells and Thelen 2002, Elsbach and Pratt 2007). To measure whether the respondents personalized their office space they were asked two types of questions. The first question (24: J) utilized a likert type scale for a general description of their office environment, "Please indicate your level of agreement with the following statements in regards to the description of office environment with 1 being "Strongly Disagree" and 7 being "Strongly Agree."" The statement stated "Allows for display of personal items such as family photographs or awards" The second type of question (question 40) used a systematic differential scale scored from 1 to 5, with 5 representing the largest amount of personalization. Question 40 asked the respondent to describe the personalization of their personal office space "•Personalized (5), •Somewhat Personalized (4), •Neutral (3), •Somewhat Impersonal (2), •Impersonal (1)". Personalization in shared spaces is not identified in the research as an important environmental factor therefore it is not considered in the survey.

Method of Data Collection

A survey sent to a convenience sample of public sector employees in central Texas explored how the physical environment of the work space affects creativity in the public sector. An online survey distributed through email and facilitated by the web service Survey Monkey, (a copy of the survey can be found in Appendix A) effectively reached a large number of public sector workers from a variety of organizations. The online survey also provided a uniform method of distribution and a simple way to collect and gather the data. The participants were sent the email through four email list serves:

- Master of Public Administration Graduates of Texas State University

- Current Master of Public Administration students at Texas State University

- The Master of Public Administration Advisory Board

- The CenTex chapter of the American Society for Public Administration (ASPA).

It is important to note that due to the nature of the email list servers all respondents are affiliated with either a public administration graduate program or a public administration professional organization.

The emails for the three Texas State University mailing lists were sent through Dr. Shields, the Program Director for the Masters in Public Administration. The emails for the CenTex chapter of ASPA were sent through Robert Ochoa, the CenTex ASPA President. These mailing lists were selected because many of the members on these lists are employed within the public sector. Each email had the same letter of intention informing the participants about the survey and the voluntary nature of their participation (letter of intention found in Appendix B). The link to the questionnaire was also provided with each email so that respondents had easy access to the survey. Employing Professor Shields and Robert Ochoa's association with the survey helped to enhance the survey response rate, as individuals are more likely to fill out a survey from a trusted source.

Respondents

The respondents are made up of a variety of individuals from varying backgrounds and positions but, due to the use of a convenience sample, all are affiliated with either a public administration graduate program or a public administration professional organization. The use of a convenience sample inhibits generalization to the general population of public sector employees as most of the respondents will be younger, graduate students and/ or individuals motivated to join a professional organization. Given the time and resource limitations and since

it is difficult to achieve a true random sample of public sector employees, the convenience

sample was the most reasonable approach. The weaknesses of the sample are some of the

reasons that the nature of this ARP is exploratory; however the large number of respondents

allows for statistical analysis.

In total, 839 surveys were sent out and there were 186 responses to the survey. After the

data set was cleansed of incomplete surveys, the final number of respondents was 156. This gave

a response rate of 18.4%. This response rate however does not take into account any undelivered

emails due to email errors which is unknown but probably limited because all email lists are

frequently updated and current. Though the response rate is low, achieving 156 working

responses is sufficient for an exploratory research project.

Each respondent was asked to identify what sector they worked in public, private, or

non-profit. Table 3.3 provides the frequency of the three categories. Four email servers were

utilized and this project recognizes that most of the people sampled reside in Central Texas and

either posse their master's or are working on their degree. The Master of Public Administration Graduates of Texas State University email list is made up of 450 people all of whom graduated with their MPA. The current Master of Public

Table 3.3 Frequency and Percent of Respondents in each sector

	Frequency	Percent
Public	117	75.0
Private	18	11.5
Nonprofit	21	13.5
Total	156	100.0

Administration students at Texas State University totals 217 and is made up of enrolled MPA

students. The Master of Public Administration Advisory Board email list has 30 individuals and

is made up mostly of Alumni, professors, and students of Texas State University. The CenTex

chapter of ASPA emailing list contained 142 individuals and is made up of mostly public sector

employees who are members of the ASPA chapter.

To gain a further understanding of participating respondents' innate creative process, a standardized and tested scale was used. Jabri's "Questionnaire to distinguish between creative and non-creative individuals" (Jabri, 1991) measures the associative and bisociative levels of problem solving of each individual. Respondents whose associative score is higher than their bisociative score tend to utilize established rules and protocols when they face a problem. Respondents whose bisociative score is higher than their associative score tend to solve problems by connecting seemingly unrelated areas. Gilson and Shalley (2004) utilized forms of the Jabri's questionnaire as part of their research to identify creativity in individuals in their article "A Little Creativity Goes a Long Way: An Examination of Teams' Engagement in Creative Process."

The questionnaire items used to measure the associative and bisociative level of problem solving are listed in Appendix D. The participants were asked to indicate their level of agreement with each statement using a likert scale from 1 "Strongly Disagree" to 7 "Strongly Agree. There were 9 bisociative statements (numbers: 6, 9, 10, 11, 14, 16, 20, 22, 23) and 10 associative statements (numbers: 5, 7, 8, 12, 13, 15, 17, 18, 19, 21). Associative and bisociative statements were randomly mixed and the scores for both types were calculated by summing the score for each question and then dividing by the number of questions.

Human Subjects Protection

Any foreseeable risks to participants of this survey were negated through confidentiality and aggregation of results. All participants were introduced to the survey through an email stating that the survey was voluntary. The opening email also stated that all the data will be aggregated and all identifying information would be kept confidential. Per IRB exemption request EXP2011P8587 submitted on 08/31/11, the Texas State University Institutional Review

Board found the project exempt from full or expedited review. (IRB exemption email found in Appendix D)

Statistical Analysis

The Data from the survey helped to test two working hypotheses and seven working sub-hypotheses. To test these hypotheses this project performed a series of correlations to determine if there was a relationship between the employees' perception of their creativity at work and their descriptions of the work environment. In addition an independent t-test was utilized to determine if individuals who were identified as having an innate tendency to approach problems in a creative manner (bisociative thinkers) differed from other employees' perception of their creativity at work. The Statistical Package for Social Sciences (SPSS) ran the correlation tests and t-test.

Correlation test

A Pearson Correlation test examined the correlation between two variables measured on a ratio scale or interval scale. The sign of the number indicates the direction of the correlation and the closer the number is to -1 or 1 the stronger the correlation. This correlation either tells the researcher that changes in one variable are associated with changes in the other, or attributes of one variable is associated with some attributes in the other (Babbie 2010, 95). A correlation test, however, cannot show causation illustrating the need for a theoretical background to make assumptions on which variable is causing the change. This test is appropriate for this research because the research is still in the exploratory stages and is the ground work for further, more detailed, research into each factor. The study does not seek to make causal claims but rather show there is a relationship.

T-test

An independent *t-test* is an appropriate statistical analysis because it is utilized to compare the means of two groups. In this case, the employee's scores on the Jabri standardized scale placed them in to two separate groups the associative thinkers and the bisociative thinkers. The groups mean scores for employees' perceptions of creativity at work will be compared. The greater the difference in group means the larger the value of *t* (Babbie 2010, 486). This test is appropriate to see whether or not there is a difference between how employees who are bisociative (creative) view their creativity at work as compared to the associative thinker.

Open-Ended Questions

To further understand how public sector employees view their work environment and its support for creativity, all respondents were asked three open-ended questions. The responses were coded for key ideas that related to the areas of the physical environment of the workspace and whether or not it was stated in a negative or positive context in regards to its support of creativity. The key ideas included: open floor plan, windows, windows with a view, natural light, interaction with co-workers, interaction with customer or clients, personalization, furniture mobility, color, display boards, technology, and conference space.

The first question asked (number 26) stated, "Think of a time at work when you were extremely creative and describe the physical environment in which that creative action took place." The second (number 27) asked the respondent, "If you had a chance to create a work space in which you would be creative, what would it look like? Please describe everything that comes to mind about the physical workplace." The third open-ended question (number 28) asked

the respondent, "Think about a time when you were least creative at work and describe the physical environment in which such work took place."

Chapter Summary

This chapter presented the operationalization of the working hypotheses and how the independent and dependent variables were operationalized and measured. As noted earlier, a convenience sample used respondents affiliated with either a public administration graduate program or a public administration professional organization. This convenience sample inhibits generalization to the general population of public sector employees. The large number of respondents and convenience sample works for the exploratory nature of this ARP. Furthermore this chapter discussed how the data was measured and the statistical methods utilized to analyze the data. The next chapter will discuss the results of the statistical test performed.

Chapter Four: Results

Chapter Purpose

The purpose of this chapter is to present the results of the statistical tests used to determine the relationship between the physical environment of the workspace in personal and shared spaces and its impact on creativity. The chapter provides descriptive statistic results first and then addresses the results as they relate to each hypothesis.

Descriptive statistics results

First, the number of associative and bisociative thinkers and their mean scores of view of their creativity at work is calculated. Utilizing the Jabri scale, these numbers gave a greater understanding of the how the respondents to the survey rate on a standardized measure of creativity. A filter was placed on the data set so that only public and non-profit employees would be included in the test.

Table 4.1 provides the numbers of bisociative and associative

Table 4.1 Descriptive of Associative & Bisociative Respondents

	Associative	Bisociative	Mean Difference	t	Sig
Mean	26.38	31.70	5.326	2.79	.006
Number	101	37			

subjects and their average score of the employees' perception of their creativity at work (the highest score possible for employee's perception of their on-the-job creativity is 42). The table illustrates that the majority of public sector and non-profit workers in this survey were scored as associative thinkers. This means that they tend to utilize established rules and protocols when they face a problem. Thirty seven of the respondents scored as bisociative thinker which means they tend to solve problems by connecting seemingly unrelated areas. The bisociative thinkers are identified as utilizing a more creative approach to problems and tasks. All participants have both traits; they are grouped by the type in which they scored the highest. The results also show that bisociative respondents on average scored their creativity at work about five points higher

than associative thinkers. To see if this result is statistically significant, an independent t-test was performed. The t-test showed that the bisociative thinkers reported significantly higher perceptions of their creativity at work (Appendix E presents the full SPSS results of the independent t-test performed). On average, bisociative thinkers rate their creativity at work five points greater than associative thinkers. With 95% confidence, we can say that bisociative thinkers rate their creativity at work from 1.5 to 9 points higher than associative thinkers $t(136) = 2.79$, $p<.05$.

Hypothesis Testing

Pearson Correlation

Pearson correlation test determined if a relationship between the employees' perception of their on-the-job creativity corresponds with their perception of the physical environment of their workspace. A filter was placed on the data set when running the Pearson correlations so that only public and nonprofit sector employees would be considered. Then several correlations were run between the respondents' total scores for employee's perception of their creativity at work, which was calculated by summing the responses to question 25, and the scores for each physical environment variable. A detailed understanding of the questions and the way they were scored can be found in the operationalization table (Table 3.2).

The physical factors were grouped and summed into one score for each area. For example: private workspace layout was the sum of questions 29, 32, 33, 34, 35, divided by the number of questions. Each area was calculated in this way and the result were 4 scores for the private workspace (layout, décor, lighting, and personalization). For shared workspaces, there were three scores (layout, décor, and lighting). A detailed breakdown of the results of these correlations can be found in table 4.2.

Table 4.2 Pearson Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12
Dependent Variable: Employee's perception of their on-the-job creativity	(1) Question 25	1											
WH1a: Interaction promoting office layout of individual workspace	(2) Question 24 (A, F, G)	.099	1										
	(3)Questions 29, 32, 33, 34, 35	.045	.452**	1									
WH1b: Visually stimulating décor in individual workspaces	(4)Question 24 (B, C, E)	.316**	.550**	.216*	1								
	(5)Questions 31, 37, 39	.155	.156	-.016	.123	1							
WH1c: An abundance of natural light with views of the outside in individual workspaces	(6)Question 24 (D, H, I)	.115	.355**	.076	.344**	.107	1						
	(7)Questions 30, 36, 38	.030	.103	-.070	.105	.171*	.670**	1					
WH1d: The use of personal artifacts in individual workspaces	(8)Question 24 (J)	.112	.191*	.020	.164	.206*	.305**	.133	1				
	(9) Question 40	.157	.030	.004	.077	.544**	.101	.130	.370**	1			
WH2a: Interaction promoting office layout in shared workspaces	(2)Question 24 (A, F, G)	.099	1	.452**	.550**	.156	.355**	.103	.191*				
	(10)Questions 42, 43, 47, 50, 52	.145	.361**	.635**	.239**	.141	.088	-.071	.107	.124	1		
WH2b: Visually stimulating décor, and furniture arranged for social interaction in shared workspaces	(4)Question 24 (B, C, E)	.316**	.550**	.216*	1	.123	.344**	.105	.164	.077			
	(11)Questions 41, 46, 48	.233**	.302**	.035	.348**	.505**	.244**	.210*	.375**	.298*	.240**	1	
WH2c: An abundance of natural light with views of the outside in shared workspaces	(6)Question 24 (D, H, I)	.115	.355**	.076	.344**	.107	1	.670**	.305**	.101	.088		
	(12)Questions 44, 45, 49	-.012	.006	-.012	.077	.135	.351**	.373**	.095	.111	.015	.188*	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Individual Workspaces (WH 1)

Of the nine variables measuring dimensions of the individual work space, only a visually stimulating décor achieved statistical significance. The rest of the variables measuring the physical environment of the individual workspace were not significantly correlated with employee perception of on-the-job creativity. The questions measuring general office space décor (WH1b) significantly correlated with employee perception of on-the-job creativity. Table 4.2 shows that there is a moderate positive correlation between the(question 24 B, C, E) general office décor questions score (.316) and total score for employee's perception of on-the-job creativity. These results give limited support to WH1b because the questions for this variable do not specify if the space is individual or shared and ask only about their offices space in general.

The grouping of variables that specifically mention natural lighting and a view in individual workspaces was not found to be significantly correlated with employee perception of on-the-job creativity. The grouping of general office space lighting questions as one entity was also not found to be significantly correlated. When further correlations were done on each individual question that fell under general office lighting and view, views of nature was found to be significantly correlated. Table 4.3 shows a weak positive correlation between the variable *has view of nature* (.181) and the *total score for employee perception of on-the-job creativity.* These results give limited support to WH1C because the questions for this variable do not specify if the space is individual or shared and ask only about their offices space in general.

Table 4.3 Correlation results for General office views of nature

	Has views of nature
Total score for employee's perception of their on-the-job creativity	.181*
*. Correlation is significant at the 0.05 level (2-tailed).	

Shared workspaces (WH2)

Shared workspace stimulating décor (WH2b) correlates significantly with public

employees' perception of their on-the-job creativity. As table 4.2 shows a weak positive

correlation between *Visually stimulating décor, and furniture arranged for social interaction in*

shared workspaces score (.233) for questions 41, 46, 48 with the *total score for employee's*

perception of on-the-job creativity.

The questions measuring general office space stimulating décor (WH2b) was found to be

significantly correlated with employee perception of on-the-job creativity. Table 4.2 shows this

moderate positive correlation between the *Visually stimulating décor, and furniture arranged for*

social interaction in shared workspaces score (.316) for questions 24 (B, C, E) and the *total*

score for employee's perception of on-the-job creativity. These results give only limited support

to WH2b because the questions for this variable do not specify if the space is individual or

shared and ask only about their offices space in general.

Due to the lack of results from the original break down of the questions, the general

décor questions were measured separately to see if individually they correlated with the *total*

score for employee perception of on-the-job creativity. When each part of question 24 were

correlated with the *total score for employee perception of on-the-job creativity,* two items (use of

collaborative technology and display of project prototypes) in the general office décor grouping

were significantly correlated with the *total score for employee perception of on-the-job*

creativity. Table 4.4 shows the rating on *use of collaborative technology* (.262) had a weak

positive correlation with the *total score for employee perception of on-the-job creativity*.

Table 4.4 Correlation Between Use of Collaborative
Technology and Employees' Perception of their on-the-job
creativity

	Uses Collaborative Technology
Total score for employee's perception of their on-the-job creativity	.262**
**. Correlation is significant at the 0.01 level (2-tailed).	

Table 4.5 shows that there is a weak positive correlation between the rating on the

display of project prototypes (.297) and the *total score for employee perception of on-the-job*

creativity. These results give only limited support to WH2b because the questions for this

variable do not specify if the space is individual or shared and ask only about their offices space

in general.

Table 4.5 Correlation Between Display of Project Prototypes
and Employees' Perception their On-The-Job Creativity

	Displays project prototypes
Total score for employee's perception of their on-the-job creativity	.297**
**. Correlation is significant at the 0.01 level (2-tailed).	

The grouping of variables that specifically mention natural lighting and a view in shared

workspaces did not significantly correlate with employee perceptions' of on-the-job creativity.

Nor did the grouping of general office space lighting questions as one entity significantly

correlate with employee perceptions' of their on-the-job creativity. When further correlations

were done on each individual question that fell under general office lighting and view, views of

nature was found to be significantly correlated. Table 4.6 shows that there was a weak positive

correlation between the *view of nature* (.181) and the *total score for employee perception of on-*

Table 4.6 Correlation Between General Office Views of Nature and Employees' Perception their On-The-Job Creativity

	Has views of nature
Total score for employee's perception of their on-the-job creativity	.181[*]
*. Correlation is significant at the 0.05 level (2-tailed).	

the-job creativity. Like WH1c, these results give limited support to WH2c because the questions for this variable do not specify if the space is individual or shared and ask only about their offices space in general.

Open Ended Question Results

The open ended questions differ from the correlations by giving many more positive inclinations that the physical environment impacts employee creativity. The open ended questions asked the respondent to discuss a space in which they were creative, a space they would create to be creative in, and a space in which they were not creative.

The results from the open ended questions displayed a very different result than the correlation results. One respondent when asked to describe a space where they were extremely creative at work wrote, "My work involves thinking of creative processes for our program and the physical environment I thrive in is a mix between strong interaction with coworkers followed by reflection away from my desk in an environment with a nice view and natural lighting." Many of the other responses mirrored this sentiment and were coded for key ideas that related to the areas of the physical environment of the workspace and whether or not it was stated in a negative or positive context.

Regarding open floor plans in relation to their on-the-job creativity, twenty six percent of public and non-profit respondents stated it as being favorable. The following are some examples of the positive comments towards open floor plans stated by respondents when asked, "If you

had a chance to create a work space in which you would be creative, what would it look like? Please describe everything that comes to mind"

- -"Open plan, no office, bull pen style to allow employees to interact with each other without having to schedule meetings, etc."
- "A large open space with several work stations where people worked in teams to develop new ideas."
- "The most creative office I ever worked in had workstations around the walls and a conference/lunch table in the middle of the large room. There were lots of spontaneous brainstorming sessions at that table."

Fourteen percent felt that a closed floor plan was more beneficial due to the lack of distractions; the rest did not mention floor plans. Twenty seven percent of respondents mention interacting with co-workers as beneficial to their creativity; 4 respondents added the caveat that they have space to think quietly at one point, and 6 report it to be a negative. One respondent mentioned interacting with customers/ clients as a positive influence on creativity but 4 mention it as a negative.

In regards to windows and natural light, 119 respondents, 86 percent, mentioned either windows, windows with a view, or natural light as being a positive asset to their creative process. Of those respondents, 38 specifically mention natural light as being beneficial, 33 mentions having a view as being beneficial, and 48 of those respondents mention the presence of windows alone. Below are some examples of statements made regarding natural light when the respondents were asked "If you had a chance to create a work space in which you would be creative, what would it look like? Please describe everything that comes to mind."

- "Quiet, natural light, room to move around, access to technology and room to write out ideas and spread out multiple papers."

- "A quiet place with sky lights, plants, and windows with a nice view of nature."

- "Big windows with views of nature. Easy access to co-workers, but with the ability to close a door. Nice decor."

- "I like my office. I would add a window with a nice view of trees and nature."

- "Large open windows with great views and like-minded people who recognize the value of free thinking."

- "Serene view with natural lighting. An area where people are accessible but not crowded"

There is no ability to categories whether the respondents are referring to individual or shared spaces, so the results are viewed as limited for support under both circumstances.

Other items brought up positively were personalization by 12 respondents, 8 mention décor, 12 mention whiteboards/ displays of plans, 12 mention technology, and 10 mention the presence of a conference room type space to work with co-workers.

Chapter summary

This chapter provided the results of both the t-test and correlations performed on the survey results and how they supported or failed to support each working hypotheses. This chapter described the limited significant results with the correlations performed as well as the items respondents identified as being supportive of creativity in their open ended responses.

Chapter 5: Conclusion

The purpose of this exploratory research was to determine how public sector employees' perception of the physical environment of their workspace influences or relates to their perception of their on-the-job creativity. Specifically, this research looked at public employees' perceptions of two aspects of their physical work environment, 1) personal work space and 2) shared work space, and how this correlates with perception of their on-the-job creativity. A questionnaire captured perceptions of on-the-job creativity aspects of the workspace. A convenience sample of public sector workers was located through the Texas State MPA program and a professional organization, the Centex chapter of ASPA. The questionnaires, electronically distributed through Survey Monkey, reached 839 people, receiving 156 complete responses.

Through a review of the literature working hypotheses were formed and questionnaire items were created to test the hypotheses. In the methodology chapter the sample was explained, the online survey mechanism discussed and the statistical techniques used were introduced. The results of the statistical analysis described, found a statistical difference between associative and bisociative thinkers' perception of their on-the-job creativity. Bisociative thinkers, creative problems solvers, scored their creativity at work significantly higher than associative thinkers.

Correlation analyses showed a significant positive correlation between employees' perception of their on-the-job creativity and shared workspace décor, and general office décor. Furthermore, Pearson correlations showed that the display of prototypes, the use of collaborative technology, and views of nature, had significant positive correlations with the employees' perception of their on-the-job creativity. The open-ended questions from the survey also reviewed and illustrated that the majority of respondents' felt open floor plans, windows, natural

light, and a view are supportive of creativity. Table 5.1 shows whether each hypothesis were

supported or rejected.

Table 5.1 Results Summary

Variable		Expected Direction	Level of Support for Hypotheses	
Dependent Variable				
- Employees' Perception of their on-the-job creativity			Pearson Correlation	Open-ended responses
Independent Variables				
H1: Public employees' perceptions of the physical environment of their **individual workspaces**	WH1a: Interaction promoting office layout of individual space	+	No support	Partial Support
	WH1b: Visually stimulating décor in individual workspaces	+	Partial Support	Partial Support
	WH1c: An abundance of natural light with views of the outside in individual workspaces	+	Partial Support	Partial Support
	WH1d: The use of personal artifacts in individual workspaces	+	No support	Partial Support
WH2: Public employees' perceptions of the physical environment of their **shared workspaces**	WH2a: Interaction promoting office layout in shared workspaces	+	No Support	Partial Support
	WH2b: Visually stimulating décor, and furniture arranged for social interaction in shared workspaces	+	Partial Support	Partial Support
	WH2c: An abundance of natural light with views of the outside in shared workspaces	+	Partial Support	Partial Support

Strengths and Weaknesses

This paper explored public sector workplace creativity and carefully constructed a questionnaire using hypotheses drawn from the literature. The research used a rigorous design, and the robust sample size enabled statistical analysis. This projects strength was that it reached a wide variety of public sector employees within Texas, providing a strong measure of innate creativity through the Jabri scale. Giving space for open-ended responses provided more detailed understanding of public sector workers' perceptions of their workspace environment and the improvements they feel would improve their creativity at work. Equally important, the results provided a point where further researcher can continue. The research shows that décor was significantly correlated with the employees' perceptions of their creativity at work, possibly leading to research on more detailed aspects of décor and how it can be used to improve the public employee's creative process.

The main weakness of this research is the sample is a convenience sample; therefore, the results cannot be generalized and does not have external validity. Since the goal of this research is exploratory, a less than perfect sample is expected. Another weakness of this survey is it did not have a strong method for measuring each aspect of the physical environment. The semantic differential scale was a limited tool in its form to measure the features of the workspace. The survey also cannot account for differences in the perceptions of the workspace. For example, what one may describe as modern another may describe as traditional. These limitations require the research to be exploratory and not a method to establish causation.

Future Research

Overall this project finds that there is some correlation between the responding public sector employees' perception of their on-the-job creativity and their perception of use of visually stimulating décor and natural light in both shared and individual spaces in the public sector. The open-ended responses showed that open layouts, visually stimulating décor, access to natural light and the use of personal artifacts are features of a work environment that the respondents perceive as being supportive of their on-the-job creativity. This project contributes to future research by providing a jumping off point to explore in greater detail how the physical environment of the workspace could be improve public sector employee creativity. The focus on the opinion of the employee is an important aspect of this research and should be continued in future research. Future research that would be appropriate for this topic is to do more comparison in opinions and creativity rating between public, non-profit, and private sector employees. Consequently allowing for a greater understanding of the differences between the three and what each requires to enhance their creativity.

Research needs to be done in greater detail on each individual aspect of the workspace and the most effective way to measure and rate the spaces. Site visits to public sector workplaces followed by focused interviews of employees may be a more accurate measure of their impact and the employee's perceptions of how the workspace can be improved. Future research should create more independent and detailed variables along with a stronger method of interpreting how public sector employees view their creativity at work. Ultimately the employee perception should be a continuing focus of research because it is the employees who reside in these spaces and, in most cases, understand their needs and the limitations better than anyone else.

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-Appendix A: Copy of Online Questionnaire (can be found at the end of the document)

- Appendix B: Letter of intention emailed with the link to the survey

Dear CenTex ASPA member:

I am a graduate student in the Masters of Public Administration Program at Texas State University working on my Applied Research Project about the physical environment of work spaces and creativity in government and nonprofit organizations. I am collecting data for this study using an online survey, the link for which is at the end of this email. Data collected from this study would help me examine and compare perceptions of the physical environment of workspaces and creativity within public sector organizations and would help me put forth some interesting propositions about it.

Your input is important to this study. Although your participation is voluntary, I would really appreciate it if you could complete this online survey as soon as possible. The completion of this survey should take no more than 20 minutes of your time. The information provided by you is essential in understanding about how the perception of the physical environment of work spaces affects creativity.

All identifying information collected through this survey will be confidential and no one will have access to them except me. I, therefore, request you to be as candid as possible in completing this questionnaire.

All data will be aggregated and no names of individuals will be reported in papers or journal articles. I propose to provide you a copy of the results obtained from this study of public sector organizations.

If you have any questions regarding the survey, please do not hesitate to contact me by email at lg1315@txstate.edu. I will gladly answer them to help you complete this survey in a timely manner.

I am looking forward to viewing your completed survey. Thank you for your assistance in this important project about improving organizational creativity and innovation.

http://www.surveymonkey.com/s/NX6T8FD

Please use the above link to go to the online survey.

Thank you,

Lorraine Grell, MPA Student

- **Appendix C: Associative and Bisociative statements (Jabri 1991, 980)**

Bisociative	Associative
6. I am a person who spends time tracing relationships between dissimilar areas of work.	5. I am a person who adheres to the commonly established rules of my area of work.
9. I am a person who pursues a problem particularly if it takes me into area I don't know much about.	7. I am a person who pays strict regard to the sequence of steps needed for the completion of a job.
10. I am a person who searches for novel approaches not required at the time.	8. I am a person who adheres carefully to the standards of my area of work.
11. I am a person who is confronted with a maze of ideas which may or may not lead me somewhere.	12. I am a person who is methodical and consistent in the way I tackle problems.
14. I am a person who struggles to make connections between apparently unrelated ideas.	13. I am a person who is strict on the production of results as and when required.
16. I am a person who makes unusual connections about ideas even if they are trivial.	15. I am a person who follows well-established ways of solving problems.
20. I am a person who is fully occupied with what appears to be novel methods of solution.	17. I am a person who accepts readily the usual and generally proven methods of solution.
22. I am a person who links ideas which stem from more than one area of investigation.	18. I am a person who is precise and exact about the production of results and reports.
23. I am a person who is caught up by more than one concept method or solution.	19. I am a person who is fully aware beforehand of the sequence of steps required in solving problems.
	21. I am a person who adheres to the well known techniques, methods and procedures of my area of work.

- Appendix D IRB exemption.

From: AVPR IRB [ospirb@txstate.edu]
Sent: Tuesday, September 06, 2011 3:40 PM
To: Grell, Lorraine B
Subject: Exemption Request EXP2011P8587 - Approval

DO NOT REPLY TO THIS MESSAGE. This email message is generated by the IRB
online application program.

Based on the information in IRB Exemption Request EXP2011P8587 which you
submitted on 08/31/11 12:21:18, your project is exempt from full or
expedited review by the Texas State Institutional Review Board.

- Appendix E Independent t-test comparing bisociative and associative respondents

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
									Lower	Upper
Total score for employee's perception of creativity at work	Equal variances assumed	3.288	.072	2.792	136	.006	-5.326	1.908	-9.099	-1.554