Back to Nature for Good: Using Biophilic Design and Attention Restoration Theory to Improve Well-being and Focus in the Workplace

A PROJECT
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To my husband, Bill
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I can think of no more important way to apply the naturalistic approach to human behavior than in the design of the places in which we live and work. The evidence is overwhelming that, given a choice, people want to bring the beauty and harmony of nature within sight. When possible, they like to blend these qualities into the details of their daily existence, because in so doing, they add to their own sense of worth and security.

E. O. Wilson
A Return to Nature

When architect E. Fay Jones received the commission from Arkansas landowner Jim Reed to create a chapel in his scenic mountainside woodland that would provide a quiet destination in which to enjoy the stillness and surrounding beauty of the Ozark mountains, he started down the literal and figurative path of designing an exquisite homage to the communion we seek when we are drawn to nature. The American Institute of Architecture award-winning Thorncrown Chapel was constructed simply and with demonstrated regard for its natural setting: only machinery able to fit through the area cleared for human passage was permitted, making the chapel look as though it sprouted from where it stood. The chapel reflects its surroundings with a wood-frame interior that rises 60 feet, recalling a towering tree canopy, and floor-to-ceiling glass walls that invite visitors to experience the soothing balm from a connection with nature described by biologist E. O. Wilson (Thorncrown Chapel, 2008).

In the late 1970s Wilson identified the biophilia hypothesis, literally “love of life,” which asserts humans “are still powerfully responsive to nature’s forms, processes, and patterns” (1983). At the core of this hypothesis is the assertion of a relationship, an intrinsic connection between humans and their natural environment that reveals an adaptation to nature over the course of time, a reliance on nature for survival, and ultimately a preference for a natural habitat. Wilson reasoned that, while a habitat supportive of survival must contain elements such as food, clean water, and shelter, “[i]f you get to the right place, everything else is likely to be easier” (1983). In addition to Wilson, Kellert, Heerwagen, and Mador believe it is the environment that goes beyond
meeting the needs for survival alone that enriches life by enhancing physical and psychological wellbeing (Wilson, 1983; Kellert, Heerwagen, & Mador, 2008).

According to archeological evidence of human movement and habitation for over two million years, humans evolved in selected environments, in particular, those with a savanna-like setting – one that varied in profile, having both hills and flat land with open areas and groups of trees for shade and shelter and to climb for safety or to watch for predators (Wilson, 1983). It is assumed this type of topography was well suited to satisfying survival needs while encouraging the evolving physical development of humans, as similar habitats became occupied across northern Africa and into Europe (1983). The question of interest here, and one that is key to my investigation, is how does this information translate into a present-day preference for settings that include or resemble nature?

Research in the areas of interior design, healthcare design, and cognitive psychology provide evidence that contact with nature can have positive effects on human cognition and behavior. Incorporating nature, or representations of nature, in the design of interior space can play a key role in creating environments that not only support their intended purpose, but promote the mental and physical wellbeing of their occupants (Ulrich, 1984; Kaplan, 1993; Heerwagen, 2008). This tension is at the root of growing research that examines the role of nature in designing environments to support wellbeing and human development. My project grows out of a strong personal interest in the impact of designed environments on individual mental and physical wellbeing; specifically, the excitement for my project comes from the desire to demonstrate the
influential role of nature in creating an office environment that not only supports wellbeing but helps to increase focus and productivity for its occupant.

This project developed as a result of observations in my work in the Dean’s Office at Augsburg College over the past 17 years, where I witnessed the negative impact of increasing stress on administrators. The University of Minnesota Master of Liberal Studies program provided the venue to explore the disciplines involved in this discovery and to refine my search. Through an array of classes in the Center for Spirituality and Healing, the College of Design, and Liberal Studies seminars, I developed an understanding of two principles that are key to my project: biophilic design, the intersection between nature, built environments, and human wellbeing, and the attention restoration theory, which highlights the role of nature in attention restoration. In this project I implement changes in a co-worker’s office, where I use the principles of biophilic design and attention restoration theory to demonstrate that design, guided by nature, can provide an environment that reduces stress and focuses attention.

The attention restoration theory relies on the premise that directed attention, an essential component of day-to-day functioning and human performance, can be restored through exposure to nature or resemblance of nature (Kaplan, 1995). Similarly, biophilic design is an understanding that “the positive experience of natural systems and processes [as utilized] in our buildings and constructed landscapes remains critical to human performance and wellbeing” (Kellert, Heerwagen, & Mador, 2008, p. viii). These principles create a framework for the creation, implementation and evaluation of my project. The timeline for my project was August, 2011-January 2012, and included the
following phases:

- **Project design:** identify participant; establish goals; create timeline and budget (August)
- **Interview and assessment:** discuss project phases, goals, and timeline with participant; interview participant to clarify current work habits, and take “before” pictures of office, and determine changes to be made (September)
- **Project in place** (September-January)
- **Mid-term assessment:** interview with participant to discuss impact of implementation to-date (November)
- **Final interview:** interview with participant to review impact of implementation since mid-term assessment and overall impact of project (January)

Upon completion of my investigation I created an at-a-glance guide of biophilic design elements, their purpose, and their use in creating spaces – office or residential – that incorporate natural qualities (Appendix). This guide was distributed at my project presentation and will be provided to other employees at the college who are interested in the outcomes possible through incorporating the principles of biophilic design and the attention restoration theory.
Biophilic Design

Environmental psychologist Joachim Wohlwill defines nature as the “vast domain of organic and inorganic matter that is not a product of human activity or intervention” (1983). For the purpose of this project I will use Wohlwill’s definition of nature. The eradication of nature, or semblance of nature, in architecture and interior design trends during the mid-20th century produced residences and office buildings that lacked restorative and regenerative value (Joye, 2007). However, as psychologist Stephen Kellert notes, nature provides a venue to address this dilemma: “We designed ourselves into this predicament and theoretically can design ourselves out of it, but only by adopting a radically different paradigm for development of the modern built environment that seeks reconciliation if not harmonization with nature” (2008, p. 5).

Research during the second half of the century reveals a growing awareness that designing with nature in mind can have broad-ranging positive impact on human wellbeing (Ulrich, 1984; Kellert, 2005; Heerwagen, 2008). The belief that humans innately seek out colors, designs, patterns, sounds, and smells found in nature, and that some of these influences facilitate and support mental, emotional, physical, and even spiritual health, is a basic tenet of biophilic design (Kellert, 2005). To understand their impact on human behavior, however, these influences must be studied within a context that explains how individuals relate to their environment.
Environmental psychologists have studied human/environment interaction in a range of settings; for the purpose of this project environmental psychology will provide a useful framework with which to examine the role and impact of biophilic design. In his book, *Environmental Psychology for Design*, Dak Kopec examines the history, development, and application of environmental psychology in order to understand the significant impact that design can have on human functioning. Identifying the symbiotic relationship between humans and their built environments, he describes a holistic approach that incorporates biological, social and environmental influences (2010).

Environmental psychologists examine human interaction within a variety of natural and built environments, and often are able to predict behavioral and psychological outcomes derived from interacting with particular environments (Kopec, 2010). Kopec asserts that human behaviors and cognitive performance are influenced by multiple aspects of their physical environment including colors; size and shape of a room; stimuli such as noise and light, and symbolic artifacts that provide meaning, such as artwork and family photos (2010). This understanding becomes an underlying premise of biophilic design when studied within the context of human interaction with nature (Kellert, 2005).

Studies performed over the past three decades provide a growing body of evidence identifying the positive outcomes from associating with nature: shortened surgical recovery rates; decreased social and health problems; improved worker productivity rates; accelerated childhood development and maturation rates, and improved cognitive functioning (Ulrich, 1979, 1984; Kaplan, 1995). Providing
opportunities for interaction with nature through interior and exterior design, biophilic design relies on an inherent connection between humans and their natural environment as an integral and foundational component of architecture, interior, and landscape design. It is, therefore, a valuable resource when creating residential, office and commercial spaces that not only serve their intended functions, but increase the physical, psychological and emotional health of the occupants (Kellert, Heerwagen, & Mador, 2008). Kellert’s categorization of organic design and vernacular design becomes a useful model in understanding not only how humans interact with their environment, but it lays a foundation for understanding how nature can enrich those interactions (2005).

**Organic design.** Kellert refers to the use of shapes and forms found in nature that “...directly, indirectly or symbolically elicit people’s inherent affinity for the natural environment” (2005, p. 5). A direct experience with nature is contact with elements such as wading along the seashore, or sitting in the sunshine. An indirect experience requires ongoing human interaction for the element of nature to survive such as watering a garden, or taking care of a pet. A symbolic experience with nature requires no interaction with the natural environment at all, but is experienced through a representation of nature such as viewing a seaside painting, smelling the pine scent of a candle, or listening to the trickle of water in an indoor water fountain (2005).

**Vernacular design.** Time-and-place-based design, or vernacular design, refers to the structures or spaces where the intersections of culture, ecology, and history create a place of meaning (Kellert, 2005). A “sense of place” is key to the development of
feelings of security and belonging. According to Kellert, attachment to a place or space is cultivated by the experiences, emotions, and the identification associated with events or time spent there. This includes not only the traditional concept of interacting with nature outdoors through parks, gardens and open spaces where individuals and their families seek time for rest and recreation, but the historical reverence of sacred places, where communities developed a “sense of place” through the spiritual and physical connections with the lands they shared with their ancestors (2005).

Ironically, the ability to stay connected with others afforded through the use of smart phones, tablets, and laptop computers, also creates isolation. Yet in spite of our highly mobile society, Kellert notes, most people still identify a need to have a physical place or space that they call “home” (2005). Along with the value that an individual places on his or her home comes the likelihood that person will assume some responsibility for its upkeep. Wendell Berry acknowledges the significance of this key motivation: “Without a complex knowledge of one’s place, and without the faithfulness to one’s place on which such knowledge depends, it is inevitable that the place will be used carelessly and eventually destroyed” (as cited in Kellert, Heerwagen & Mador, 2008, p. 6). Biophilic design, then, incorporates the sense of ownership that comes from cultivating a space, whether in the home or the workplace, where a personal connection is made through the use of items that have personal significance, such as family photos, and memorabilia (Kellert, 2005).

**Implementing biophilic design.** Biophilic design often can be implemented quite simply and inexpensively through a variety of means, such as the use of color, fabric
patterns and textures that mimic those found in nature, and artistic representations or simulations of nature such as photographs, paintings, and some abstract forms of art. Making such changes in an office setting, for example, might be restrictive due to existing furniture and budget concerns, but it is important to note that even very limited exposure to nature can create a positive effect (Ulrich, 1986; Kaplan & Berman, 2010).

In my Master of Liberal Studies program coursework at the University of Minnesota, I examined the impact of design influences on physical health and cognitive functioning, with specific attention to the influence of nature. Exposure to the variety of design uses and applications that bring people closer to nature in order to encourage physical and mental wellbeing was pivotal in the discovery and development of my program’s direction and curriculum. Early in my coursework I learned of a study by Roger Ulrich that became a key concept in the development of my program. In his groundbreaking study comparing the healing rates of patients who underwent identical gallbladder surgeries, but whose rooms either had a view of a natural setting or a brick wall, Ulrich discovered those patients with a view of nature not only healed more quickly, but they reported a decreased need for pain medication in comparison to those with a view of the wall (1984).

Ulrich went on to perform multiple studies revealing the health benefits of exposure to nature in a wide variety of settings. Results from these studies included reduced stress, decreased anxiety, decreased blood pressure, and increased directed attention. Ulrich theorized that partaking in even small-scale experiences with nature,
through the use of design can have a significant positive impact on human health (Kaplan, 1993; Ulrich, 1986).

Woodwinds Health Campus, a local alternative care hospital and clinic facility that also serves as a community resource center for nearby diverse populations, provides several examples of biophilic design implemented for the physical and psychological health and wellbeing of patients and staff. The woodlands, healing gardens and patio areas surrounding the facility entice patients and staff to come outdoors and enjoy these environments, and floor-to-ceiling windows in the lobby connect indoor viewers with the year-round changes of scenery. All common areas at Woodwinds have lush indoor plants and large fish tanks with colorful tropical fish and adjacent seating for convenient viewing. Observing fish in simulated natural environments has been shown to reduce stress and anxiety (Friedman, Son, & Tsai, 2010). One experiences calm almost immediately upon entering the lobby.

In addition to the common areas, all patient rooms have a view of nature and utilize natural colors and textures in fabric, furniture, and paint. Fluorescent lighting is not used except in surgical areas; soft, incandescent lighting is used in common areas and patient rooms. Such examples of biophilic design technique, providing access to views of nature or representations of nature, use of colors, patterns, and textures found in nature, use of plants, and proximity to other living beings such as the fish tanks, and the sound of water from water features, can be successfully modified and implemented for use in office or residential settings. Understanding the potential for outcomes that effect human wellness and behavior in the workplace is a key purpose of my project.
Because many people spend their days in an office setting, this is an important location for the successful implementation of biophilic design principles. Office work often includes hours spent sitting, coping with noise from telephones, office machines and co-workers; additionally, individuals in cubicles often find themselves under increased stress due to a lack of privacy. Not surprisingly, these conditions, along with the mental fatigue that results from extended periods of focused work, can exact a significant psychological toll on office workers, resulting in diminished work productivity, and decreased job satisfaction (Kaplan, 1993).

Psychologists Rachel Kaplan and Stephen Kaplan co-authored two extensive studies involving approximately 800 office workers that examine the influence of nature in relationship to several aspects of job satisfaction (1993). The significance of these studies is in their results that indicate preference of a view of nature provides a restorative effect. This work is based on the principles of the attention restoration theory. Along with the principles of biophilic design described above, my project integrates an understanding of the attention restoration theory (ART) developed by Stephen and Rachel Kaplan, which relies on the influence of nature to create restorative environments (1988).

Attention Restoration Theory

The attention restoration theory (ART) is an example of a stimulation theory, which helps to explain the responses of humans, in particular, to the sensory information contained in their environment. Since each environment – interior or exterior – can contain any number of stimuli to which any or all of our senses can react,
understanding the role of environmental influences on human functioning and wellbeing is essential to the successful implementation of any design plan (Kopec, 2010).

As an example, consider the sight, sound, and/or smell reactions one might have to visiting the seashore, a bakery, a car factory, or a court hearing. Not all of the stimuli, and the levels of stimulation, will be desirable and perceptible. Understanding the threshold of perception and tolerance of environmental elements that over- or under-stimulate senses is a core component of ART (Kopec, 2010). In their studies using the principles of ART, the Kaplans confirm that this theory plays an integral role in designing an office space that increases productivity and job satisfaction while decreasing stress levels (1993).

The Kaplans’ work builds on that of William James (1892), who identified two types of attention integral to human cognitive functioning: voluntary attention and involuntary attention (Kaplan, 1995). Voluntary attention is what a student uses to complete an assignment at the last moment, the attention required to drive through a snowstorm, or perhaps, babysitting a strong-willed two-year-old child. It is an integral component of effective daily functioning that is key to problem-solving, selection and inhibition, perception, and feeling; it is often required to complete tasks that would be considered uninteresting, thus the need to concertedly focus one’s attention (1995).

Situations requiring mental focus eventually create fatigue and thereby reduce cognitive functioning (Kaplan, 1993). Since fatigue is the greatest enemy of voluntary attention, the need exists to provide a means of its restoration in order to facilitate
voluntary attention again. Sleep is one remedy for restoring voluntary attention, but clearly not always the most convenient. Stephen Kaplan suggests that, as involuntary attention does not require the energy or effort required by voluntary attention, it actually has the ability to restore focused or voluntary attention by allowing it, like an overworked muscle, to rest and thereby rejuvenate (1995).

James described involuntary attention as the response to stimuli having a “direct exciting quality” (as cited in Kaplan, 1995). Examples could be the immediate attention paid to such things as bright colors, the sound of an ambulance, the sight of a puppy at play, or the coolness of a walk in the woods - responses that come without effort or intentional focus. The attention restoration theory builds on the notion that humans often seek out nature when stressed. Taking a walk in a park, or targeting a tropical destination for a vacation, for example, provide outlets for physical activity, relaxation, and rest, underscoring a premise of ART that periodic, effortless exposure to nature can have a significant impact on lowering levels of stress via a setting that allows directed attention to rejuvenate (Kopec, 2010). The benefits of exposure to nature through the use of photos, artistic depictions, colors and sounds also can be realized in the designed environment. The Kaplans determined that, in order to be a restorative setting, the following components must exist (Herzog & Strevey, 2008):

- fascination – achieved through a part of or a whole setting that easily engages attention thereby allowing fatigued attention to rest;
- being away – provided by a setting that is either physically or conceptually different from an individual’s typical setting;
extent – provided by a setting that is complex enough to engage the mind and promote exploration; and

compatibility – achieved when the design of a setting supports the intended use by the occupant.

The attention restoration theory provides a valuable framework to demonstrate how nature can play a role in creating a workspace that supports physical and psychological wellbeing, while encouraging the restoration of the directed attention needed for daily human functioning (Berman, Jonides, & Kaplan, 2008).

The two large-scale studies performed by the Kaplans provide evidence supporting the premise of the attention restoration theory. In the first study 168 office workers in two public agencies with a variety of locations were surveyed: those with no view to the outside, those with a view to the outside but not including any natural elements such as sky, trees, or green space, and those with an outdoor view containing natural elements. Participants responded to a survey that sought feedback on issues such as perceived job stress, perceived success of restorative opportunities such as wellness programs, and overall life satisfaction (Kaplan, 1993). Results indicated that workers with a view of natural elements reported fewer health concerns than those without a view of nature. Those with a view of nature also reported a significantly higher overall job satisfaction than those without a view of nature (1993).

In the second study a group of 615 office workers responded to a written survey around the authors’ topic “daily hassles and their costs,” and were informed that this study also sought to examine the role of plants in helping people recover from the
effects of daily office work. While the survey findings reported a weaker response to job satisfaction related to the use of indoor plants, the response to a window view of natural elements was significantly positive (Kaplan, 1993).

Of particular interest for my project are the responses revealing that individuals with a view of nature felt strongly that their view was restorative. They reported higher job satisfaction in comparison to workers who either had a view of man-made elements such as a building, or no view at all (Kaplan, 1993). Additionally, the authors found that those workers with a view of nature reported improvements such as having more patience, greater enthusiasm for their work, and a higher level of satisfaction with their life overall, than those workers with no view of nature (1993). So it is the goal of ART to reduce the fatigue of focused attention in order to restore effectiveness to human functioning, and it is shown that this can be accomplished using the restorative influence of nature (Kaplan, 1995).
 CHAPTER 2
A BIOPHILIC DESIGN PROJECT AT AUGSBURG COLLEGE

Redesigning an Administrative Office

The three phases of this project include planning and preparing, implementation, and evaluation. Before discussing these stages I provide background information on the worker whose office will be the subject of this project.

Participant Information. Nate is a 36-year-old employee of the college who was hired into his current position in 2000. His resume includes a PhD in theology from Harvard University and administrative experience with grant-funded programs at the Graduate Theological Union in Berkeley, California. He brings energy, insights and skills to the growing work in Academic Affairs. As Special Assistant to the Vice President of Academic Affairs and Dean of the College his work regularly intersects with departments and divisions across campus on a variety of topics and concerns. He oversees the generation of faculty contracts, is integrally involved in aspects of budget discussions for Academic Affairs – the largest division at the College – and works closely with the deans on a variety of division and college-wide strategic issues.

Nate reports that he generally enjoys the complexity and variety of his work, and feels that his talents and skills are challenged and used well in the problem solving that is inherent in most of this work. He is well regarded by faculty and staff for his accessibility and visibility as a point person for the Deans in Academic Affairs. People enjoy working with Nate – he is personable, intelligent, has a good sense of humor and is respected for his integrity. He describes himself as a peacemaker. Nate is always eager to learn, and
was intrigued with my project when I approached him about my work. It was partly due to the unfinished quality of his office that Nate became the subject for this project.

Nate’s office is centrally located in the administrative suite that houses two Deans in Student Affairs, three Deans in Academic Affairs, the Executive Assistant, two administrative assistants and two reception areas. He is literally and figuratively in the middle of most of the activity that is central to the work of the division. Because of his office’s location, Nate’s work is often interrupted by individuals and by noise in the nearby workroom.

Nate’s 10’ by 12’ office has an east-facing window and white blind; concrete block walls were painted the standard color: a cool tone, bright white; the carpet is the same as throughout the suite offices, variegated navy and gray, and there is a large six-bulb overhead fluorescent light fixture. New furniture was purchased for Nate’s use when he started in this position. He selected a light maple L-shaped desk/hutch combination, matching credenza and bookcase. A 36” round faux wood, laminate worktable with two blue side chairs fit in the corner, and a matching blue guest chair sits opposite his desk. Nate’s diplomas hang on a wall and a picture of his family is displayed on his desk.

When Nate interviewed for his position he ended the day with a meeting in my office where we had a casual conversation recapping his visit. He commented on the comfort he felt in my office. After starting his work at Augsburg, Nate commented that he would like to make his office “less sterile” and “more welcoming,” but progress on this idea was quickly subsumed by his workload. Nate would like his office to be one
that not only provides visitors with a welcoming atmosphere, but one that makes him comfortable.
Project Overview

During the month of August I determined the budget, time and labor that would be involved in this project, and developed a list of elements eligible for redesign in Nate’s office. The college pays for repainting an office for new occupants, and lighting was funded as well; Nate purchased the artwork, and I bought the water feature and plants.

Phase I: Interview and Assessment - September

Prior to our initial interview I provided Nate with a synopsis of my project goals, phases, and timeline, basic information on biophilic design and the attention restoration theory, and information on the design components of the implementation phase. We discussed procedures of implementation, timing and where he will have input. Nate is articulate and I could rely on him to be informative. I asked him to send me his reflection on what he understood to be his current work style; what, if any problems he saw with his work style, and how he viewed his use of his office. He provided me with the following thoughts:

- He tends to work on many projects at the same time, spending short bursts of energy on one project before moving to another; he recognizes this is both a personal style and a response to the workflow of his position.
- He says he has lacked time to plan and reflect on his workflow so does not have a framework for organizing his many tasks and ongoing projects. His office does not support this need; it has a feel of “stuff needs to get done” rather than “what are my goals and priorities.”
- He gets work done “in time.”
- The ad hoc nature of his office elements – “no plan, things stay where they land” – leads to his sense that his work is responding to that which occurs rather than a sense of executing a plan of action.
- His default preference is not to hold meetings in his office. This is something he knew but had not reflected upon until this time.

At this interview we discussed the information I sent in advance and the design components that will comprise the changes in his office: wall color, lighting, artwork, and plants. Table 1.0 (Appendix 2) provides a context for understanding the significance and application of these elements when designing with biophilic principles. Phase II lists the changes made, and where Nate selected items from the choices that I provided to him. It is important to note here the role of choice that was utilized in this project.

While this project demonstrates the positive impact of using biophilic design and attention restoration theory principles in an office setting, it is also an important consideration to note that these changes fell within the scope of Nate’s preference, not necessarily mine. We discussed Nate’s style preference for a somewhat contemporary look in his office, and the choices I made kept this style in mind.

Nate identified that he “knows what he likes when he sees it,” but has a difficult time making choices. This is not uncommon, and having too many options can be counter-productive. So, it was a goal of mine in this project to make the process of selecting paint colors and artwork less onerous than if I were to ask Nate to make these choices on his own.
In their well-known “jam study,” Iyengar and Lepper reported their conclusion that having a greater number of items from which to choose does not always produce satisfying results (2000). In this study shoppers were offered a limited tasting display of six different kinds of jam on one day and on another day the display offered 24 different jams to try. The purchasing results surprised the authors: shoppers who tested jams from the limited selection made decisions to purchase at least one jar almost 30% more often than shoppers who were exposed to the extensive array. Subsequent studies by the authors helped to confirm that, given a smaller selection from which to choose, ultimately, many people will be motivated to make a choice (2000). The number of items I provided from which Nate would choose his paint and artwork were selected with Iyengar & Lepper’s study in mind – fewer is better.

I used the principles of biophilic design and ART to guide my decision-making when selecting paint and artwork options for Nate’s office. By this I mean the colors needed to be reminiscent of those found in nature, and the artwork needed to be representative of nature or elements such as colors and shapes found in nature. I asked Nate if he preferred bold or lighter colors, and while he likes bold colors he did not want them on his walls. I provided him with a selection of lighter paint colors from which to choose – all three were variations on an eggshell color: Benjamin Moore’s Vanilla Ice Cream, Simply White, and Cloud White. In spite of their names these paints had more color than an off-white: one reminded me of afternoon sunlight, another had a little more gray and reminded me of oatmeal, and the third was the color of light clay. Using
an objective awareness of colors, patterns, or objects easily recognized in nature was a key to determining whether the item had biophilic properties.

During the interview I photographed Nate’s office to record “before” images prior to the implementation phase (Fig. 1, 2). After discussing the goals of my project, the phases, and changes that would take place in his office and the timeline, I addressed Nate’s questions. He looked forward to participating in this project.

Phase II: Design implementation – September

During the first two weeks of September, and with the assistance of a work crew, all four design changes were made in Nate’s office:

- Wall color

  While all three pre-selected paint samples provided a warmer tone in contrast to the cool bright white wall color that existed, they also coordinated well with his furniture and carpeting, and represented a pleasant range of brightness from which Nate could choose. Nate selected Benjamin Moore’s “Vanilla Ice Cream,” which, when applied to his walls, did in fact remind me of the color of melted vanilla ice cream.

- Lighting

  Nate’s office contains a large, six-bulb overhead fluorescent light fixture. The lighting from this fixture resulted in over-illumination for such a small office, and therefore was kept off during this project. Over-illumination results when the amount of light produced by a lighting fixture exceeds the needs of the space, and can produce computer screen glare, resulting in
headaches. It is also well known that, in general, overhead fluorescent lights can trigger headaches (McColl & Veitch, 1983). Office workers who spend the greater portion of their day under fluorescent lighting are at real risk to suffer from such negative effects.

The lighting in Nate’s office was adjusted to provide him with table and floor lamps where compact fluorescent and bulbs closely resembling daylight provided directed task and accent lighting; no overhead lighting was used. The “daylight” bulb, providing a whiter light, more closely resembling daylight, was installed in the floor lamp next to Nate’s work table and provides good illumination for project and paperwork. Since Nate works mostly at his computer, I installed a lamp using a warm, compact fluorescent light bulb that sheds appropriate light on his workspace, but does not result in the physical side effects of overhead fluorescent lighting. The lamps purchased are either made of wood or metal painted to resemble wood, and are contemporary in design (Fig. 6, 7, 8).

- Art

Keeping in mind that Nate described himself as tactile, I selected two pieces of art to use on top of his hutch and bookcase that would encourage the imaginative thinking that is restorative to focused attention: a 10” tall carved wooden replica of a nautilus, and a 3’ long replica of a boat hull made with dark stained reeds and tied together at either end (Fig 11, 12). Both pieces are made with products found in nature, are somewhat abstract, and
give the generalized impression of a shape that is familiar, while engendering room to imagine - the “extent” component of ART referred to by the Kaplans.

For the walls I chose two wall hangings of translucent leaves framed in black wood; one is hung vertically above the other, which hangs horizontally on a narrow projection on the west wall in Nate’s office (Fig 15, 16). Above his credenza hangs a long, narrow poster of a coastline with sand dunes and sea grasses (Fig 14). All of these images were chosen because they resemble actual items or scenes found in nature. For example, the coastline picture is a peaceful image that can convey the movement of wind in tall grasses, the smell of the ocean, and the sensation of sunshine – the sense of “being away.”

On the wall next to Nate’s desk hangs a replica of a 19th-century map of the former Dakota territory, now Minnesota, North and South Dakota, framed in black (Fig 17). I chose this map because it represents Nate’s birthplace of North Dakota and his current home in Minnesota, and gives a nod to his enjoyment of history. This item was chosen specifically to add to the sense of place in Nate’s office described by Kellert (2005) as it represents the intersection of Nate’s personal history with that of his home state, and Nate’s intimate connection to the cultures of both places.

- Water feature and plants

A small water feature was purchased to use on Nate’s credenza. I chose a discreet jade green tabletop fountain to be surrounded by plants (Fig 10).
The water gently trickles down the sides of the center shape, providing a calming bubbling sound. I purchased low maintenance plants: miniature orchid, bamboo, and dracaena; together with the water feature they provide a desktop micro-environment (Fig 9).

Pictures were taken when the design changes were completed, as “after” photos of the implementation phase. These changes remained in place through January 2012. Nate was told that, if needed, at any point during this project I would make adjustment to the design changes.

Fig 3: Nate’s office after re-design (east view)
Mid-semester assessment – November 4, 2011

I met with Nate to get his feedback on the project to-date. I asked him to describe any perceived changes in his work habits and ability to focus on projects, and he provided the following reflections:

- He doesn’t look out the window as much as he did before the project was implemented. Nate used to stand and gaze out the window when talking on the phone, and now he likes to stand and look at the “boat” and the wooden nautilus. They are very tactile items.

- He noted he has developed a routine when he comes in each day. He turns on the lights, the water feature and now his radio. He enjoys having this routine.

- He enjoys the ambient sound of the water feature and the radio, which are at opposite ends of his office.

- The radio that he has been using is tuned to a classical music station of Minnesota Public Radio, the station Nate grew up. Nate said that in most rooms of each house where he lived as a young person, his parents tuned a radio to the NPR classical music station. He feels very comfortable with the familiarity of this music in the background.

- When changes were initially made in his office Nate took advantage of that opportunity to clean up a few piles of paper. Since then he has been motivated to think about how he organizes his work, and to take small steps that will improve his workflow.
o He has decided that he doesn’t need to make a stark departure from the way he thinks about his work to improve it. The changes in his office have shown him that small, or discreet changes can have a significant impact.

o In his first interview Nate mentioned that he preferred not to hold meetings in his office as he did not feel comfortable in his space, and he assumed that if he wasn’t comfortable in his own office and didn’t enjoy being there, that others likely did not either. He now feels more comfortable in this space and frequently holds meetings in his office.

o He needed an environment where he could sit and reflect in order to work better. This office now provides that for him.

o He enjoys the daylight light bulbs; the light is clear and useful to work under. He also enjoys the warmer task light provided by the desk lamp.

o Before the project implementation, when he met with people at his worktable, Nate said his sight line above and behind his guest included nothing of interest. Now he enjoys seeing the wooden nautilus and the two leaf images on the adjoining walls, and describes that they allow him to think creatively. The description he gives suggests that, while these pieces have definitive shapes, they are slightly abstract enough where they do not “dictate” their meaning, thereby leaving room for imaginative thinking.
Post-occupancy interview – February 7, 2012

At this interview Nate and I reviewed the overall impact of the design implementation. He was asked to describe changes in his work habits, overall perceived stress, and ability to focus on projects, both since the mid-term interview and as he recalled from the progression of the fall months.

- He continues to choose to meet in his office frequently rather than go to another person’s office to meet saying, “there’s just a better feel here.” This was one of his initial reactions to the changes in his office and it has continued throughout the project.
- He feels very comfortable in his space. He has thought about his office and it is difficult for him to recall what it looked like before the project began.
- He still finds the “boat” and the nautilus fascinating to look at and they have become his “go to” points when he is on the phone or collecting his thoughts while meeting with someone.
- He says he is pleased with the way the office looks – he appreciated that I took the time and was willing to try different items that suited his taste and met the requirements of my project. Examples of this are the wall hangings and lighting styles. Nate had an opinion on these items and because he was able to articulate his style, I was able to find compatible items.
○ He said that he likes white noise in his workplace as it helps him to focus.

He hadn’t brought up his use of white noise in our earlier conversations, and it was the presence of the water noise that reminded him of the value of white noise for his workspace. He also enjoys looking at the water feature, which along with the soothing background music from his radio, make a comfortable environment for Nate.

○ The 12-month wall calendar that he wanted to keep up near his worktable has been helpful to Nate’s work as it prompts him to plan and look ahead and not just live in day-to-day thinking. However, he has been thinking about the artwork he would like to put up in that place if he can find a way to work without the calendar.

○ He has noticed that his need to fidget and pace has decreased. Where he used to have a need to step away from his office he now wants to sit at his worktable, or just remain in his office to work or to think.

○ The comfortable environment has made it easier for Nate to be more productive. Nate said because he does not fidget as much as he did before the project he is able to work for longer stretches before he feels a need to get up from his desk.

○ Nate has developed a connection to his office. The last few months of the project were tension-filled as the office prepared the next year’s budget. Nate works integrally with the Academic Affairs’ budget, and made the
observation that his office is one place that he feels he has control over, relative to the pressures he faces on a daily basis.

My final interview with Nate confirmed to me that this project had indeed been a success. Not only did Nate become more comfortable in his space, to the extent that he chose to hold more meetings in his office rather than meet elsewhere, he also began to see his office as the place where he could settle down and work for greater periods of time than before the project began. Nate has taken ownership of the environment in his office. When the project was initiated I monitored his plants and the water level in the fountain, but as time wore on I discovered he was taking care of these items, and I could let go of this responsibility. I enjoyed watching this transition occur as it conveyed Nate’s developing sense-of-place in his office.

I also noticed that when Nate works in his office during the mid-to-late afternoon, typically a time when it is less hectic in our suite, he began to whistle! He has a beautiful singing voice and equally as lovely a whistle. My father often whistled when he was happy, so the message to me, and I’m sure to others, when I hear Nate whistling is that he is feeling good, and that reaction can be infectious.
CONCLUDING COMMENTS

The results achieved in this project illustrate the effectiveness of its interdisciplinary approach. Here the intersection of intentional design, nature’s influence, an understanding of work styles, and the exploitation of an opportunity created an office environment that not only supported the work performed within and became a space that its occupant wanted to use – demonstrable values to both Nate and his employer – but it drew interest from visitors. Since even minor changes have been proven to make a difference in workplace satisfaction, there is great opportunity for implementing affordable changes using the principles of biophilic design and attention restoration theory (Heerwagen & Orians, 1986). Providing individuals with the occasion to rethink the purposeful design of their work or home environment is an enormous motivator for proposing changes that incorporate nature.

Second only to the satisfaction of creating an environment that facilitates Nate’s work goals and physical wellbeing is the excitement of potential – when individuals recognize the value and accessibility of design changes that incorporate natural elements for their own use. Comments made by individuals coming to Nate’s office provided feedback that reveal these subtle changes created a positive impact during even brief visits.

This is where it gets exciting – throughout the installation of this project I have fielded questions from Augsburg employees regarding the work performed in Nate’s office, and have been asked to evaluate and make suggestions for changes in their offices using the principles applied in this project. Our discussions about the two
principles that served as the theoretical basis of my thesis led to an analysis of their current office design, and then the intentional re-design utilizing attributes of biophilic design and attention restoration theory. The simplicity and affordability of this work are important features that make it accessible for most people and budgets.

Augsburg College is an ideal environment for implementing the principles identified in this project. As a college that embraces its urban setting, self-named “a college of the city,” Augsburg provides several venues for faculty, staff and students to connect to nature: through the cultivation of community gardens, an on-campus farmers’ market, numerous planned activities in the adjacent Murphy Park, Minneapolis’ first public park, the creation of student-maintained rain gardens, and the careful, intentional cultivation of outdoor gathering spaces to encourage the use of its modest 25-acre campus. Carrying that theme indoors, including the use of nature when designing office and community spaces acknowledges and extends the benefits typically sought out-of-doors. Staff and faculty offices become an obvious choice for implementing natural design elements to create an environment that restores attention and enhances focus.

In addition to offices and common areas, however, residence halls present another on-campus opportunity to utilize the good that comes from connecting with nature through design. The adjustment to living away from home, and the rigor of college studies can create extraordinary pressure for which many first-term freshmen may not be prepared. These students can benefit from the use of readily available and affordable elements that capture the essence of nature such as indoor plants, landscape
posters, wall paint and appropriate lighting, to develop a space that supports their needs as they work through this complex transition. Creating awareness of the intention behind this design is essential to its use and growth.

In the case of residential student spaces, the office of Residence Life could be a place for centralizing and disseminating this information. For example, student-led activities during summer orientation could include providing incoming freshmen and their families with a handout containing background information on biophilic design and attention restoration theory with a few simple suggestions for how to implement such changes in their student’s dorm room. When students understand how and why these concepts of design enhance their lives, it is not difficult to assume they will carry this information with them after college to incorporate into future living and workspaces. An extended goal of this project, then, is that the notion of co-existing with nature becomes an intuitive part of the way individuals seek to design their environments.

Understanding the benefits of living with exposure to nature as a key element of our designed environments can be eye-opening. The spaces we inhabit are not just shelters – they can have a positive influence on achieving our goals, or they can work against such progress. In addition to residential and workplace environments, nature has an important role to play in the design of spaces where we learn, where we go to heal, where we seek refuge and rejuvenation and where we recreate: schools, clinics and hospitals, and houses of worship are just a few of the many other places where people spend time, and where the principles explored in this project can be implemented to enhance our lives.
While most of us have sought beneficial experiences with nature in the out-of-doors, it is particularly timely, in the pressurized world in which we live, that we raise the awareness of nature’s ability to meet us indoors and provide continuing benefit to our lives. Consider your response to the photograph of the Thorncrow Chapel at the beginning of this paper – an uncomplicated structure that makes a powerful statement, like many aspects of nature. Its glass walls entice us to come in for shelter, but we immediately stay connected to all that is surrounds us – where we want to be. The symbolism of the chapel’s invisible walls sends a meaningful reminder that we should strive to stay connected with nature. There is much to be gained from reaching back to our roots in order to live life well, moving forward.
Appendix A

Fig. 6: Desk lamp with warm fluorescent lighting
Fig 7: Floor lamp with bright, “daylight,” lighting
Fig. 8: Credenza lamp with warm compact fluorescent lighting
Fig. 9, 10: Low maintenance plants: dracaena, bamboo, and miniature orchid, with water feature
Fig. 11 Wooden nautilus, atop bookcase
Fig. 12 Hull-shaped artwork atop desk hutch

Fig. 13 Close-up of hull-shaped artwork
Fig. 14 Seaside poster, placed at eye-level on wall over credenza
Fig. 15 Translucent leaf prints on west wall, placed at eye-level next to door
Fig. 16 Map of Minnesota and Dakota Territories, placed at eye-level on east wall next to Nate’s desk
## Biophilic Design: Using Nature to Making Life Better

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<th>Element</th>
<th>Biophilic Descriptors/Purpose</th>
<th>Use in Biophilic Design</th>
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| Ability to see into the distance | - Ability to get a distant point for a better view  
- Provides rest for the eyes  
- Enjoyable view of horizon/sky imagery (sun, mountains, clouds)  
- Provides strategic viewing conditions  
- Open spaces encourage feeling of safety, security when there aren’t hidden areas or pathways | - “Open concept” rooms eliminate barriers  
- Mirrors open a room and make it feel larger  
- Views from a window can build on the impact of a room’s design |
| Sense of enclosure, shelter  | Canopy effect (lowered ceilings, screening, branchlike forms overhead) encourage sense of refuge, intimacy | - Fireplaces provide warmth, encourage togetherness and relaxation  
- Cozy seating areas encourage informal conversation  
- Lighting can create feelings of coziness |
| Water                        | - Sight of glimmering or reflective water surfaces suggests clean water  
- Sound of moving water also suggests clean, aerated water, and the support of life | - Indoors: small water fountains, fish tanks  
- Outdoors: pools, garden water feature, bird bath  
- Symbolic forms of water: photos, paintings |
| Natural diversity            | - Variety of plants, flowers, trees connects us with natural environments  
- Relationships with pets and farm animals can provide therapeutic effects  
- Representations (photos, paintings) of plants, animals can have calming effects | - Indoors: potted plants, fresh flowers, pictures or artistic depictions of nature, use of windows that are designed and placed to incorporate nature views  
- Outdoors: access to gardens, parks, bodies of water  
- Animals: pets, farm animals |
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| Environmental changes| Changes in environmental color (sky, stars, seasonal changes in foliage), temperature, air movement, and light over time and spaces connect us to the rhythmic movements of the day and night | -Windows that allow fresh air, show movement of sun and stars  
-Mirrors that reflect light and movement from windows  
-Artistic representations of changes in the environment (photos, artistic depictions) |
| Sense of playfulness | Incorporation of décor, natural materials, artifacts, objects and spaces whose primary purpose is to delight, surprise, and amuse | -Unique objects or paintings that have a quirky component, such as Michael Sowa’s painting, *Diving Pig*  
-Outdoor fire pit that can be used for warmth and relaxation, but also encourages community  
-Garden art |
| Curiosity and enticement | Information richness that encourages exploration and piques interest | -Winding garden paths or labyrinths that encourage contemplation or interest  
-Interior angles that provide interest and create intimate spaces |

References


