2.1 INTRODUCTION

A literature review was conducted to explore theories that could serve as the focus of this design problem, to determine which of these theories will be applied to the problem, and to provide reference for issues pertinent to the relocation of the Department of Design, Housing and Apparel (DHA) to the current Armory building located on the East Bank as a part of the new College of Design (CDes). The theory that will serve as the basis for this thesis project is place attachment. This literature review discusses the theory of place attachment and summarizes the theoretical framework to be used in studying the problem, organizing the data, and guiding design solutions throughout this project. This literature review also explores issues, spaces, and features that are important to designing this space.

2.2 PLACE ATTACHMENT THEORY

When designing a space, several theories can apply whether building new or remodeling. Place attachment theory was identified as being the most appropriate for serving as the focus of relocating DHA into the existing Armory space and establishing a new home for the department as a part of the new College of Design (CDes).

Place attachment theory is an important concept for designers because it affects both functional and meaningful aspects of space (Kopec, 2006). People establish a strong sense of place attachment when they are satisfied with their environment, which supports both mental and physical health (Kopec, 2006, p. 216). Understanding the experiences of individuals and groups that have taken place in a particular space and how that space affects their emotions will help designers to create environments where people feel at home (i.e., secure, comfortable, and sense of identity and belonging) (Wood & Guerin, 2006).

Place attachment is commonly defined as, “a person’s bond with the social and physical environments of a place,” (Kopec, 2006, p. 62). When broken down further, place can be defined individually as a room or space, specific portion of a space being occupied by another person, or an area that is designated for a particular purpose. As well, attachment can be defined by itself as a bond, affection for, or loyalty to something, in this case, to a place (Hawker, 2003). Place attachment revolves around central themes such as people’s emotions and feelings,
positive and negative experiences or effects, and satisfaction. There are also two primary interrelated concepts woven into place attachment: place identity and sense of place. These concepts contribute to the holistic concept of place attachment.

There are three constructs that create the basis for place attachment: people’s emotions and feelings, positive and negative experiences or effects, and satisfaction. Emotions and feelings play a key role in an individual’s attachment to a place. Attachment “is not necessarily a direct result of any particular experience with the place, though it generally involves a psychological investment with the place that tends to develop over time” (Williams & Vaske, 2003, p. 831). Recurring aspects, such as rituals, can help initiate a bond to a place (Low & Altman, 1992). For example, attending a scheduled lecture or an annual exhibit can be considered ritual, or a ritual can be any other event or set of actions that happen regularly. According to Kopec (2006), certain aspects of the environment then bring back memories and feelings. These memories and feelings form a foundation for the sense of attachment to the place. Ponzetti (2003) points out that attachment is influenced by people’s emotions and feelings when he writes, “Place attachment refers to the emotional connection formed by an individual to a physical location due to the meaning given to the site as a function of its role as a setting for experience” (p. 62). Stokowski (2002) refers to the “nostalgia for a place and its people, especially a place once known intimately” and “the longing to return to a place once lived in or visited” (p. 369). This emotional response to a place serves as a foundational element for attachment.

An individual’s experiences in or how he/she is affected by a place contributes to the degree to which he/she feels attached. The environment itself can form or break ties “through the interaction of technologies and resources (cultural ecology), adaptation of people to the constraints and opportunities of the environment (geomorphological regionalism), or the impact of the environment on all aspects of human habitation (environmental determinism)” (Low & Altman, 1992, p. 8). The interaction between experience and attachment is noted by Kopec (2006), “How we relate our experiences to our perceptions of a setting will affect our levels of attachment to it” (p.62). He goes on to say, “The development of place attachment can be compromised by circumstances, settings, or both. Our emotional bonds with our environments can change—for better or for worse—as a result of a significant event or the passage of time” (p. 62). A person may at one time
feel attached to a place, but because of a negative experience, may suddenly experience an adverse response to it and therefore may lose that attachment.

An individual’s level of satisfaction is another element that contributes to forming attachment with a place. Satisfaction with a place can be described as the “value [of a place] to meet certain basic needs” (Stedman, 2002, p. 564). If a place is meeting the primary needs of an individual, the value is increased, thus resulting in a higher level of satisfaction. Satisfaction and attachment are seen to have a positive relationship, meaning if one is satisfied with the place then one will become attached (Stedman, 2002). Satisfaction is also closely linked to beliefs, the precursor to satisfaction or attitude and behaviors, seen as the consequences of the satisfaction or attitude (Stedman, 2002). Therefore, “people who hold positive attitudes should engage in behaviors that approach, support, or enhance the attitude object [place], and people who hold negative attitudes should engage in behaviors that avoid, oppose, or hinder the object [place]” (Stedman, 2002, p. 566). Satisfaction, to whatever degree, plays a part in determining whether attachment is formed.

Two key concepts, place identity and sense of place, also play an important role in understanding the theory of place attachment (Low & Altman, 1992). Place identity can be defined as, “how people incorporate a place into the larger concept of their own identities or senses of self” (Kopec, 2006, p. 62). According to Kopec (2006), two overall functions of place identity center on the identity of the individual. Place identity allows the individual to create a framework for defining themselves and to protect against that which would interfere with this identity. According to Williams and Vaske (2003), the emotional attachment that constitutes place identity “refers to the symbolic importance of a place as a repository for emotions and relationships that give meaning and purpose to life” (p. 831). Place identity has been related to other concepts such as self-identity and self-esteem (Williams & Vaske, 2003). The concept of place identity demonstrates how attachment may be formed or enhanced as individuals integrate a place with their identity.

The second concept, sense of place, can be defined as what “develops when a level of comfort and feelings of safety are associated with a place, which for many people translates to a sense of belonging” (Kopec, 2006, p. 62). According to Kopec (2006), for a sense of place to formulate, a person must be able to make an emotional connection to the place and experience a sense of belonging there. This attachment can be based on “a
combination of use, attentiveness, and emotion” (Stokowski, 2002, p. 369). The place to which one is attached has typically been spoken about in terms of a physical environment such as a room or building. However, according to Stokowski (2002), “places are more than simply geographic sites—they are also fluid, changeable, dynamic contexts of social interaction and memory” (p. 368). The sense of belonging contributes to an individual’s overall ability to experience attachment to a place, whatever form that may take on.

Place attachment theory involves different social relationships including individuals, groups, and cultures. According to Low and Altman (1992), “the social relations that a place signifies may be equally or more important to the attachment process than the place qua place” (p. 7). Also, Riley (1992) states that, “attachments may not be to landscape solely as physical entities, but may be primarily associated with the meanings of and experiences in a place—which often involve relationships with other people.” This concept supports the importance of the physical environment and how it supports student relationships. For example, the Interior Design program begins with approximately 90 freshman students each year. Upon the completion of the first year, all pre-interior design students have the option of participating in a portfolio review, at which time 35 to 40 are selected to continue on through the interior design program as majors. Students then move through the remaining three years of the program as a cohort, taking the same set of courses. Over the course of these remaining three years, many classes may involve group projects where students may spend long periods of time working together, problem solving, building, writing, and creating, causing students to become very well acquainted with one another making how the environment supports student interaction and relationships imperative.

DHA includes Clothing Design, Graphic Design, Interior Design, Housing Studies, and Retail Merchandising undergraduate programs; a comprehensive graduate program; and several research/outreach centers. Place attachment also suggests that both time and change are complex and relatively neglected aspects of psychological, social, and phenomena (McGrath & Kelly, 1986). How the space was used in the past, how it is used today, and how it is going to be used in a new location, will change our temporal aspect of the department. DHA design programs (i.e., Clothing Design, Graphic Design, and Interior Design) typically involve studio courses, which meet three hours per session with several sessions per week and are required every
semester. Studio and design projects can vary in size and require research and design that may be completed either individually or in collaborative teams. All such projects are time-intensive and may require many hours of problem identification and problem solving. These projects may also require specific computer software and equipment, large teaming spaces to design and produce work, and individual work stations for all design students. Students can expect to spend many hours in studios and computer labs on campus working on these projects. In general, DHA students spend a significant amount of time in the building that currently houses DHA (i.e., McNeal Hall).

This proximity to place and to one another provides opportunity for place attachment to occur. The designed environment must maximize the use of place identity and sense of place by using design to achieve such things as belonging, security, and comfort. Place attachment takes place within settings that have deep meaning for people because their identities are intricately woven into those places (Kopec, 2006). The challenge is that within the new environment, how will DHA students establish their own identities?

As discussed in this section, there are several major reasons why the place attachment theory is most appropriate for the study of this project, and how the designers are going to achieve functional and aesthetic space depends on the understanding of this theory and how it will be applied to the design of the new space.

The following design criteria should be considered when designing to create place attachment for the users of a space:

- Include access to natural areas such as gardens to increase place attachment by improving mood, increasing satisfaction, encouraging communication, and providing refuge for users (Sugihara, 2000).
- Allow for spontaneous social interaction by crossing circulation paths and placing student work areas near one another, as having contact with support networks in a particular space has been linked to place attachment (Sugihara, 2000).
- Provide for the user to develop his or her own attachment to the space since society is becoming more mobile. Because of this, physical spaces are becoming void of social interaction and experiences; therefore, the ability to feel connected to the space is becoming more important (Gustafson, 2001).
• Design the space to create a sense of community to encourage place attachment for the user through socialization (Hay, 1998).

• Use a variety of unique materials in the design, as individuality in the space will promote place attachment (Hay, 1998).

• Allow students to become involved with the planning of the space. Their input will likely increase their connection to the space (Killeen et al., 2003).

• Include areas for public permanent display of student work. This will give the students pride in their work, and allow them to feel more connected to the space as compared to allowing only for temporary display of student work (Killeen et al., 2003).

2.3 ISSUES

Historic Preservation

The Armory was placed on the National Register of Historic Places in 1984 as part of the University of Minnesota Historic District. Because of this distinction, the preservation or restoration of the Armory is of great importance and in some cases a requirement. Preservation of the Armory not only sustains institutional life on campus, but gives the University community a landmark, a sense of history, and a place where students can identify with the University through the experiences they have had there.

Figure 1.1. The Armory in 1904
Historic preservation is defined as “the theory and practice of creatively maintaining the historic built environment and controlling the landscape component of which it is an integral part. The Secretary of the Interior of the U.S. government defines the historic environment as districts, sites, buildings, structures, objects and landscapes which are significant in American history, architecture, archeology, engineering, and culture” (wikipedia.org, ¶1).

Why should we protect and preserve these structures and landscapes?
- They may have aesthetic value
- They add interest to the community
- They possess contextual value
- They can still be of use, if not for the original intent then for another
- They have an associative value
- They provide a link to our past and tell the history of who we are
- They possess a memorial value
- They give us a depth of time

Often preservation is for buildings associated with the famous, dead, or rich. In reality, it involves structures of all types, used by all classes of society. Preservation can be less costly than building new when considering the energy involved in removing a structure and then replacing it. Preservation can boost business; travelers spend more money when visiting historic places on vacations. Rehabilitation of old structures can create jobs and keep money in the local economy versus the same amount spent on new construction. Older buildings are or can...
be safe. The careful construction of older buildings make them able to stand up in a disaster better than modern built structures built less expensively. Older buildings can be retrofitted with safety systems such as sprinklers.

The following are guidelines that the Secretary of the Department of the Interior (1995) offers for historic preservation:

- Building use, whether for its original purpose or a new use, should maintain distinctive features, materials, and spaces.
- Historical character should be preserved including features, materials, and spaces.
- Structures are a product of the time, place, and use for which it was constructed.
- Changes that have been made to the structure and are in themselves of historic importance should be preserved.
- Repair or replacement of distinctive features should use materials that match the original.
- Chemical or physical treatments that cause damage should not be used.

- Archeological resources should be preserved in place (Archeology and Historic Preservation, 1995).

Preservation cares about the past, but also about the future. Preserving the structures and landscapes of our past provides us with a glimpse of our own history and gives future generations that same opportunity. The movement of DHA into the Armory gives the students in these programs a chance to see their past. The Armory can instill a sense of place by telling us where we've come from, who we are, and who we can be.

**Universal Design**

Universal Design is defined as “an approach to the design of products, services and environments to be usable by as many people as possible regardless of age, ability, or situation” (wikipedia.org, ¶ 1).

The Center for Universal Design gives seven principles of universal design:

1. Equitable use
   - The design is useful and marketable to people with diverse abilities.
2. Flexibility in use
   - The design accommodates a wide range of individual preferences and abilities.

3. Simple and intuitive use
   - Use of design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level.

4. Perceptible information
   - The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s sensory abilities.

5. Tolerance for error
   - The design minimizes hazards and the adverse consequences of accidental or unintended actions.

6. Low physical effort
   - The design can be used efficiently and comfortably and with a minimum of fatigue.

7. Size and space for approach and use
   - Appropriate size and space are provided for approach, reach, manipulation, and use regardless of user’s body size, posture, or mobility (Center for Universal Design, 1997).

The integration of Universal Design principles into the renovation of the Armory will provide the opportunity for all students, faculty and guests to comfortably use the space. They will come away with positive experiences. This will help develop place attachment. People are more likely to use a space if its one in which they are comfortable and not hindered by obstacles, either physical or mental.

**Sustainability**

Sustainability is an important aspect of this project. Designing a sustainable facility will support the University’s Sustainability Initiative (Ecosystem Science, 2006) by providing a more healthy environment for students and saving money over the lifetime of the building (Moussatche & Languel, 2002). Additionally, progressive and sustainable buildings can become unique spaces in which people are more likely to remember and develop an attachment to.

There are several important resources that can be used to assist designers in implementing sustainable practices, materials, and finishes into their designs. Using the Leadership in Energy
and Environmental Design (LEED) Green Building Rating System as a resource to set up sustainable guidelines for a project, analyzing previous sustainable higher education projects for practical examples of implementation, and understanding how to create a systematic approach to assessing the programmatic needs of a building may be helpful tools in approaching the project.

The LEED Green Building Rating System was developed to provide reliable, consistent standards that can be used by architects, facility managers, interior designers, and other industry professionals to determine whether or not a building should be considered green (i.e., environmentally conscious). LEED acknowledges building performance in five main areas: sustainable site development, water conservation, energy efficiency, materials selection, and indoor environmental quality. Projects that meet these standards are awarded Certified, Silver, Gold, or Platinum certification depending on their level of achievement (Leadership in Energy, 2006).

Several examples of LEED certified designs were reviewed to gain insight into sustainability criteria used for university buildings. The Morken Center of Learning and Technology at Pacific Lutheran University reached LEED-NC Gold certification. The Morken Center is a three-story building with two wings on opposite ends (i.e., north and south) that house the business school and math, computer science, and computer engineering departments. Sustainable features included concrete flooring used in 65% of the building to limit the amount of chemicals and wax needed to treat the floor for maintenance purposes, lamps controlled by motion sensors so they shut off when no one is in the room, steel framing throughout the building that has 95% recycled content, use of wood made of bamboo (i.e., a rapidly renewable hardwood) as well as maple and fir veneers harvested from certified sustainable forests, and access
to daylight and to a view to the outdoors from all rooms (i.e., except utility areas) (Morken Center Fact Sheet, 2006).

Similarly, the Green Classrooms of Guggenheim Hall at Colorado State University are three classrooms that were remodeled in a historic masonry building by graduate students taking a facilities management course in 2002. The project eventually received LEED-CI Silver certification. Sustainable elements included low-VOC paint selections, use of existing lamps and luminaires, wood trim, specification of carpet with 100% recycled content, and installation of soundboards to increase audibility and control acoustics (LEEDing the Way, 2006).

Rinker Hall at the University of Florida is the main building housing the University’s College of Design and Construction. It was a new construction project that reached LEED-NC Gold certification. Sustainable elements included materials that were assessed for the proximity to the manufacturer, high levels of recycled and renewable-resource content, energy used in the manufacturing process, estimated life, maintenance requirements, toxicity, and the potential for reuse and flexibility in the designed space through selecting materials and assembly pieces that can be disassembled. In this way, energy can be saved if the building has a change in function (Rinker Hall, 2005).

Although at times sustainability may seem as a more expensive approach to a project, this is not necessarily true. Research has shown that the life-cycle cost of using sustainable products, materials, and finishes, which at times have a higher initial cost, is often lower than when using products, materials, and finishes that are less sustainable. It is important to educate all involved parties of the project (e.g., clients, investors, users) to the economical and environmental impact of sustainable design before the project begins. Additionally, by listening to the concerns, issues, and priorities (i.e., specifically regarding interior products, materials, and finishes) of all parties involved, a more holistic approach can be taken to the design in general (Moussatche & Languel, 2002).

Creating a sustainable environment means creating an environment that will stand the test of time. People tend to form attachment to places they are familiar with. If a building is sustainable, than it has the potential to remain unchanged and unharmed for an extended length of time. In this way, even if users are away from the building for years at a time, they can...
come back to a place that they can recognize, understand, and feel comfortable in.

Sustainability may also seem like a broad subject that is difficult to systematically incorporate into a project. However, LEED criteria for new construction or commercial interior projects are good tools to use as guidelines for this project. It may also be helpful to review the design solutions of similar projects that have successfully implemented LEED criteria, like the examples discussed earlier in this section. Specifying materials and finishes that are sustainable is essential to this project. In addition, the life-cycle cost of the materials and finishes can be useful in promoting the cost-effectiveness of sustainability to clients. Taking the simple measures listed above will be instrumental in making this a successfully sustainable project.

The following are key suggestions for the Armory project:

- Orient spaces to maximize daylight (Rinker Hall, 2005).
- Consider large, open spaces that allow for flexibility and ease of travel (Rinker Hall, 2005).
- Include indoor/outdoor spaces to maximize resources (Rinker Hall, 2005).
- Consider providing daylight in all rooms that are occupied on a regular basis (Morken Center Fact Sheet, 2006).
- Reuse as many fixtures, furnishings, and materials as possible (LEEDing the Way, 2006).
- Specify products, materials, and finishes that are recycled, recyclable, durable, energy efficient, low in volatile organic compounds, and naturally or locally manufactured (LEEDing the Way, 2006).

Health and Safety

Occupant health is an important consideration in this project. For users to be comfortable and satisfied within a space, they must feel as though it is a healthy environment in which to work. Indoor air quality (i.e., the indoor air pollutants affecting the built environment) is one of the most frequently discussed causes of poor occupant health. In particular, occupant health in commercial buildings has been analyzed in many studies. The findings of these studies and the implications for the built
environment, particularly for learning environments will be discussed in this section. Specific illnesses related to indoor air quality will also be discussed.

Research has shown that factors influencing poor indoor air quality include poor heating, ventilation, and air conditioning (HVAC) systems and inadequate specification of interior materials and finishes (Pejtersen et al., 2001). The sustainability portion of this literature review includes more information about sustainable materials and finishes that support good indoor air quality. Increasing the supply of outdoor air (i.e., a common solution to indoor air quality problems) may not always create the desired effect. This underscores the importance of discussing the effects of the HVAC systems used in all areas of the space with a mechanical engineer (Sakr, Knudsen, Gunnarsen, & Haghghat, 2003). It is important to note that some perceptions of poor indoor air quality may be psychological in nature (i.e., users perceive poor indoor quality when in fact it is not present) (Pejtersen et al, 2001). Nevertheless, it is important to be aware of indoor air quality design criteria to create environments that are comfortable and healthy for all users. For example, designers should know, review, and analyze information regarding carpet, carpet pads, and carpet adhesives to specify those that emit lower amounts of chemical gases; specify hard floor coverings (i.e., stone, ceramic, or porcelain tile) as they do not emit toxic gases; and specify linoleum as an alternative to vinyl tile or sheet tile (Nussbaumer, 2004).

Multiple chemical sensitivity, a condition where a person reports intolerance or sensitivity to chemicals at low concentrations, is an illness closely associated with indoor air quality. Although it is a relatively ambiguous illness (e.g., varies greatly for each person and is difficult to treat), it is important to understand how the built environment can minimize the symptoms prevalent in the users of the building. It is likely that there will be many users in the building with many different symptoms. Carpet installation methods; wall covering manufacturing methods; ceiling treatments; and flooring, fabric, and paint specifications are all areas where sustainable products should be considered to improve indoor air quality and minimize the symptoms of multiple chemical sensitivity (Nussbaumer, 2004).

Research has also suggested that nasal functioning may be affected by indoor air quality. Walinder et al. (2001) reported that users attained more desirable nasal functioning in buildings made of stone and brick and in classrooms with less open bookcases.
and no PVC flooring material. Additionally, it was suggested that older buildings, in general, may induce fewer nasal problems. That the Armory is an older existing building may be one advantage for this project in terms of improving health. It may be important to consider that students will be prominent users of the building, some of whom live in residential halls where influenza and possibly other illnesses may spread more easily (Tsuang, Bailar, & Englund, 2004). Therefore, materials that minimize the spread of germs should be considered.

Ergonomics is another important consideration for the interior environment of the building, especially as it relates to work spaces, which will be prevalent throughout. It is also important to consider ergonomics as the number of college students with ergonomic problems continues to grow. Both vision problems (e.g., from lighting conditions, computer distance) and physical discomfort have been noted as physical problems by students at the college level. It is important to specify ergonomically correct furniture, specify and install proper lighting, help users to understand the functions of ergonomic furniture (e.g., how to adjust a chair), and inform users of proper work habits that will help them avoid injury (Rasicot, 2006).

Multiple sclerosis (i.e., a neurological condition that affects the central nervous system) is an illness not commonly discussed when addressing the needs of students in a college environment. However, implementing design solutions that accommodate those with multiple sclerosis will not only assist those with the illness, but may also allow for a holistic design solution that takes more specific physical needs into consideration. Yagodich, Wolfe, and Boone (2000) have analyzed the needs of those dealing with different levels of multiple sclerosis. Flexibility in the physical design of the classroom is especially important as multiple sclerosis and other similar illnesses progress in stages in which needs are constantly changing. This also reflects Universal Design principles.

The Green Seal (www.GreenSeal.org) and the U.S. Green Building Council (www.usgbc.org) Web sites will be used as resources for additional information on specifying sustainable products, materials, and finishes that promote a healthy indoor air environment (Nussbaumer, 2004).

Creating spaces that accommodate the health and safety needs of all users is essential for users to create an attachment to the building. If a user feels like a space has poor indoor air quality or that it does not accommodate their physical needs, they
may feel that it is not a safe environment for them to be in. If they do not feel safe, they most likely will not feel comfortable and will not form a positive attachment to the space. It is important that the health and safety of all users are carefully considered throughout the design process to support a positive place attachment.

All occupants have different needs for their own personal safety and health. The design of the new home for DHA should accommodate as many of these needs as possible. Creating flexibility within the space may allow for different solutions dependent on the user’s specific needs. Indoor air quality and ergonomics are universal concerns that are especially prominent in this building type and may have harmful effects if not handled appropriately. It is important to analyze and consider all possibilities for accommodating different needs for health and safety within the space.

Security

Security for learning environments is an important issue and is influenced by the building envelope (i.e., doors and windows), surveillance, and creating a defensive space for occupants.

Windows and doors are important when trying to secure access to buildings. Fixed windows provide security by preventing access to a building; however, operable windows may be required and should utilize a locking system that can be deactivated to provide a safe exit for students during an emergency (Kollie, 2006), while at the same time securing access to the building. In older buildings the existing windows may need to be replaced to improve the building’s efficiency as well as security (Fickles, 2006). Doors provide secured access while they are locked. To ensure security, doors should close securely and locks and hinges should be located on the inside of the door so they cannot be tampered with (Kennedy, 2006a). Exterior doors should provide a view both into and out of the building, while interior doors may at least provide a good view of the inside of classrooms (Kennedy, 2005). This will allow people to see what is going on in the space before entering or exiting, which is especially important in the event an intruder or other emergency is present.

Surveillance of the building might also be provided by video cameras in locations that may not be easily seen otherwise. The use of video surveillance has become more popular now that schools do not require their own closed circuit network, but
instead can use an Internet Protocol (IP) system, which is accessible via the internet allowing video surveillance to be viewed from any location (Kennedy, 2006b).

Crime Protection Through Environmental Design (CPTED) is a concept that addresses the problem of creating a defensive environment and considers main features of building security including the building site, landscaping, wayfinding, fencing, entry points, shared space, and operation of the building after normal hours (Elements of Campus Security, 2004). Secured by Design, a security document (2004), suggests allowing separate access to shared areas, like a conference room, so members of one group do not have to go through a space belonging to another. Placing storage areas and computer labs away form exterior walls and entrances will make access to these spaces more difficult for intruders. Closing off certain areas of a building after hours, but at the same time allowing access to other parts of the building is another way to keep the building secure (Elements of Campus Security, 2004).

Security is an essential factor when forming an attachment to a place because it can make a space more inviting to us on a conscious or unconscious level (Blue, 1998). The ability to visually and physically understand one’s surroundings and to anticipate events and encounters in the environment will allow people to feel safe. Feelings of safety and security help the occupants feel relaxed and more comfortable in the space, making it more likely that they will associate positive feelings with the space and will form an attachment to it. This kind of attachment is not possible if the threat of danger is always present.

**Wayfinding**

The goal in providing wayfinding clues is to provide a stress-free means of finding a destination. Consistency is important in providing navigational clues that are easily understood. According to Muhlhausen (2006), designers must include wayfinding in the initial planning stages of a project. This consists of graphic, audible, and tactile communication.

Graphic communication includes the use of maps, landmarks, signage, lighting, furniture arrangements, grouping of areas such as restrooms and stairways, and change in color. Maps should be located near the entrance and use consistent room names for clarity. A “you are here” marker will assist users in determining where they are in relation to where they want to be and aligning maps with surrounding settings will clarify the
location of the user. Landmarks are art or a recognizable element and may indicate special functions and assist in wayfinding for some users (Kallai & Lawton, 2002). Standards should be established for room names, letter forms, sign placement, graphic images, and floor numbers. It is important to consider visual clarity when designing signage and specifying lighting. Furniture arrangements can determine traffic flow through a space, allowing for appropriate placement of signage. Color and texture choices may distinguish public from private spaces.

Audible communication includes verbal communication, chimes on doors and elevators, audible landmarks such as fountains, and audio maps. Verbal communication must be consistent with printed communication. For example, a receptionist should refer to a room by the same name indicated on the graphic communication. Door chimes, audible landmarks, and audio maps assist those with impaired visibility as well as those at lower reading levels.

Tactile communication includes the use of Braille as well as changes in material and texture that assist all users. Material and texture changes are helpful at areas people use to map a space. These areas include paths of movement, places of activity, boundaries, areas with a defined identity, and points of reference (Kruse & McGowan, 2004).

Occupants of private areas are familiar with their space, so require fewer clues to navigate their environments. The majority of wayfinding clues are needed in public areas where occupants may not be familiar with the space. Social, cultural, and gender differences can affect spatial abilities and preferences. For example, men are more likely to use global references while women use landmarks. Additionally, perceived safety in a new environment can affect one’s anxiety level and inhibit wayfinding (Kallai & Lawton, 2002).

Multiple means of wayfinding will speak to a broad range of users, ensuring efficient navigation of the space. The ability to understand and navigate through one’s surroundings can lead to a sense of satisfaction in the environment, therefore allowing users to establish attachment to a place.

**Proxemics**

Proxemics is “the study of the cultural, behavioral and sociological aspects of spatial distances between people” (American Heritage Dictionary, n.d.). The term proxemics was first introduced by anthropologist Edward T. Hall in 1963. Hall
described proxemics as “the interrelated observations and theories of man’s use of space as a specialized elaboration of culture” and defined the conceptual framework of proxemics as “social and personal space and man’s perception of it (Hall, 1966, p. 1). In his book, The Hidden Dimension, Hall distinguished between four perceptual distances: intimate, personal, social, and public, all of which include both a far and a close phase. Based on extensive observation of both animals and humans, Hall used these distances to classify the levels of territoriality animals (e.g., humans) exhibit determined by how the specific distance illustrates the relationship and interaction between them. Hall defined each of the four perceptual distances.

- Intimate distance is anywhere between zero and 18 inches and is characterized by the heightened awareness of the other person’s presence (i.e., sound, smell, touch) and involvement and typically includes lower voice levels (e.g., whispering).
- Personal distance is anywhere between 18 inches and 48 inches and is considered to define the protective space people put between themselves and others.
- Social distance is anywhere between four and 12 feet and is associated with impersonal interaction and includes normal voice levels.
- Public distance is anywhere beyond 12 feet, details of objects are more difficult to distinguish clearly, and voice levels are higher.

Other, more recent, sources of research also address the concept of proxemics. Eye contact is a form of interaction that is significantly impacted by proximity to others. In spaces where proximity to others is great (e.g., elevators, buses, or subways), especially among strangers, eye contact is typically reduced or may cease completely (Argyle & Dean, 1965). However, in situations where people need to feel in communication with others, eye-contact is imperative (Argyle & Dean, 1965). Designers should provide spaces that facilitate eye contact when eye contact is required for effective communication (e.g., conversations, group meetings); however, designers should also consider the impact of more intimate spaces (e.g., elevators) and their implications for occupant comfort in relation to proximity to others.
In a study that focused specifically on the privacy needs of students working in a design studio, researchers discovered that students preferred working in close proximity in groups of their friends and that the intrusion of others not part of these groups lead to feelings of over-crowding (Demirbas & Demirkan, 2000). Designers should consider methods for controlling unwanted interaction among occupants to avoid feelings of over-crowding.

Regulation of personal space is important for people to feel comfortable when in close proximity to others. Consider the intimate, personal, social, and public distance levels as described by Hall (1966) when designing in public spaces. Creating spaces that afford occupants control over interaction and distance to others may contribute to an individual’s comfort in the space, thereby influencing that individual’s satisfaction and the likelihood that they will have a positive experience. Place attachment is more likely to occur in spaces where people will not feel over-crowded and have the opportunity to engage in effective communication with others (i.e., feeling comfortable using eye contact). It should also be noted that the degree at which people feel comfortable interacting with others varies across cultures as well as gender.

**Building Codes**

The Armory building at 15 Church Street in Minneapolis is on the National Register of historic places. Any modifications to the building must meet the requirements of the National Register as well as those of the 2003 Minnesota State Building Code. Chapter 1303 of the Minnesota State Building Code details the rules Minnesota has adopted in addition to the 2000 IBC. Chapter 1305 lists the chapters of the IBC that must be followed in Minnesota municipalities that have adopted it, including Hennepin County. Ronald Holden is the building code official assigned to the University of Minnesota.

DHA consists of offices, classrooms, computer facilities, studios, lecture halls, meeting areas, and laboratories as well as mechanical rooms. These spaces determine the occupancy groups as indicated in IBC section 302. This project will involve occupancies A-3 (lecture hall), B (educational), F-1 (parking garage), H-3 (combustible fibers), and S-1 (storage), and must provide separation of these occupancies as indicated in table 302.3.2 (IBC 2003). The building type must be determined based on construction materials and sprinkler system. Type I construction is the most fire restrictive. The occupant load is calculated using the occupancy type and determines exiting...
requirements. Table 1004.1.2 indicates square footage per occupant for each occupancy type.

The Minnesota State Building Code is broken into chapters. The following pertain to the renovation of the Armory:

- Chapter 1305 Adoption of 2000 International Building Code
- Chapter 1311: Guidelines for the Rehabilitation of Existing Buildings
- Chapter 1341.0411: Detailed accessibility codes for alterations to a building
- Chapter 1307: Elevators
- Chapter 1315: Electrical
- Chapter 1346: Mechanical
- Chapter 4715: Plumbing
- Chapter 7510: Fire

- Chapter 7: Helpful tables in calculating fire-resistance
- Chapter 8: Classification of materials for fire and smoke resistance
- Chapter 10: Safe egress practices.
  - Table 1004.1.2 - floor area allowed per occupant for various occupancy types.
- Chapter 12: Minimums for the interior environment including ventilation, lighting, sound transmission, and room dimensions.
- Chapter 29: Tables that will help in calculating plumbing requirements.

The following steps may be helpful in beginning the planning process:

- Review Guidelines for the Rehabilitation of Existing Buildings
- Calculate occupant load (A3 with fixed seats = number of seats, \(B = \frac{\text{net square footage}}{100}\))
• Determine stair and exit corridor width (number of occupants * multiplier in table 1005.1 – sprinklered or non-sprinklered), minimum stair width = 44” + handrails

• Calculate stairs: tread = 11” minimum, risers between 4” – 7”, headroom = 80” minimum, handrails at each side

• Use the more restrictive business occupancy to calculate plumbing facilities. Occupants divided by 2 = separate male and female facilities. Use table 2902.1 to calculate fixture counts. A urinal can be substituted for 67% of male water closets
  - Rooms exceeding 50 occupants require two exits that are separated by a calculated distance

The building code is a minimum requirement. Creating a good design may dictate exceeding these minimum requirements. The State of Minnesota is considering the adoption of the 2006 International Building Code (Joachim & Rosendahl, 2006). Since building codes can change, it is important to verify the current requirements.

**Studio Culture**

Design project work is among the most common teaching methods used in design courses (Henderson, 2004). Studio-based learning, or “learning by doing,” using real-world projects and deadlines has proven to be successful in teaching critical design skills (University of Texas, 2005). This activity best takes place in a studio environment, where individual instruction and peer learning can easily co-exist. The combination of environment, educational instruction, and social interaction combine to form a *studio culture* (Henderson, 2004). Having a good studio culture is an essential element in providing a creative and well-rounded design education.

Studio culture is becoming so important that many schools are adopting policies that outline the nature of their studio culture. These policies are actually required for accredited architecture programs (National Architecture Accrediting Board, 2004). Some of the key topics addressed by colleges and universities that have adopted these policies include a functional and welcoming studio environment, the balance of professional and personal life, reasonable workload expectations, the development of time-management skills, an effective design studio review processes, peer collaboration, student-faculty
relationships, and a studio code of conduct. All of these factors contribute to the overall sense of studio culture (NAAB, 2004).

As the College of Design intends to bring their administrative, classroom, and studio facilities together on one campus, the development of a studio culture will be important to consider. With the countless hours students spend in their studios, the physical environment should be given special attention.

Flexible space should be created to facilitate a variety of studio activities (i.e., individual and group work, lectures and social interaction). Regular critiques and studio schedules will help students develop routines in the space and be able to form a bond more easily. Studio services should incorporate equipment to support studio work, such as computer/digital technical support (e.g., plotting, printing) and appropriate furniture for drafting and project work (Roger William University, 2005). The environments should encourage individual responsibility and discipline as well group interaction and accountability (University of Texas, 2005). A supportive and positive physical working environment will help students form an attachment to the space and feel comfortable working there. A balanced working schedule and good time management skills should be emphasized. Professors and faculty member support regarding issues of health, safety, and rest are all important to consider for the establishment of a successful studio culture. The teaching methods, studio routines and activities, and the physical environment, and the ability to socialize in the space will all greatly impact the development of a positive studio culture for DHA in the Armory.

Branding

One of the most important yet intangible assets a college or university has is its long-term image. To successfully develop, expose, and then preserve that image, schools are focusing their marketing efforts on branding. The goal of branding is to distinguish an institution from rival institutions and aid student choice in the competitive market (Whyatt, n.d.). Brands make a prospective student’s choice easier. Similar to consumers of other services, students will base their decisions on perceptions often formed over many years. Branding concepts extend much further than just relating to the college as a whole. Larger universities in particular focus marketing efforts on particular colleges and degree programs within the university. While maintaining the brand of the university as a whole, individual
schools and colleges often create an additional brand strategy that will promote their particular programs both within the university as well as to prospective students and the general public.

An innovative branding strategy is ideal to market and promote the new College of Design at the University of Minnesota. In developing this brand, it is important to maintain the University of Minnesota’s brand as a whole, but at the same time create a more specific identity for the College of Design and the Department of Design, Housing, and Apparel. The relocation of several degree programs will bring the college together to a central location on campus. A branding strategy can help students on campus identify this change and become comfortable with it. The development of a brand identity for the DHA will help individuals also recognize the college’s new facilities. In the case of the DHA, the brand will be able to quickly become associated with place. Current students will immediately develop a sense of community and belonging in a new space that is physically branded. New and prospective students will also feel a sense of belonging and be able to quickly become comfortable in their new surroundings because the schools brand is something they are already familiar with.

In developing a brand strategy, the DHA should focus on several key components:

- **The product**: the DHA needs to emphasize their unique and specific offerings (Whyatt, n.d.).
- **Develop and clearly define long-term strategic goals**: the DHA needs to decide what they want to be known for and then develop a plan to achieve that goal.
- **Make critical decisions on a sound empirical basis**: appropriate research and preparations need to make sure efforts and strategies will pay off (Hesel, 2004).
- **Integrate everything you do**: intelligent and highly coordinated management of marketing activities is essential (Whyatt, n.d.).
- **Every activity must be part of an integrated scheme**, each serving the same overarching goals and communicating related themes and messages. For example, in developing a logo, the DHA may want to seek the assistance of their own graphic design students. This will further build on the bond and
sense of attachment these students feel to the overall identity of the school.

- Commit to your plan and be consistent: every year expensive marketing materials are discarded and then new ones created. Administrators and marketing consultants churn out new brands, slogans, and images at an alarming rate (Whyatt, n.d.). With limited budgets and a transient target market, consistency and longevity are essential ingredients of a successful college marketing effort. Branding strategies should create a consistent identity that is representative of what the DHA has to offer.

2.4 SPACES

Exhibit and Display

Exhibit and display space is important to include within a building housing the DHA. This space needs to be flexible and attract visitors. The display areas must also be secure. When designing display space, the audience must first be determined. A study conducted by Harvey, Loomis, Bell, and Marino (1998) found that interactive components, multisensory stimulation, and dynamic displays were the most important factors in determining visitors’ experiences at an exhibit. Display spaces should be located in well-traveled areas to increase viewing. Information being displayed needs to be delivered clearly and concisely. Providing a seating area near the exhibit area can enhance the comfort levels of visitors (Harvey, Loomis, Bell, & Marino, 1998).

In the Armory, two- and three-dimensional presentations will be displayed by various programs. Each of these programs may prefer to have their own distinct display space. Space should be provided for informal exhibits, such as group critiques. The display space should be flexible enough to display individual works or large group exhibitions. An art gallery in New York was successful in accomplishing this. Display walls were placed on castors to create great flexibility in the layout of the space. By simply rotating these walls around a central column, multiple configurations were possible. Individual, closed spaces could be created, as well as a large open room. Paint was kept simple and white. Track lighting was used to be flexible (Walker, 2002). Exhibit and display space for DHA will provide an informal learning environment that can be fun and exciting for visitors.
Chapter 2

Allowing students to showcase their work in temporary and permanent displays or exhibits will enhance place attachment leading students to establish a connection to the space. Pride taken in contributing work to the displays, located in view of the public, will also enhance satisfaction within the space.

Conference Rooms

A study by Renzi (2003) found that flexibility is important in the design of modern conference rooms. Movable walls and furnishings are beneficial in today’s meeting spaces. Conference rooms must also be designed to accommodate technological advances.

An ad agency in Seattle arranged its office around a large, 4000 square-foot space. This space incorporated informal teaming areas, social gathering areas, individual work areas, and formal conference settings. Flexible partitions and multi-functional furnishings allow the space to transform into several smaller conference rooms or meeting areas. The space can be easily transitioned back to serve as a larger venue for presentations or social gatherings. The conference room’s central position in the plan allows it to serve as the primary hub. It was found that people were more likely to use this conference space when flexibility was available. It served various purposes instead of a standard “meeting room” (Renzi, 2003). Positioning a conference room near an entrance area allows the space to be opened up to become part of a larger reception area (Guzman & Klint, 2005).

As technology changes, conference rooms must be able to accommodate these changes. The spaces need to support presentations and the technology tools that enhance them. Access to power and data must be provided anywhere it may be needed. The design of conference rooms should promote communication and the display of information.

Within the Armory for the DHA, a central conference space or several of varying sizes will allow the interaction among the various programs. A range of conference room sizes should be provided to accommodate different sized user groups. Flexibility in the layout will provide faculty, staff, and students the ability to create various sizes and arrangements of the space that would be suitable for their needs.
Social and Group Spaces

Gathering spaces are an integral part of this design. Students need spaces to gather in teams; faculty need spaces to gather in for meetings; and the department needs spaces to accommodate smaller and larger gatherings. Gathering spaces also provide areas to create place attachment through socialization. It is important to understand the design implications for privacy, acoustics, aesthetics, proxemics, and other issues to design holistically for these spaces. While these issues are discussed in general elsewhere, this section will focus more directly on their influence on gathering spaces.

It is important to note that many of the spaces students gather in are used for studying and collaborating. Research has shown that when completing a more intensive task (e.g., studying together for a test), users desire a more enclosed, private space. However, if the task is not as intensive, students perform better in a more open space (e.g., a table in a common area). In addition, color can have an impact on task performance. For example, if the space is being used for an intensive task, stimulating color can be distracting, and it is important to provide spaces that vary in aesthetic and privacy level (Stone, 2001). Providing a variety of spaces (i.e., both those that are more open and accessible and those that are enclosed) will afford people working together on an intensive task less disruption by those working in a more casual groups. Research suggests that providing enclosed areas for group work may contribute to greater group cohesiveness and acoustical privacy should be provided between meeting areas and individual work areas (Lee & Brand, 2005). These considerations are especially important in the context of this project. The different majors within DHA require different types of spaces (e.g., housing students may require spaces for intensive book work, while clothing design students may require spaces that stimulate creativity and accommodate hands-on activities).

Studio spaces are common gathering and collaborating spaces among the different majors (i.e., Clothing Design, Graphic Design, and Interior Design) in DHA. Team and collaborative work areas are types of gathering spaces for Housing Studies and Retail Merchandising students. Previous research has indicated that users of a studio were more comfortable when they could locate their tables among a close group of friends. Studio spaces that accommodate small groups of students sitting together and incorporate architectural features that visually and acoustically divide the larger studio space for use by multiple groups or
classes should be provided (Demirbas & Demirkan, 2000). It should be noted that females may desire intimate settings with friends more so than males, however, females also had a lower tolerance for isolation (Demirbas & Demirkan, 2000). These findings can be generalized to other types of gathering spaces outside of studio spaces.

Creating a sense of community and providing areas where students can work with others in their cohort groups have the potential to support positive place attachment. If students and faculty are able to gather in spaces that support their needs and allow them to share positive experiences, positive connotations with these spaces may be developed. Additionally, the more users feel a sense of community and feel socially comfortable in a space, the more likely they may be to form attachments to the space.

Classrooms & Learning

The classroom environment has an effect on the ability for students to learn. The layout of space, the placement of furniture, and the availability of daylight influence both students and teachers within the classroom. Currently, flexibility is critical in the planning and designing of schools (Brubaker, 1999).

Through the study of two college building layouts, Peatross and Peponis (1995) found that open spaces create an opportunity for interaction and flexibility. Specialized, more specific activities tend to take place in more divided spaces. To successfully design an educational facility, it is important to determine what types of interaction are desirable among students and faculty. Spaces and circulation should be arranged to facilitate this interaction. Subdivided areas should be available for specialized activities, such as studios and team work areas.

The placement of furnishings within a classroom affects the activities that take place within. A study conducted by Amedeo and Dyck (2003) had teachers evaluate desk layouts in terms of how they affected teaching and learning in the classroom environment. The basic rectangular classroom was viewed as traditional and structured, while more complex layouts were viewed as flexible and more student-oriented. Students need to be given adequate personal and work space. Classrooms should be laid out to provide all students with a clear view of visual material.
While furniture placement is important to promote learning, skylights, natural lighting, and the appropriate use of color have proven to enhance student’s learning (Mosher, 2005). Providing windows and natural lighting is important to help students perform at a higher level while also improving mood. Increased learning ability and a more optimistic frame of mind will have users of the space attach a positive meaning to the classroom environment. According to Robinson and Kakela (2006), “Creating a space for fun, interaction, and trust, teachers and students together can build a learning environment that promotes engagement, deep learning, and meaning” (p. 202).

### 2.5 FEATURES

#### Acoustics

It is important to consider the sensory impact of a design on the user. Sometimes overlooked is the user’s sense of hearing as it relates to how the space should function. Including the study of acoustics and how it affects the users of the space.
The following table (Rayfield, 1994) includes recommended NRC and STC ratings for various spaces:

<table>
<thead>
<tr>
<th>TYPE OF OCCUPANCY</th>
<th>NRC Noise Reduction Coefficient</th>
<th>STC Sound Transmission Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjacent Offices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confidential</td>
<td>over .75</td>
<td>52</td>
</tr>
<tr>
<td>Normal</td>
<td>.60-.75</td>
<td>45</td>
</tr>
<tr>
<td>Open Plan Office</td>
<td>over .75</td>
<td></td>
</tr>
<tr>
<td>Mechanical Equipment</td>
<td>over .75</td>
<td>37-60</td>
</tr>
<tr>
<td>Corridors and Lobbies</td>
<td>.60-.75</td>
<td>45</td>
</tr>
<tr>
<td>Washrooms and Toilets</td>
<td>.60-.75</td>
<td>45-52</td>
</tr>
<tr>
<td>Conference Rooms</td>
<td>.60-.75</td>
<td>45-60</td>
</tr>
</tbody>
</table>

NOTES

1. This table lists general conservative recommendations. An acoustical consultant should be involved for highly complex applications.
2. Noise Reduction Coefficient: An arithmetic average of sound absorption coefficients of the four middle frequencies (250, 500, 1000, and 2000 Hz).
3. Sound Transmission Class: A measure of the effectiveness of a partition in reducing airborne sound transmission, not impact noise, low frequency noise sources, or amplified sound. (i.e. related to speech privacy potential.)

Table 2.1. NRC and STC Ratings

In a classroom environment, it is important to provide an environment conducive to learning. Ambient noise (i.e., the noise created by mechanical systems, movement within the space, and noise pollution from the outside) can inhibit hearing intelligible conversation and prevent learning. When designing a classroom environment, non-parallel walls, ceiling, and floor planes decrease reverberation of sound. Choosing sound absorbent materials at floors, ceilings, windows, and walls as well as considering the furnishings within can also reduce ambient noise (Kopec, 2006). Use of a microphone in a large classroom or lecture hall will enhance the voice of the speaker (Rayfield, 1994).

When designing private office space, such as faculty and staff offices, privacy of conversation is important. Often, the visual privacy provided by floor to ceiling walls gives a false impression of acoustic privacy (Herman Miller, 2003). When designing a partition, consider how the noise may move over or through the partition. Doors should be a dense material with a sound gasket around the perimeter. Floors finished with a sound absorptive material will reduce both impact and airborne noises. Ceilings should be constructed of an absorptive material such as acoustical ceiling tile. Consider the mechanical system and plan for sound traps or absorptive lining if needed (Rayfield, 1994).

In open office areas, planning for users to be seated not facing one another can help with acoustic privacy as well as visual privacy. In teaming areas, users must be able to hear each other without raising voices, which would disturb others. Absorptive
floor, ceiling, and partition finishes will reduce distracting noises. Additionally, a sound masking system can be considered to reduce the intelligibility of surrounding speech. (Rayfield, 1994).

Human perceived sound can be measured in A-weighted decibels (DBA). McGowan and Kruse (2004) suggest the typical sound level for a private office is 40 DBA, that of a general office is 60 DBA, and face-to-face conversation is 70 DBA. Sound is absorbed at differing rates as shown in Table 3.

**Table 2.2. Sound Absorbing Coefficients**

The use of absorbent materials and care in planning can improve the sound transmission class of building elements, creating a successful design for the user.

Providing good acoustics in a classroom can lead to positive experiences for the users. Positive experiences can lead users to a sense of belonging in the space. Well planned acoustics in an office lead users to a feeling of satisfaction. These responses are linked to place attachment.

**Storage**

With educational facilities frequently lacking space, storage needs are among the first to be overlooked. Functional classroom storage solutions can be integrated in a variety of ways including, built-in units as well as flexible freestanding furniture pieces. Finding additional space to fulfill storage needs can be accomplished by selecting furniture and other case goods that make the most of the existing square footage (Greischar, n.d.). It is important to specify furniture and casework that is effective and efficient both for its current use as well as long-term use in the space.

Various storage needs exist outside the classroom walls. Space for custodial purposes must be addressed. Ideally, custodial closets would be located on every floor of an educational facility at a rate of one per 25,000 square feet (Princeton University, 2006). This is especially important if
elevator access is limited. To receive maintenance supplies as well as furniture shipments and other large deliveries, a shipping and receiving dock is required. Ideally this is located where delivery trucks can have direct access to easily deliver and unload shipments (Princeton University, 2006).

Faculty and staff require separate storage needs as well. A designated office or functional workstation is important for faculty and staff to have both for organizational and storage purposes but also to develop a sense of ownership and attachment to their workplace surroundings (Revell, 2006). With the long hours and variety of tasks faculty and staff partake in on a daily basis it is necessary to have a place to “nest.” Security should be an important consideration here as well, users to need to be able to know that their belongings and teaching materials will be kept safe and undamaged (Revell, 2006). Instructors also may require additional secure storage for teaching resources such as books, media slides, and electronic equipment and other classroom aides (Australasian Association for Institutional Research, 2005). Security should be an important consideration here as well, users to need to be able to know that their belongings and teaching materials will be kept safe and undamaged (Revell, 2006). Instructors also may require additional secure storage for teaching resources such as books, media slides, and electronic equipment and other classroom aides (Australasian Association for Institutional Research, 2005).

Students need access to storage facilities; this may be in the form of a locker or possibly even a dedicated workspace. Again this secure, designated space will not only serve the functional purpose of storing student belongings and course work, but it will enable students too feel more secure and develop a certain degree of attachment to their educational facilities.

All of these storage issues should be addressed in the planning and design for DHA classroom and administrative facilities. Classroom and storage needs should be addressed based on the specific use of the space. Lecture halls will require minimal storage while studio classrooms that may house student projects and other design resources will require more specialized storage space (Australasian Association for Institutional Research, 2005). Appropriate storage for resources relating to the department’s degree programs must be considered. For example, the interior design program requires space to store design resources and material samples.

Faculty and staff will require designated spaces to work as well store personal belongings. The nature of the design-oriented degree programs housed within DHA translates into many additional learning resources and supplies for both faculty and students. By appropriately addressing the need for storage and personal space, a greater overall sense of attachment and belonging to the place can be developed.
Color

The use of color in educational facilities is an important topic because of the various ways color can influence our behavior from how often we go to class to how we feel when we are there, and how well we can navigate through a building.

Color use in classrooms can reduce the number of absences from school and improve students’ attitudes (Jago, 1999). In classrooms, there are a variety of ways to use color effectively. Generally in secondary educational facilities, cool colors are good choices because they help focus concentration, but any colors can be used in any space, as long as it is done in the right way (Fielding, 2006). A specific suggestion for the use of color is specifying a medium tone color on the teaching wall and specifying neutral colors on the side walls to help reduce eyestrain (Engelbrecht, 2003). In an experiment that tested subjects’ ability to remember photographs, subjects consistently remembered more information about the color photographs than the black and white photographs (Meyers, 2004).

Colors can have real effects on our bodies and minds. For example, using warm colors stimulates the brain and body by momentarily increasing heart rate, blood pressure, and respiratory rate, especially when used in bright light settings. Cool colors, when used in conjunction with dim lighting, have the opposite effect on the body (Kopec, 2006). Using an abundance of color and incorporating complex patterns of color in a single space should be avoided so as to not cause overstimulation for the occupants. Using all white or off-white hues in a single space should also be avoided so as to not cause under stimulation. “White and off-white hues decreases human efficiency by an average of 25%” (Kopec, 2006, p. 192), making it important to use other colors where efficiency is required or imperative.

Wayfinding can be improved through the use of color in hallways and other areas where there are groups of rooms or larger open spaces. People tend to be attracted to color (Fielding, 2006) making it helpful to use color in signage and on wall and floor surfaces that lead to main passageways for occupants unfamiliar with the space. Color can also be used to designate the use or importance of a room (Engelbrecht, 2003). For example, computer labs may be of one color and studios another.

Place attachment could be affected by the colors used in a building. If a color that generally does not have positive associations, gray for example, is used for majority of the finishes, but not for a functional reason, it may cause people to dislike the building or specific places within. This dislike would make an
attachment to that space more difficult, while using a more highly preferred color would make attachment to the space more likely. Choosing the right colors to make everyone like a space is extremely difficult, if not impossible, because emotions related to specific colors depend greatly on one’s own past experiences and personal preferences (Kaya & Epps, 2004).

Fixtures, Furnishings, and Equipment

There are many areas in a University building that have different furniture and equipment needs. Lecture halls, studios, classrooms, computer labs, common areas, offices, and specialty spaces (i.e., DHA’s Textile Lab), all need to be considered. The main concern, however, is for lecture halls and studios, places where students must sit for long periods. These spaces are often what students associate with their college experience, and help to determine their attachment—or lack thereof—to their time in school. Improving students’ experiences with these spaces will improve their learning and also improve their attitudes toward the university.

Many students have problems with school furniture, as it is often “one size fits all” and not ergonomically designed. While this is often driven by budgetary concerns, allowing for adjustability can significantly increase comfort, which leads to better focus and improved learning. Many studies have been conducted on this subject, most of which focus on young children, but the information can still be applied to older students, who face many of the same conditions. Milanese and Grimmer (2004) found that student furniture is often purchased based on the wrong anthropometric measures—namely, the use of stature for the significant measurement, rather than the more descriptive measures of popliteal height and buttock-to-popliteal length—which led to the furniture being ergonomically incorrect for the majority of students. Knight and Noyes (1999) also reached this conclusion, and further found that furniture design can impact students’ on- or off-task behavior and sitting styles. Both of these researchers also found high levels of reported back and neck pain among students, which is likely attributable (at least in part) to the poor ergonomic quality of standard school furniture. The classroom is a student’s workplace, and their comfort and long-term health must be accounted for.

Beyond the physical aspects of furniture, classroom layout can have psychological effects on learning. As discussed by Kopee (2006), classrooms should be sized appropriately for the activity taking place, and the number of students involved.
This facilitates communication between students and teachers, and also creates a less stressful environment for students by reducing crowding. Kopec also notes that different classroom shapes lend themselves to different types of learning, and therefore one type cannot be considered universally effective. Amedeo and Dyck (2003) studied the perceptions of teachers in regards to various classroom types and found that the shape of the classroom can influence how teachers plan learning activities. By providing flexible classrooms, teachers can be free to be innovative in their approach to teaching, which can significantly impact students’ learning experience.

Since sustainability is one of the major tenets of DHA, the furnishings and finishes chosen should reflect that. By practicing what we preach, DHA can further the idea of sustainability in the very people who will be influencing the practice of design, across several different fields. Many manufacturers (i.e., see Steelcase, Haworth, Kimball, Milliken and Interface’s Web sites) have begun to offer sustainable options and to give data on the sustainable features of their products. In a related vein, products and finishes need to be selected for their durability and maintenance requirements. Piotrowski (1999) notes that high traffic and spills are facts of life in a school, and that student safety must also be considered. Furniture in all areas of the building should not be prone to tipping over, and should be able to withstand non-standard use. Finishes should be easily cleaned—or at least hide stains—and should hold up to frequent cleaning as well as constant use. At the same time, however, these items should have aesthetic value, especially in a college focused on design, to ensure that students find the spaces appealing and worthy of care and respect—to foster attachment by creating pleasant associations.

**Lighting**

Various areas need to be considered differently when selecting lighting. The variety of tasks within a college building is very broad, and environments must be tailored to fit them all. The most important tasks being performed happen within the classrooms and studios—the real workplace of the college. Additional areas that must be considered carefully are faculty offices and the common areas that constitute the public face of DHA.

DHA classes are varied, but the most common types are studio-based, computer-based, and lecture-based. Studio classes consist largely of students working on projects at tables or desks.
and require high-quality lighting. Many tasks in this type of class are considered paper tasks for which proper luminance is critical. Luminance ratios between the paper and surrounding surface should be maintained at 1:3. Similarly, the ratio between the paper and adjacent vertical surfaces should be 3:1, and between the paper and further surfaces should be 10:1 (Gordon, 2003). These ratios promote focus and reduce eye fatigue. The Color Rendering Index of the lamps in these rooms should be high, as many studio projects have artistic components.

Computer-based classes generally take place in computer labs, with many workstations in the same room. Computer tasks often require persons to switch back and forth between their screens and a paper document, which makes the luminance ratio issue even more important. A low level of surrounding luminance will increase the time needed for a person’s eyes to adapt as they move back and forth, increasing fatigue and increase the time needed to complete a task (Sheedy, Smith, & Hayes, 2005). Also, since the field of vision when viewing a computer screen includes a larger portion of the room than when viewing a paper task, location and direction of overhead lighting to avoid glare becomes more complex (Gordon, 2003). Care must be taken to reduce glare from both interior and exterior sources, to reduce fatigue and improve concentration. Lecture-based classes take place in an open classroom, and while the general lighting is somewhat less critical, a greater variety of activities must be accommodated. Many lectures include a media component, and lighting must be flexible to allow for projected materials. An additional issue to consider is the general use of computers in studios, which will require lighting design that accommodates several functions in one space.

Like any other workplace, faculty and staff offices must be comfortable and effective places to work. Lighting levels should be variable to allow for different preferences among the users and to allow for use of the offices at all times of day or season. It is just as important for faculty and staff to become attached to their spaces as it is for the students, as their attitudes can be transferred to students in the classroom.

In the common areas, lighting design can be used to even more psychological effect. Since these areas create the public’s impression of DHA, the aesthetics of light should be carefully considered. Brightness should be balanced to lend the spaces unity and legibility (Gordon, 2003). By using light in a non-uniform way and lighting the walls of a space, the appeal of the space is increased (Gordon, 2003). These areas also perform an
important function in wayfinding through the building. Emphasis should be placed on the common traffic paths and important signs or other visual cues to lead people where they need to go. Conference and gathering spaces should be inviting and comfortable, to encourage students and faculty to use DHA facilities when they need to work together and to foster interaction among different groups within the department.

In all areas, the type of light used is important. Both electric and natural light are necessary to create an optimal environment. Fluorescent lighting is easily the most common and cost effective method for lighting larger spaces, but can lead to flicker, which is uncomfortable to users even when the flicker is visually undetectable (Kuller & Laike, 1998). Computer screens and fluorescent lights also emit ultra-violet light, which can be harmful to the eyes over time and should therefore be filtered or strategically placed to minimize exposure (Kitchel, 2000). Natural light has positive psychological effects, specifically that of relaxing a building occupant by expressing the natural world outside. Natural light also has the benefit of adding luminance to a space without adding luminaries and their equivalent wiring and electrical needs. By taking advantage of natural ambient light, energy costs can be reduced and occupant well-being can be improved, but care must also be taken to allow for light control and glare reduction. Energy efficiency of electric lighting is becoming more and more critical, as energy costs increase and legislation restricting energy use becomes more prevalent (Rewi, 2006). DHA’s drive for sustainability is another reason for selecting luminaires and lighting methods that are easier on the Earth, not to mention easier on the budget.

2.6 SUMMARY

The purpose of this literature review was to provide a better understanding of the information pertinent to this project. As discussed in section 2.1, place attachment will serve as the basic theoretical concept that will guide problem solving and design throughout the remainder of the project. Place attachment will play a significant role in how smooth the transition from DHA’s current home, on the St. Paul campus, to their new home, on the East Bank, will be. Helping students, faculty, and staff create an attachment to their new location will involve heavy consideration of how this space will support emotions and feelings, create positive experiences, and achieve satisfaction.
In relation to place attachment, the designers should also consider the issues, spaces, and features of the new environment and how these aspects can support place attachment for the occupants. Important issues to consider include preserving the historical qualities of the space; employing sustainable design practices; incorporating universal design principles; ensuring the health, safety and welfare of the occupants; designing environments that are easy to navigate; addressing issues of personal space; adhering to all applicable building codes; creating a stimulating studio environment; and establishing an identity for DHA within the new College of Design. This project will involve designing classroom and learning environments, exhibits and displays for student work, and meeting and social spaces. Features of the environment that will also need to be considered