

Suchi Mohanty. Physical Comfort in Library Study Environments: Observations in Three Undergraduate Settings. A Master's paper for the M.S. in L.S. degree. April, 2002. 50 Pages. Advisor: David Carr

This paper discusses the elements that contribute to student comfort in library study areas. These factors, which include lighting, color, acoustics, and furniture, were generated from a search of library and architectural literature. The criteria were then applied to three undergraduate libraries, Clemons Library at University of Virginia, Johnson Center Library at George Mason University, and Lilly Library at Duke Library. The case studies include descriptions of the physical appearance of the spaces based on the generated criteria, as well as suggestions for improvements that may be made. Photographs and floor plans are included to illustrate visual elements of the spaces.

Headings:

Architecture and building -- Color, decoration, etc.

Architecture and building -- Programming and planning

College and university libraries

Furniture

PHYSICAL COMFORT IN LIBRARY STUDY ENVIRONMENTS:
OBSERVATIONS IN THREE UNDERGRADUATE SETTINGS

By
Suchi Mohanty

A Master's paper submitted to the faculty
of the School of Information and Library Science
of the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements
for the degree of Master of Science in
Library Science.

Chapel Hill, North Carolina

April, 2002

Approved by:

Advisor

TABLE OF CONTENTS

Introduction.....	1
Literature Review.....	4
General Planning Literature.....	4
Subject Specific Literature.....	5
Lighting.....	5
Color.....	6
Acoustics.....	7
Furniture Selection and Placement.....	8
Methodology.....	12
Case Studies.....	17
Clemons Library, University of Virginia.....	17
Johnson Center Library, George Mason University.....	25
Lilly Library, Duke University.....	32
Observations and Conclusions.....	39
Appendix A.....	42
Appendix B.....	43
Appendix C.....	44
Appendix D.....	45
Bibliography.....	46

Introduction

The university library has long been viewed as the center of academic life on campus, but the library environment has evolved dramatically in recent years. Gone are the quiet halls of academia, and in are printers, scanners, group projects, and online research. Libraries provide a variety a computing and research assistance and are indispensable to the campus community. However, many libraries have found their prestige falling along with their gate counts in recent years. What can account for the fall in building use? A top contributor is the increase in resources that can be remotely accessed, along with the explosion of attractive places where students can study. Students can search the catalog from home, reserves are available online and there are fewer restrictions on accessing proprietary databases outside the library. For the students seeking an easy fix, the World Wide Web is only a click away (Carlson 1).

In contrast to the “online” student is the student who views the library as a study hall. These are not students who are primarily using library resources while they are in the library; rather, they are students who may bring their own laptops and homework to the library seeking a pleasant environment to study in. These students tend to be loyal to the library, becoming “regulars” over time. Despite this presumed loyalty, many users are seeking more welcoming environments. One only needs to wander into the local coffee shop, café, or bookstore to see the number of students reading over class notes. Consider the local coffee shop – a student can eat, drink, read, and talk without fear of being “shushed.”

In contrast, libraries are misperceived by students as being storehouses of books, irrelevant scholars, and useless librarians. Libraries can no longer rely on goodwill to win back patrons; they must actively market themselves as welcoming places that can serve many student needs. Undergraduate libraries are in a unique position to assist students because they are, in essence, designed to acclimate students to the greater library culture on campus. Not only can undergraduate libraries introduce students to library resources, but they can also offer students an environment where they can work without fear of disturbing the “serious” scholar.

Specifically, it is the premise of this inquiry that librarians and administrators must make libraries more comfortable for students. While some libraries can add coffee bars and bands without an uproar, most are hard-pressed to find funding for such trendy improvements. What librarians can do is understand the essential elements under their control – lighting, sound, space, and furniture – that factor into human comfort, and consider them when planning or redesigning study places for students. Designing spaces that are physically and psychologically comfortable is essential to attracting repeat users to the library (Bennett 51). In addition, administrators should attempt to anticipate educational trends that could impact the manner in which the library is used. Many libraries are not properly wired for Internet use, yet many schools require freshmen to purchase laptop computers. There has also been a push towards problem-based learning and group work. Libraries may wish to add larger tables or study rooms to accommodate these users (Focke 116).

While the solutions offered in the literature are thought provoking, many of them are unrealistic for existing libraries. Unless funds are available for renovating the space,

only small improvements can be made. However, with careful study of the user population, libraries can modify the existing state of their facilities to become a more welcoming environment. Altering the color, lighting, and layout of the library are possible methods of improving a library space. This inquiry will explore these changes.

These preliminary questions have guided my review of the literature and the case study exploration described on the following pages:

1. What are the factors that make a library space comfortable?
2. How can we encourage students to use the library?

There are many factors that contribute to a welcoming atmosphere in a library, such as staff attitudes toward students, ease of access to necessary resources, and attractiveness of the environment. While issues related to staff attitudes, library instruction, and access are important, they are massive topics with a wide body of existing literature. I chose to concentrate on the level of comfort afforded by various physical environments. By providing an environment where students feel comfortable studying, librarians may be able to overcome stereotypes and help students become better researchers. The level of comfort in the library may impact student perceptions of the library, and their willingness to view the library as more than a quiet place to study.

This paper will discuss the components of comfortable study spaces and how they are applied in different libraries. By examining different libraries with varying missions, we can understand how the elements of a study space interact to form a welcoming environment for students. The objective of this exploration is to determine if libraries are successful in the context of their own mission and projected environment.

Literature Review

General Planning Literature

There has been a multitude of literature published on the planning and design on new and renovated libraries in the past 30 years. Many works have focused on the entire process while others have focused on a particular aspect of design. These sources contain information covering lighting, color, acoustics, and furniture selection.

While architects and interior designers are responsible for the design of library space, it is important that participating librarians provide input and suggestions because they are more qualified to state how the library will be used than decorating professionals. To this end, librarians must be educated as to the decorating options available to them and important factors to consider. In *Interior Design for Libraries* (1979), James Draper and James Brooks offer practical advice for relating to basic design principles and their application to library interiors. Some of their decoration suggestions may be dated, but they can be adapted to current styles and trends. Aaron and Elaine Cohen fuse the practical needs of the library with the aesthetic tendencies of architects and interior designers in *Designing and Space Planning for Libraries: A Behavioral Guide* (1979). They also address user preferences and typical practices in their discussion of furniture selection and placement. Richard J. Bazillion and Connie L. Braun also examine user needs in their book *Academic Libraries as High-Tech Gateways: A Guide to Design and Space Decisions* (2001). They examine such issues as lighting to reduce glare on computer screens, furniture selection, and leisure-reading

areas. They also discuss issues relating to the integration of technology in study areas and integrating the new or renovated library into campus culture.

Subject Specific Literature

Lighting

Lighting is an important part of library ambiance, but one of the most difficult to control. Cost concerns must be considered, as well as practical versus aesthetic needs. In fact, “lighting may be one of the most important subjective factors determining ‘warmth’ and ‘atmosphere’ in a library” (Murphy 56). The quality of lighting can affect motivation, emotion, and even physical health. Seasonal affective disorder is currently treated with light therapy; one may conjecture that proper lighting in libraries can enhance learning and motivation. Full-spectrum lighting can even impact melatonin levels in the human body, affecting a person’s energy level (Benya 14).

A classic text on lighting is Keyes D. Metcalf’s *Library Lighting* (1970). His study includes information collected from architects, engineers, interior designers, and physicians. He also includes a list of questions that may be asked by librarians; while useful, the answers are often too technical for the average reader to understand. For example, measurements are given in terms of footcandles – a measure of light intensity – a concept that may not be understood by many. Instead of concentrating on the technical aspects of lighting, I will focus on the aesthetics of lighting, and user’s needs and perceptions of lighting in libraries. Cohen and Cohen discuss the need for “lighting for events.” They encourage lighting designers to consider the activities that will occur in each area of the building and to develop lighting designs based on that. For example,

stacks need simple lighting on the center of the shelves while decorative light fixtures are possible in hallways where there is not a specified need for lighting. Study areas should avoid dramatic lighting; an even lighting pattern is best to minimize glare, which may distract some readers (132). Bazillion and Braun also recommend that windows be treated and fluorescent lights be filtered to reduce the possibility of glare against computer screens (44). Indeed, one of the most pressing concerns currently facing lighting designers is the minimization of glare (Benya 14).

Color

Like lighting, color affects the way people perceive a space and influences their emotions. In studies conducted to examine color and mood, several correlations have been found:

- Blue – lowers blood pressure, improves concentration, increases learning comprehension
- Red – influences people to eat more and stay longer in a location
- Yellow – draws attention, symbolizes a nonpermanent state
- Green – increases comfort, security, reduces stress
- Grey – symbolizes success, encourages success
- Black – implies dignity, power
- White – represents purity, goodness, formality (Crocker 15)

Blue and green are ideal for library study spaces because libraries are, by nature, learning environments where comfort, concentration, and the reduction of stress are essential.

Light colors make a space appear larger, therefore they are best for small rooms; dark

colors can make a large room more inviting and comfortable. It is best to minimize the number of colors used in one room; for example, using two different colors of paint on different walls in a room decreases the sense of size and can create an uncomfortable environment. Color should also be chosen according to the purpose of the room – vibrant yellows and blues are appropriate for a children’s area, but not for a study area in an academic library (Draper and Brooks 42-44). Cohen and Cohen recommend that wall and carpeting colors remain neutral while using bright furnishings and drapes to add color to the environment (196). Similarly, Philip M. Bennett recommends using warm colors in localized areas, such as reading lounges and carrels, but using cool colors in surrounding spaces. This has the effect of stimulating thought, but not distracting the user (in Bazillion and Braun 115).

Acoustics

Libraries no longer follow the stereotype of providing a quiet haven for booklovers; today’s libraries are collaborative centers of student activity and research. Libraries host a variety of activities such as database searching, academic counseling, and group and individual studying. Because the library is evolving into a center for social activity, the level of noise is also increasing. Denelle and John Wrightson identify three sources of unwanted noise:

1. *Intrusive noise from another space or activity.* This is defined as “sounds that are not wanted in a space,” such as talking, heating or air conditioning noises, rest rooms, etc.

2. *Overly reverberant spaces.* They are “characterized by a preponderance of acoustically ‘hard’ sound-reflective surfaces such as tile and stone floors, windows, and gypsum board ceilings.” These tend to be large, open spaces, often with high ceilings.
3. *Lack of speech privacy.* This is most commonly associated with open floor plans in staff areas, but is also applicable to study areas. For example, if study rooms are not available to students they will study in open areas, possibly disturbing others. (349-350)

There are several simple solutions to lessening acoustical problems. Separating “loud” and “quiet” activity areas is one solution to reducing noise pollution (352). Others recommend using acoustical tile on ceilings and carpeting on floors to absorb a percentage of noise (Wrightson and Wrightson 352, Cohen and Cohen 219). In situations where a choice must be made, Cohen and Cohen state that because “carpet absorbs up to 10 times more noise than most other flooring” it should be installed first (219).

Furniture Selection and Placement

Furniture is one of the most costly expenditures for a new or renovated library and is expected to last for years. Therefore, ample consideration must be given to the quality and construction of each individual piece as well as its aesthetic value. Carol Brown has written two excellent books devoted to the selection of library furniture, *Selecting Library Furniture: A Guide for Librarians, Designers, and Architects* (1989) and *Planning Library Interiors: The Selection of Furnishings for the 21st Century* (1995). While the majority of her discussion focuses on technical requirements and the

construction of quality furnishings, she briefly mentions the aesthetic and comfort aspects of library furniture. In *Selecting Library Furniture*, Brown emphasizes the need to project who will use the furniture, as well as how it will be used. She also recommends evaluating if the furniture can be adapted for other purposes in the future. She advises that in selecting furniture, classic, simple designs are most prudent, with a decorative element to pick up an architectural element of the library interior. In *Planning Library Interiors*, Brown pays special attention to ADA compliance and elements of furniture construction.

Cohen and Cohen provide an excellent analysis of behavioral factors involved in furniture selection and placement. People are comfortable with a certain amount of personal space around them, and this is no different in a library. Students do not like to sit close to each other unless they know each other. It is a common sight to see two students working at a table that seats four. ACRL's "Standards for College Libraries, 1995 Edition, Draft" recommends that seating for 20% of the population be provided when less than 50% of the fulltime equivalent (FTE) resides on campus. It is recommended that seating for 25% of the population be provided when over 50% of the FTEs reside on campus (261). However, the "Standards" do not advise on the type of seating to be offered and their recommendations must be tailored to each individual campus community. To maximize patrons' comfort, Cohen and Cohen encourage a variety of seating including tables, carrels, and lounge seating, depending on the library's purpose (24). Circular tables are more appropriate for group study because there is a greater sense of equality, while rectangular tables are appropriate for individual study because one can comfortably claim a certain amount of space (23). Carrels are an

alternative for library users seeking privacy. They offer a degree of territoriality not offered by tables and provide the isolation needed by some researchers (25). Libraries are a major access point for web-based resources on campus, and students expect flawless connectivity to the Internet. Many students prefer to bring their own laptops to the library, so it is necessary to provide carrels and tables equipped with electrical and Internet wiring (Bazillion and Braun 77). Most furniture manufacturers now offer wire-management systems built into their study units in order to avoid trailing electrical and cable wires that can be kicked loose from floor connections (124). Libraries anticipating an increase in laptop use may wish to invest in carrels with a larger work surface; units averaging 42 inches wide by 30 inches deep provide enough space for a laptop and other material a student may need (134).

Once appropriate furniture has been selected for the library, the task of arranging it remains. This task is usually claimed by the architect or interior designer, but librarians are in an ideal position to advise on students' needs and habits. Librarians at the Ciletti Memorial Library at Pennsylvania State University at Schuylkill observed student use of the library before selecting furnishings for their new facility, completed in 1994. They found that the majority of students using the old library were engaged in individual study, and that although ample seating was provided at large tables, students did not like to share that space. Groups would also make use of the tables creating a loud environment. Librarians decided to isolate group study areas in the new library while maximizing seating geared to individual study. They placed 12 group study rooms seating up to four people around the perimeter of the building; with few exceptions, the remainder of the seating was in the form of individual carrels, also placed along the perimeter of the

building. Several small tables and lounge chairs were arranged on the first floor (85-86). The most popular seating was the round tables on the first floor and the study rooms; the most often used carrels were those placed by windows (92). Michael Organ and Margie Jantti also noticed a higher occupation rate at seating bordering windows (211).

Methodology

As an undergraduate student I attended a small liberal arts school, Mary Washington College. I also worked at the campus library, a building housing approximately 300,000 volumes, which served approximately 3,500 students and 180 faculty. As a library worker and a student I was in a unique position to understand what it was that made the library an attractive place to spend time in. At that time, there were not many full-text resources online, so students had to visit the library to conduct research. The library had approximately twenty public use computers offering Internet connections, so it was also a convenient place to check email. Despite this transient use of the library, I noticed that there was a large population that always studied in the library. Group study rooms, carrels, and lounge areas were consistently occupied by students reading, studying, and researching. When I came to SILS I found that my interest still lay with undergraduates and their use of the library. Through my own experience and by examining the professional literature of the field, I found that while students increasingly rely on the Internet for their research needs, they still turn to the library as a study environment.

I followed a linear process when conducting the research for this project. I began by studying the scholarly literature of art, architecture, and library science, specifically searching *Art Index*, *Avery Index to Architectural Periodicals*, and *Library Literature*. I used the following search terms:

Architecture and building -- Color, decoration, etc.

Architecture and building -- Programming and planning

College and university libraries

Furniture – Selection

Lighting

I also relied on the excellent bibliographies provided in the general planning literature for pertinent resources. The purpose for examining the literature was in order to generate a list of desired qualities in an undergraduate library, but also to learn about general planning and design processes.

The case study approach to my examination of the libraries was an appropriate choice for several reasons. Foremost, it was a complex study, including both objective and subjective elements. While certain factors, such as color schemes and quantity of seating, were quantifiable, others, such as lighting and furniture mix were not. To gain an accurate picture of each space, it was necessary for me to visit and record my own observations about each library. For example, a survey would be an inadequate form of information gathering because it would not be able to account for the subjective nature of the study.

When choosing which libraries I would visit, I consciously decided to visit only undergraduate libraries and to evaluate them independently of the other campus facilities. I selected them based on recommendations from coworkers and my own knowledge. I selected Clemons Library at University of Virginia, Johnson Center Library at George Mason University, and Lilly Library at Duke University to examine. Although I wanted to observe how students used the study spaces I would be examining, I chose to visit these campuses during their spring breaks so I would not disrupt as many students as I

would at a busy part of the semester. I requested and received written permission to photograph the libraries from the head of each library. See Appendix A for the letter that was sent to each library director.

When I arrived at each library I began by observing the study spaces and evaluating them with the guidelines I had generated from the literature, listed below. The guidelines were useful because they helped me measure the same elements in each library while ensuring a greater degree of uniformity, but also allowed me the flexibility to highlight particularly interesting features. They also served as a method of gaining an overarching view of the space's features, allowing me to understand how the elements functioned together. After recording my observations, I photographed interesting aspects of the facility. I focused on the following features as guidelines when evaluating the spaces:

Seating/Furniture Mix

- Number of study rooms
- Number of individual carrels
- Number of open tables
 - Circular
 - Square/rectangular
- Seating placed by windows
- Upholstered furniture
- Lounge seating – couches, lounge chairs
- Mix of tables, carrels, and lounge seating in each area

Acoustics

- Noisy areas (conference rooms, stacks) isolated from study areas
- Buffer zone between noisy areas
- Building materials to absorb noise (carpet, drapes, acoustical ceiling tiles)

Color

- Wall color
- Carpet color
- Neutral and bright mix

Lighting

- Upper walls and ceiling lit (creates a light, inviting feeling)
- Task lighting/lamps at desks and carrels

After recording my observations, I photographed interesting architectural and design aspects of each study area. The photographs illustrate features of the study spaces that will be of interest to the reader in understanding the success or shortcomings of a given space. Because the visits were conducted during each university's spring break I was able to avoid including students in my photographs.

With the notes based on the criteria generated and the photographs taken at each site, I was able to balance each element of the interior to evaluate the space as a whole. The notes from my observations served as a reminder of my first impressions of the

environment, and allowed me to compare my subjective opinion of the space with concrete factors that I had evaluated. In my final evaluation of the libraries, I chose not to compare to each other for several reasons. Each library has a different mission, and carries out its mission differently. I did not feel that it was appropriate to compare such varied libraries. Instead, I treated each library individually, without reference to other campus structures or the other libraries studied.

Case Studies

Clemons Library, University of Virginia

Clemons Library combines the traditional elements of a library – reading, learning, and creating – with modern technology. The library includes a basic reference collection, a circulating collection of resources supporting the undergraduate curriculum and the McIntire School of Commerce, and a computer lab. The library also houses the Robertson Media Center (RMC), a space where students can digitize audio and visual materials and watch videos for class. The library has an unusual layout – one enters the building on the fourth floor rather than the first. Therefore I will refer to the ground floor as the fourth floor, the RMC as the third floor, and the second and first floors together. Because the third floor of the building is entirely devoted to the RMC, it was not included in my examination of the building.

The entrance to the library hints at the inviting nature of the fourth floor. Although this is a large space, it has a warm feel. One enters through a tiled foyer and is met by the combined circulation-reference desk. Artificial light is set within the ceiling and provides enough light for reading, writing, and other tasks. In addition to the ceiling lights, two walls of the floor are lined with wide windows, creating a light, cheerful environment. These windows provide a stimulating study environment; not only do they let in light, but they also allow students to look out and escape their immediate surroundings. As the literature recommends, several tables and lounge areas are set adjacent to the windowed walls. The result is a cozy study area.



*Photograph 1: Clemons Library, reading lounge on the fourth floor
Note that this lounge is set by the windows, offering an attractive view of the surrounding landscape.*

The color scheme of the floor is fairly neutral. The carpeting is a blend of muted maroon and green tones, offset by the cream and brick walls. Teal paint is used to highlight certain features of the room such as the browsing literature collection and the copy machine area. The shelving suits the room, matching the brick walls with its maroon and black coloring. The majority of the furniture is wooden, which complements almost every environment. The only variation is the lounge seating, which is upholstered in a blue and green pattern. The combination of blues and greens on this floor is a wise choice. Blue is often associated with increased learning comprehension, while green decreases stress and implies a secure environment.

Unfortunately, the ground floor is not arranged to reduce sound distribution. The entranceway is tiled so footsteps can be heard in the information commons. While the rest of the library makes use of carpeting and acoustical ceiling tiles to reduce

reverberation, the layout of the floor does not prevent further disruption. In essence, the room is a large square with no partitions or divisions to block sound from the study area. Adjacent to study space is an information commons, several copying machines, microform readers, an ATM, and the computer lab, complete with printers and scanners. Noisy functions are grouped together, but they are not physically separate from the study space. Students seeking a quieter environment may wish to move to the first or second floors.

Approximately half of the fourth floor is devoted to study furniture, consisting mainly of rectangular wooden tables. There are approximately 30 rectangular tables, seating four each, arranged through the center of the room. There are only two circular tables provided in the room. Although studies show that rectangular tables encourage solitary study and circular tables are best for group study, one may infer that the rectangular tables were used for group study because they were the only choice available. Several of these tables are also lined against a windowed wall, providing some variety for students.

The fourth floor offers three areas of lounge seating, all placed by windows providing comfortable reading nooks. Two are arranged in square patterns, encouraging group discussion, while one area simply lines chairs against a windowed wall for the solitary reader. These seats are separated by placing a low table between each chair. While there are several seating options for students to take advantage of, the overall effect of the room is one of monotony and congestion. All the tables are placed in the middle of the room, with no variety in their arrangement or composition. The area may be improved by interspersing more circular and rectangular tables, and moving some of

the lounge seating into the center of the room and adding more tables along the windowed walls.

The first and second floors of the library are the primary study spaces of the library, and because they are identical in layout and design I will treat them together. Both floors house sections of the general collection, but shelving occupies a small percentage of the room. The stated purpose of both floors is to provide a study space for students, but the first floor is explicitly designated a quiet study area. Both floors have a “no cell phone” policy.

Like the fourth floor of the library, the first and second floors include large windows for natural lighting and variety. Although both walls are lined with windows, the atmosphere seems darker. The ceiling lighting is appropriate for the room, but does not appear to compensate for the lack of natural light on a cloudy day or at night. Adjustable lamps are often used in situations where extra lighting may be necessary, but none of the carrels or tables provided the lighting recommended by Cohen and Cohen (134).

The colors appearing in various aspects of the room are well chosen for the most part; they are muted tones of maroon, blue, and green. The carpet is a blend of blue and green, while the shelving is the same as that on the fourth floor. The majority of the wall color is cream with bricked highlights at part of the building. The most dramatic deviation from this conservative color scheme is the placement of a bright orange wall near the elevator. This color is not close to the actual study area, but is jarring when viewed in the context of the rest of the room. One may speculate that the orange wall was included because orange and blue are the school colors of University of Virginia, but

the color could have been incorporated in a variety of less flashy ways – for example, adding a hint of orange to the upholstery of the lounge seating, or printing signs with an orange background.

Although the size and composition of the room lend themselves to poor acoustics, the room was appropriately quiet. The first and second floors are both carpeted, reducing the amount of sound footsteps would create; acoustical ceiling tiles are also used to reduce noise. The room design also contributes to the success of the room. The elevator is located at the farthest most area from the study area and the noise from the stairwell is blocked by a heavy set of doors. Both floors include a small area of shelving for the collection, but the ranges are placed in one corner of the room, reducing their proximity to the rest of the room. Placing the stacks in one corner of the room also minimizes the visual distraction to students studying nearby.

The majority of both floors provide study space, mainly consisting of rectangular tables, individual carrels, and lounge areas. The tables are the same rectangular tables appearing in the fourth floor, placed in two long rows. There are no circular tables provided. The individual carrels are mainly placed adjacent to the tables, along one of the walls with windows, and several tables and carrels are placed near the stacks. The lounges consist of individual chairs and low tables; no couches are provided for those wishing to stretch out. The following is a breakdown of the furniture composition:

Second Floor:

47 rectangular tables

221 carrels

20 lounge chairs

First Floor:

45 rectangular tables

245 carrels

32 lounge chairs

See Appendix B for a floor plan of the first and second floor.

For the most part, the different styles of seating were not integrated together.

With the exception of the small area adjacent to the stacks, the tables are arranged in one area, carrels are in one area, and lounges are set apart. While there are advantages to this arrangement, the lack of variety may be uncomfortable for some students. Those using the tables are exposed to passing students and are not offered any privacy for their studies.



*Photograph 2: Clemons Library, tables in the first floor study area
There is no variety or novelty to the arrangement of the tables in the open area of the first and second floors.*

Those seeking more privacy may wish to use the individual carrels. However, they do not give students a complete sense of solitude. The carrels are arranged in

clusters of between four and twelve and placed close to each other. They are also built with short walls, so a standing student may be able to see into a neighbor's carrel. The composition of the carrels coupled with the congestion of the area could lead to a claustrophobic feeling when the carrel area was heavily occupied.



*Photograph 3: Clemons Library, carrels in the first floor study area
These large carrel units seat a large number of students. While they offer partitions between workspaces, students are still in close proximity to each other.*

The furniture provided is comfortable and welcoming, but its arrangement could be improved. Integrating the table and carrel area may alleviate some of the concerns associated with the current arrangement. Students wishing to study at tables but seeking privacy would be shielded by the surrounding carrels, and the density of the carrels would be lessened to create a more open feeling. The three lounge areas on each floor are spaced throughout the room, but never integrated into the rest of the study space. The most attractive arrangement is the lounge placed at the corner of the two windowed walls.

This area is spacious and well lit, creating a comfortable location for students to read.

Carrels and tables are also placed along the windows providing some variety in the room.



*Photograph 4: Clemons Library, lounge area on the first floor study area
Located near a row of windows, this lounge offers students plenty of space for
studying. The seats are separated by low tables, allowing students personal space.*

While the lounges located along the windows were well maintained, the lounges along secluded walls were not as inviting. From the haphazard arrangement of the chairs it is evident that students have arranged them for their own comfort and that library staff have not rearranged them. In one situation, it was difficult to even use the chairs because they were arranged to form a closed square. Library staff might avoid the constant moving of furniture by creating smaller nooks within each lounge area.

At this point, the issue of group study rooms has not been discussed. Unfortunately, Clemons Library is lacking in useable study rooms. Of the five study rooms available, only two were suitable for group study. Two rooms contain broken and unusable furniture, and one room contains equipment for handicapped users. The rooms

are generally small, barely accommodating four users. I was disappointed by the lack of study rooms because the literature has proven that study rooms are popular study spaces among students and because they are effective in reducing noise open areas. Overall, Clemons Library has positive and negative elements. It offers the resources necessary for students to work independently or in groups, but with a several changes it would be a more useful study space. Among the highest priorities for modification are the integration of seating styles and restoration of study rooms.

Johnson Center Library, George Mason Library

The Johnson Center Library was built to facilitate collaborative learning, to provide study space accommodating different learning styles, and to accommodate emerging technology. In May 1990, the University Life Taskforce adopted a proposal for a learning center including the following: “In the University Center students and faculty will be able to read, do research, collaborate, and socialize in one unified space” (Hurt 87-88). The University has remained loyal to this premise; the library is set in the middle of a busy student union. The building currently houses a food court, bookstore, bank, travel agency, movie theater, Admissions Office, and other student and administrative offices. The Johnson Center is a complex structure – it has three levels, five entrances, a spiral staircase, and a variety of areas for student use. The Library itself is divided into two sections – a “controlled” space housing reserves, reference, multimedia, periodicals, and service desks for reference and circulation, and the “open” library consisting of the stacks and study space (Hurt 95). Although the library’s staff maintains the stacks, the study areas are not directly controlled by the library so they will not be the focus of this

examination. However, the library must be examined in the context of the whole building to clearly understand its role in students' study habits. See Appendix C for a diagram of the Johnson Center.

The first floor of the library proper houses the circulation desk, media resources, periodical collection, reserves, computers for online searching, and study areas. The second floor houses the reference desk, reference collection, information commons, and study areas. Because the floors are similar in layout, lighting, and color, I will discuss them together.

The library is lucky to function with an abundance of natural lighting from the large windows and skylights included in the original design of the building. Evenly spaced ceiling lights complement the natural lighting and compensate for the lack of sunlight on a cloudy day. Unfortunately, the reading nooks, study tables, and most carrels are not equipped with individual lighting. The only carrels providing individual lights are those with "roofs" – these are the carrels providing almost total privacy and are designed to reduce the amount of glare on a student's laptop screen. Despite the lack of task lighting, the library is well lit and provides for the needs of students. The rest of the Johnson Center is ringed with clerestory windows, skylights, and large picture windows. Most of the study space provided outside the library proper is in these well-lit alcoves, eliminating the need for extra lighting during the day. However, individual lamps would be a useful addition to the ceiling lights.



*Photograph 5: Johnson Center Library, study alcove on the second floor
The large windows and variety in furnishings are notable features of this alcove in the reference area of the library.*

The color scheme of the controlled library is neutral, with bright colors used as accents in furniture and decorating. The carpeting is a muted blue with flecks of grey and yellow. The walls are painted a light shade of blue, whose intensity varies depending on the amount of sunlight in the area; in some areas it even appears white. The yellow flecks in the carpeting are accented by the yellow paint used to highlight certain areas of the library, such as the periodicals collection. The chairs are all upholstered in shades of blue and grey, matching the carpeting in the library, but most of the lounge chairs and couches are upholstered in red or brown. Although the lounge chairs do not match the rest of the library's color scheme, the use of red is effective because the intensity is dispersed in small units. To paint an entire wall or have all the furniture covered in red fabric would be overwhelming, but in small concentrations the concept is manageable. The shelving is all black metal, a wise choice minimizing conflict with other decorative features.

Although the building is not intended to be a quiet area, the designers have taken measures to reduce noise in the controlled library. Ceiling tiles and carpeting are used on both the first and second floor, and activities that would generate noise are relegated to side rooms. For example, the copying machines are placed in a room near the periodicals section, while the audio-visual materials are grouped in another section of the library, both on the first floor. This leaves the second floor for quieter activities. However, the purpose of the Johnson Center is not to provide quiet study space, just study space. There are approximately 30 closed study rooms, but the majority of the seating is exposed to the noisier activities of the building. Students can hear the chatter from the food court, student activity offices, and other activities all over the building. The high ceilings in the building do not deter the flow of sound. A small alcove across from the reference desk is a favorite area for group study because of the large tables and couches, but its high ceiling and windows cause noise to reverberate so strongly it is distracting to those working in the reference area.



*Photograph 6: Johnson Center, open seating area on the second floor
This seating is adjacent to the building's atrium. Note the large open spaces – students are exposed to the noise of the busy floor below.*

Despite this, I would not make any recommendations on reducing noise in this environment because it is meant to be a collaborative, active place for students to gather. To impose rules minimizing discussion or to further divide study spaces would go against the stated mission statement of the Johnson Center to provide a space “free of artificial space constraints” (Hurt 95). The campus’s research library is also located nearby for those seeking quieter surroundings.

When designing the Johnson Center, librarians wished to provide students with seating that would suit a variety of learning styles. Students prefer couches, carrels, tables, and lounge chairs depending on the activity they are engaging in and the Johnson Center meets their needs. The same furniture is used on both levels of the library and both floors are consistently used by students (Hirvonen). The following is a breakdown of the seating provided in the library:

First Floor:

18 rectangular tables

38 carrels

39 lounge chairs

1 couch

Second Floor:

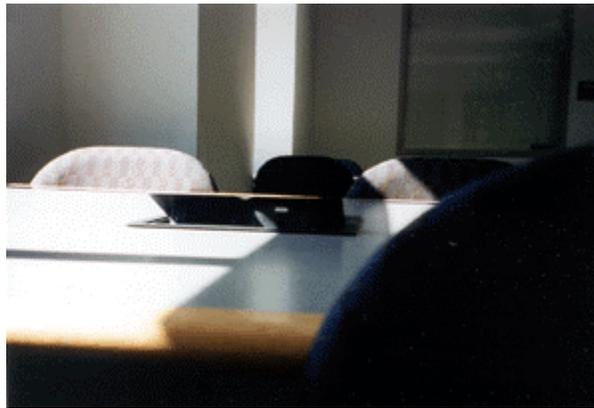
11 rectangular tables

85 carrels

7 lounge chairs

1 couch

The strength of the furnishings is their accommodation of emerging technology. The rectangular tables seat four students each and are paired with upholstered chairs to maximize student comfort. The tables also integrate Internet and electrical connections for students bringing their laptops to the library. These ports can often be folded into the tabletop when students do not need them. Tables such as these are now standard for many furniture vendors and are a wise investment for universities requiring incoming students to purchase their own laptop computers.



*Photograph 7: Johnson Center Library, integrated data/electric port
These data ports fold into the table when they are not needed, allowing students flexibility when working.*

The carrels are a mix of traditional and innovative details. They provide high walls to ensure student privacy, but are wide enough to accommodate a laptop computer and study materials as Bazillion and Braun recommend (72). Many of these carrels also provide electrical and Internet ports like those at the open tables. One of the most interesting design choices is the inclusion of “roofs” for several sets of carrels. These

carrels have extra high walls, ensuring almost total privacy. They also provide a light to compensate for the shade caused by the top. These carrels are specially designed to accommodate those using laptops – the roofs actually reduce glare from the overhead lights. They are a thoughtful selection and popular among students.



*Photograph 8: Johnson Center Library, covered carrels on the second floor
These carrels are a playful alternative to tables and traditional carrels.*

While the bulk of lounge seating is located outside the library, there are several areas found within the library. The majority of lounge furniture is found on the first floor, adjacent to a wall completely lined with windows, providing a warm, sunny, quiet place for students to read. The seating in the rest of the building compensates for whatever is lacking in the controlled library; more couches, lounge chairs, and circular tables are provided in various sections of the building. Both inside and outside the library proper, furniture is mixed together – tables, carrels, and lounges seating are mixed in the same area, ensuring that students can choose from a variety of study options. They can study at a table by the windows, carrels in the middle of the room, or couches in an

alcove. Because of the open nature of the building, students also have the option of taking library materials to the café. The Johnson Center and Johnson Center Library excel at providing a stimulating environment that responds to the diverse needs of all students.



*Photograph 9: Johnson Center, study alcove on the second floor
There is an abundance of natural lighting from the picture windows and a variety of seating options, making this alcove an attractive reading nook.*

Lilly Library, Duke University

Built in 1927, Lilly Library first served as the library for the Women's College of Duke University. Today the library primarily serves the undergraduate students living on the University's East Campus, collecting in the fields of philosophy, fine, and performing arts. Lilly also houses the library's film collection (*History of Lilly Library*). The library has a simple layout – there are two study rooms on the first floor, and one large study room on the second floor. There are no individual study rooms, and although there is a small study area in the basement of the building, the majority of the seating is on the first and second floors. I will concentrate on those areas.

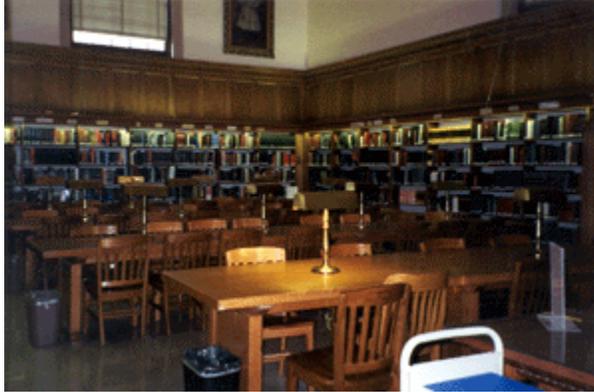
The Reference Reading Room is decorated in a classical, conservative manner. While it is very beautiful, it is a mixture of positive and negative elements. The nature of the lighting and the color selection contribute heavily to the atmosphere of the room. This room has a tendency towards darkness due to the decorative features of the room. It has a high ceiling, which allows for the use of large windows around the perimeter of the room. Windows could be a wonderful source of sunlight for the dark room but most of them were fitted with blinds that were closed when I visited. Three chandeliers are placed down the length of the room, providing some compensation for the lack of sunlight.

One of the strongest points of the room is the provision of table lamps on all of the reading tables. There are four lamps per each table seating 16. These lamps are useful for students engaging in long-term study in the reference room; they contribute to the comfort of the room by allowing students to modify it for their needs. In a room of this size and design, colors must be selected that will lend intimacy to the room, but retain the dignity of the space. The lower sections of the walls are lined with wooden bookshelves; several portraits and windows decorate the upper walls, but they are otherwise unadorned. They have been painted a cream color to balance the heaviness of the lower section. The ceiling is also painted cream to maintain the simplicity of the room.

The reference room was not constructed to minimize acoustical disturbances. The tile floor and high ceilings contribute to the reflective surface areas of the room, producing a higher noise level than desired. There are very few absorptive materials incorporated into the room. One rug is placed under several tables in the center of the

room; books are the major absorptive material in the room. Several studies have shown that books are successful at reducing noise in an enclosed area, but they are not successful as the sole source of sound insulation. The location of the room reduces the introduction noise from other library. The room is located near the lobby, but a short hallway and set of heavy doors isolate it from the noisiest areas.

The furniture in the reference reading room is fairly simple; the room only provides tables and upholstered chairs for student use. There are no carrels or lounge seating in this area of the building. The room contains six rectangular tables seating 16 people each, holding four lamps. There are also two tables seating eight students, with two lamps. While it seems that this may be an adequate amount of seating, the chairs were placed close to each other at every table. Because students seldom sit next to strangers, the room may often sit fewer students than its capacity (Cohen and Cohen 25). The tables in this room were also fairly narrow; combined with the cramped seating and lack of comfortable workspace, one may guess that this area is not used by students engaging in long-term study. The Periodicals Reading Room, located on the opposite side of the building, is similar in design and layout to the reference reading room. The periodical reading room also provides carrels and equipment for students using the library's video collection. The remaining half of the room is furnished with tables and chairs identical to the type used in the reference room.



*Photograph 10: Lilly Library, Reference Reading Room on the first floor
Note the similarity of the tables, walls lined with bookshelves, and high ceilings.*

The Thomas Room is a designated quiet study space, meaning that the use of cell phones, laptops, and other noisy devices is advised against (*History of Lilly Library*). This gorgeous, lushly decorated room may remind many of the way a library should look. Decorated with Chinese antiques, portraits, and plush furniture, this is a place that inspires serious thought and study. See Appendix D for a diagram of the Thomas Room.

The outside wall of the rectangular room is lined with five windows spanning the height of the room, producing a sunny, pleasing environment. Drapes and blinds filter out excessive light and shield readers from unwanted glare. Three chandeliers light the room, providing more light for readers, but also diffusing light over the ceiling and upper walls creating a warmer feeling. Individual lighting is also provided at most study stations. Each table in the room holds three lamps and movable lamps are also located near each set of lounge seating. This room is well designed to suit the varied needs of students by allowing them some degree of customization in their study area.

The main elements of this room are colored in neutral tones, with color provided in the form of furniture, drapery, artwork, and carpeting. The tile floor is the same cream color as in the reference room, while the walls and ceiling are a darker taupe. These pale colors are an appropriate backdrop for the vivid colors found in the decorations. The drapes are a bright shade of red, contrasting with the jade green couches and lounge furniture. Three oriental rugs are placed under the long tables. The center rug is navy with muted purple and white designs, while the outer two rugs are brighter shades of red, blue, green, and black. Several tapestries hanging in the room echo the red of the draperies. Color is used well in this room; the pairing of the neutral backdrop with colorful accents is a textbook example of incorporating vivid colors into an academic environment.



*Photograph 11: Lilly Library, Thomas Room on the second floor
The classical furnishings, such as chandeliers, Oriental carpets, and dark wooden furniture, establish this room's character.*

Although located on the second floor away from the stacks area, this room is only semi-isolated from unwanted noise. Both landings adjacent to the entrances to the room

are exposed to the lobby and reference area on the first floor. When the doors to the Thomas room are left open, sound travels into the room easily. Echo does not seem to be an excessive problem until one walks over the uncarpeted areas of the room. Aside from adding more sound absorptive materials such as carpeting, there is no simple solution to the problem. Library administrators do contribute to the quiet atmosphere by posting small signs reminding students that the room is a quiet zone.

The variety of furniture in this room is one of the most welcoming aspects of the space. While retaining the symmetry of the room, tables, couches, and lounge chairs are arranged to offer students a range of seating choices:

- 3 rectangular tables

- 2 couches

- 4 lounge chairs, with footstools

- 1 desk

The dark, wooden tables are arranged as the focal points of the room. They each seat twelve, a number that may be over optimistic considering the size of the tables. As discussed earlier, students do not like to sit near strangers, especially in such close quarters. The couches are sized to seat three students, but this is only likely when all three users are working together. The couches are a comfortable alternative allowing students to relax while spreading out some of their belongings. The most attractive seating option may be the lounge chairs and footstools placed around the room. The chairs swivel and allow the reader to recline slightly. Partnered with a footstool and adjustable lamp, these alcoves allow students to study in a serious environment, but comfortably. The furniture is arranged symmetrically through the room allowing

students some variety in selecting an appropriate study space, but there are certain restrictions on their freedom. For example, students wishing to read in a lounge chair may select one near the window or one away from the window, but students wishing to study at the table must sit in the center of the room. While this may be uncomfortable for some students, the general ambiance and beauty of the room make up for seating difficulties. While Lilly Library lacks in modern amenities such as data ports and mass seating, it makes up for in elegance and atmosphere. The age and construction of the building do not lend themselves to easy redesign, so smaller changes must be made to make study spaces more student-friendly.



Photograph 12: Lilly Library, detail of Thomas Room

<http://www.lib.duke.edu/lilly/cstthosrm.htm>

The Thomas Room is filled with fine ornamental features such as the carved cabinet, decorative screen, and portraits.

Observations and Conclusions

Through the course of my research I have come to several findings:

- Lighting is one of the most influential factors an individual's perception of comfort in a space. Libraries must be well lit to ensure the physical well being of students, but also to contribute to a warm, comfortable environment. Allowing students some control over lighting by providing desk lamps at tables and desks is also necessary to guarantee that proper lighting is available for those engaged in study. The Johnson Center Library, in its carrels, and Lilly Library, in the Thomas Room, have made successful attempts at providing individualized lighting for students. By increasing the amount of task lighting, these spaces may become more consistent with students' needs.
- Color functions similarly to lighting – students' reactions to color can strongly impact their perceptions of a room. The size and purpose of the room must be considered when selecting a color scheme – certain colors enlarge spaces and manipulate emotions. Academic libraries must be colored to stimulate thinking while providing a calming atmosphere. Lilly Library is successful at highlighting neutral colors with bright accents and architectural details. While these environments must attract and inspire students, they are not the place to include

school colors for the sake of energizing students if they do not match the rest of the decor.

- Unwanted noise can stem from a number of sources and can be minimized in many situations. Physically separating loud activities from quiet areas, installing carpeting and acoustic ceiling tiles, and providing study rooms are common ways of reducing unwanted sound. The designers of the ground floor of Clemons Library made some attempt to minimize noise – they grouped ATMs, copying machines, and the information commons in one area, but there is no physical division between that area and the study space. The Johnson Center Library is slightly more successful, placing copy machines in a separate room.
- Furniture and furniture placement can impact seating patterns. Students prefer seating near windows because they are sunny and provide stimulation. Because students have differing study needs, it is sensible to provide an assortment of seating options, such as tables, carrels, and lounge seating. Lilly Library provides few carrels, concentrating instead on open tables and lounge seating. However, the designers of the Johnson Center Library felt so strongly about the furniture mix of their library that specific guidelines were included in planning statements. They provide not only an abundance of different styles of seating, but also integrate seating for variety and comfort.

In an ideal situation, all of these elements would converge perfectly to create a model study environment. However, few libraries are in a financial or political position to completely redesign their libraries. There is no correct solution to this problem; we can only consider the physical factors of the space and the purpose of the room, and exploit its strengths. For example, if a room has large windows, more seating should be placed near them. If quiet study space is lacking in the library, it may be appropriate to designate one area as a quiet zone. Utilizing existing resources is the key to creating positive changes on small budgets.

Assessing study spaces with the criteria outlined here allows libraries to modify their spaces to best serve their students. Clemons Library at University of Virginia has large, open study spaces, but isolates most of the furnishings. Mixing carrels and tables together would provide a more interesting space for students to use. The Johnson Center Library at George Mason University can be a loud environment, but compensates for that by offering a variety of seating choices. Lilly Library at Duke University is lacking in large spaces that can accommodate mass seating, so they compensate by providing a quiet space rich with “old-world library atmosphere” (Carlson 6). By using these criteria to assist in the evaluation of a space, libraries can produce spaces meeting the needs and desires of students.

Dear **[Head of Library]**,

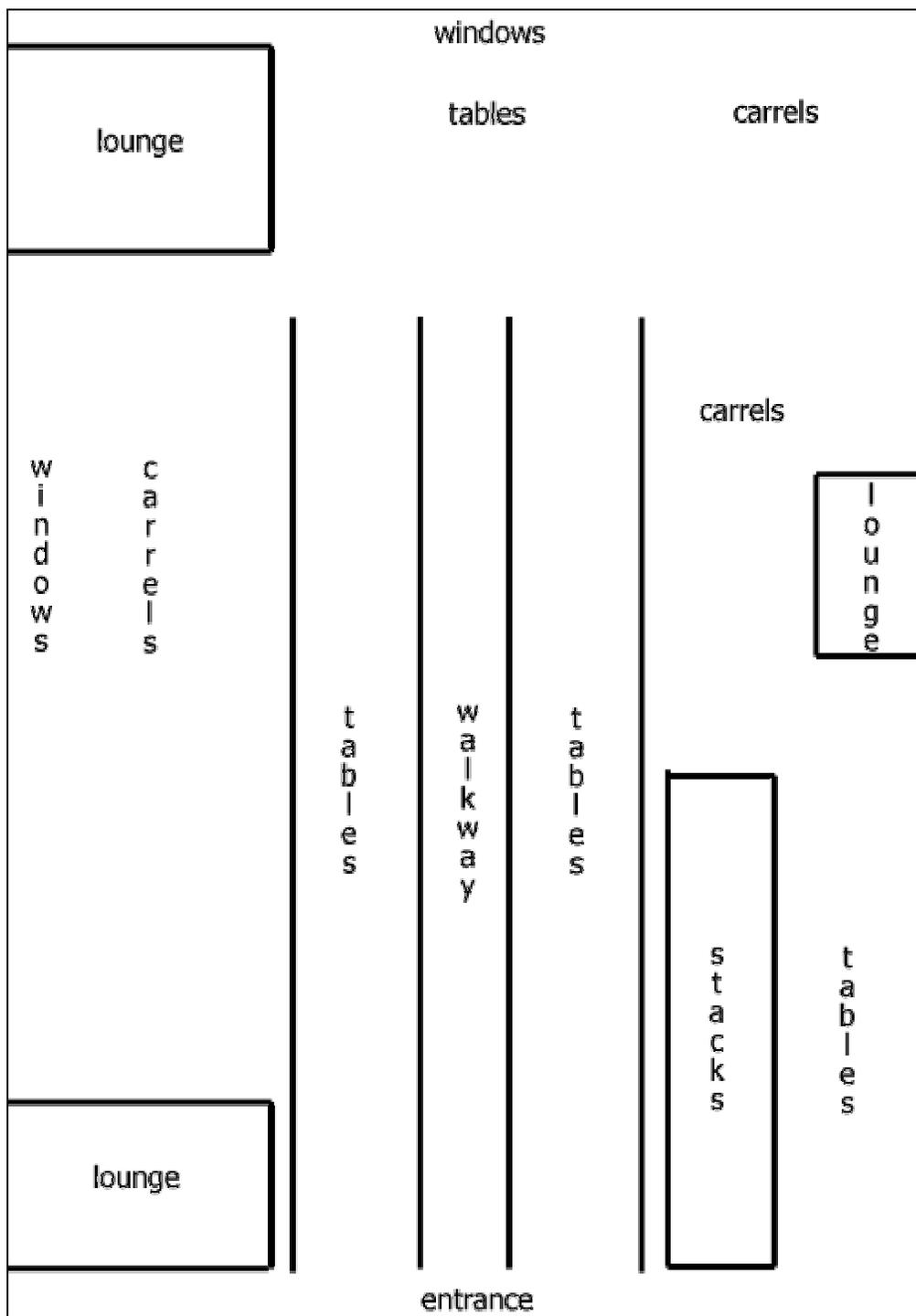
My name is Suchi Mohanty and I am a graduate student in the School of Information and Library Science at the University of North Carolina at Chapel Hill. I am currently working on my Master's paper, in which I am examining learning spaces in undergraduate libraries.

I am interested in visiting **[Name]** Library on **[date]**. I would like to observe the physical aspects of the library in my visit. I am also seeking permission to photograph certain aspects of the public spaces, such as furniture arrangement, density, and color schemes. I will attempt to photograph these spaces without intruding upon students; however, if they are present I will seek their permission for the photograph. I must stress that this documentation will only be used in the context of this paper – I have no plans for any formal public presentation.

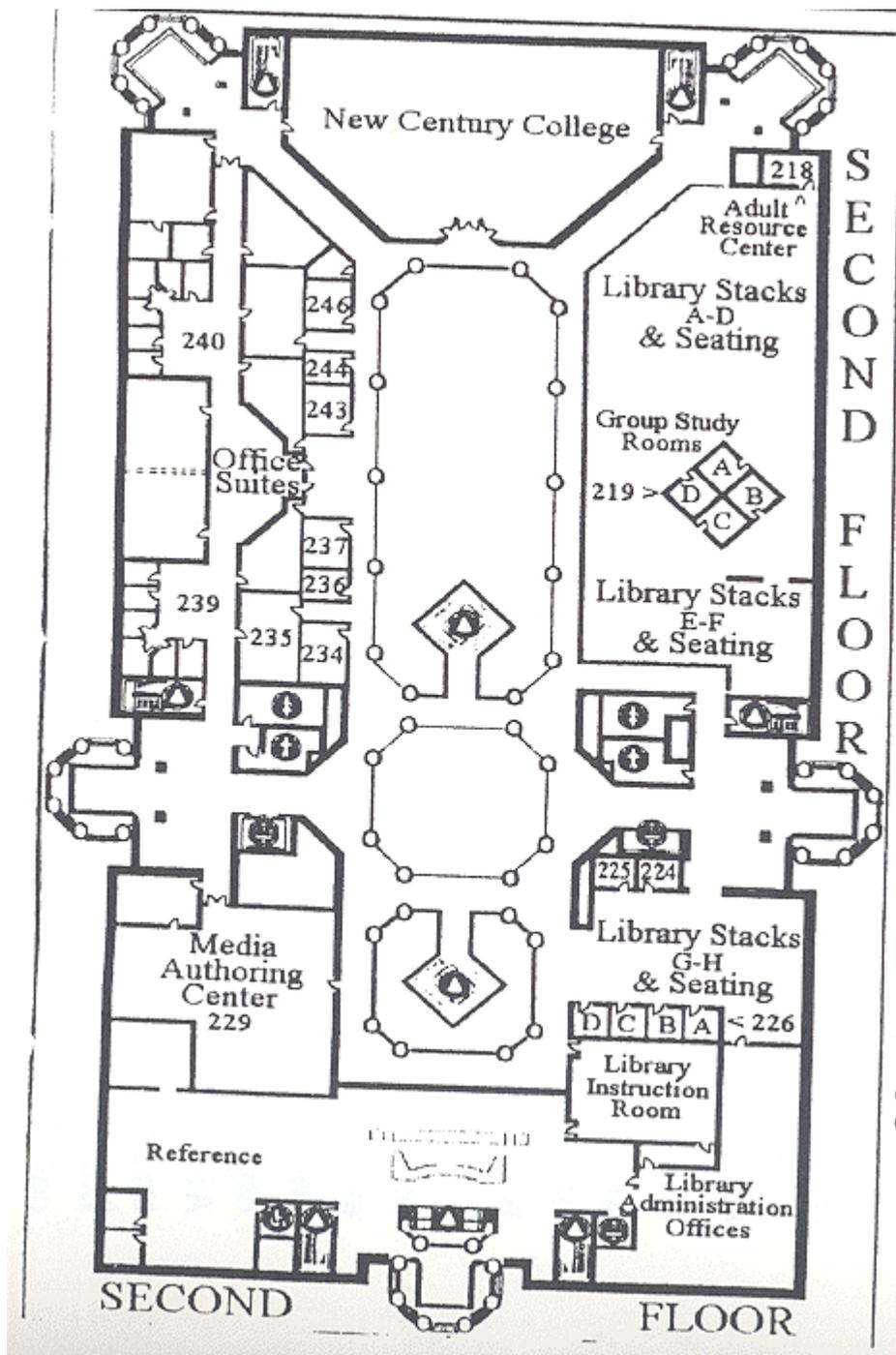
If you have any questions or concerns please feel free to contact me. My email address is smohanty@email.unc.edu.

Thank you for your time,
Suchi Mohanty

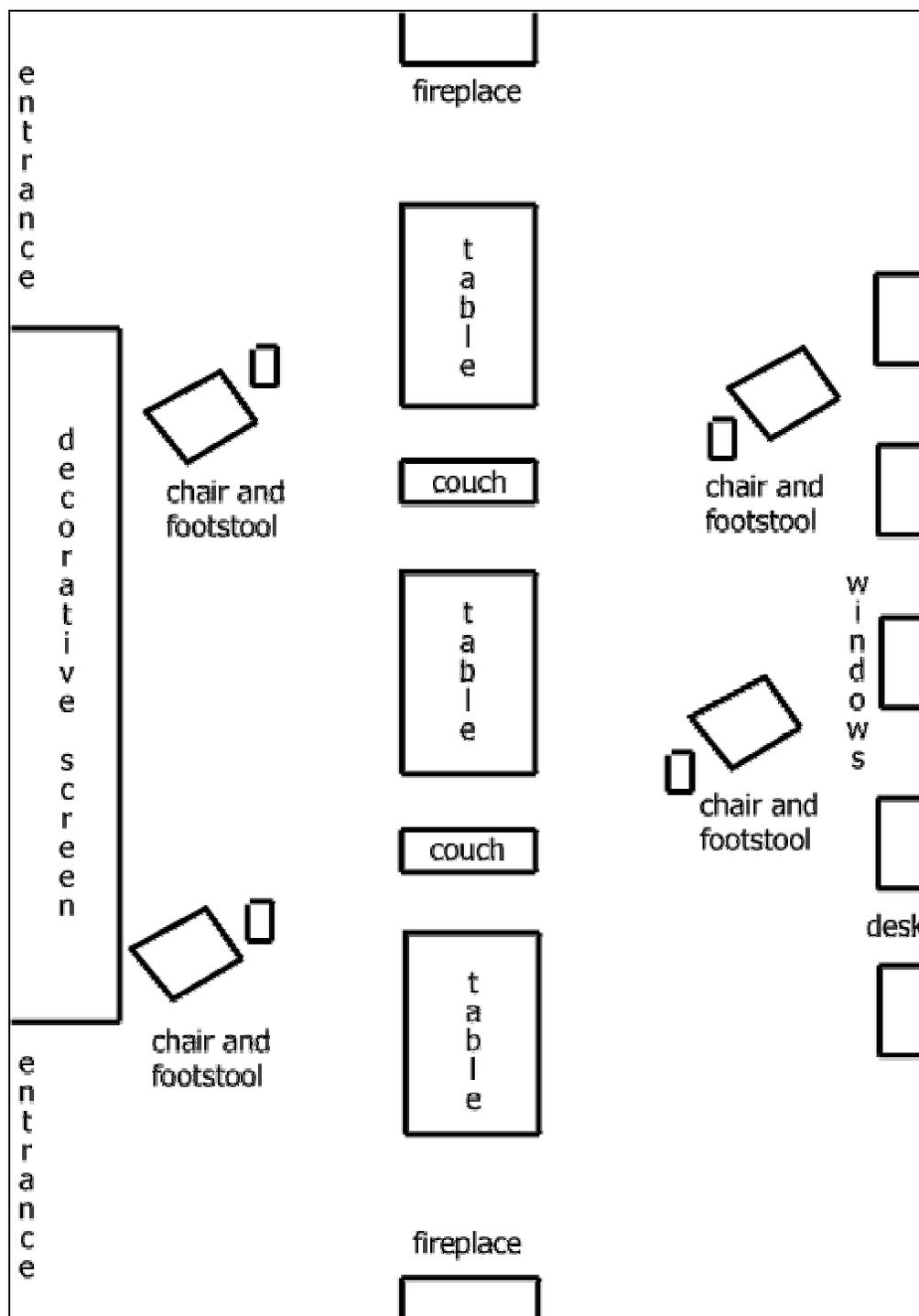
Appendix A: Letter of permission sent to library directors.



Appendix B: Floor plan and furniture arrangement on the first and second floors of Clemons Library, University of Virginia.



Appendix C: Floor plan of second floor of the Johnson Center, George Mason University. (Hurt 93)



Appendix D: Floor plan and furniture arrangement of the Thomas Room in Lilly Library, Duke University.

Bibliography

- Bazillion, Richard J., and Connie L. Braun. *Academic Libraries as High-Tech Gateways: A Guide to Design and Space Decisions*. Chicago: American Library Association, 2001.
- Bennett, Philip M. "Users Come First in Design: Physiological, Psychological and Sociological Factors." *Wilson Library Bulletin* 74 (March-April 1978): 51-58.
- Benya, James R. "Light and the Human Animal." *Architectural Record Lighting* 183.5 (May 1995): 14-15.
- Brown, Carol R. *Selecting Library Furniture: A Guide for Librarians, Designers, and Architects*. Phoenix, AZ: Oryx Press, 1989.
- . *Planning Library Interiors: The Selection of Furnishings for the 21st Century*. Phoenix, AZ: Oryx Press, 1995.
- Carlson, Scott. "As Students Work Online, Reading Rooms Empty Out – Leading Some Campuses to Add Starbucks." *The Chronicle of Higher Education* 48.12 (November 2001). 12 November 2001
<<http://chronicle.com/free/v48/i12/12a03501.htm>>.
- Crocker, Jane L. "Color in Libraries." *New Jersey Libraries* 23 (Spring 1990): 12-17.
- Cohen, Aaron, and Elaine Cohen. *Designing and Space Planning for Libraries: A Behavioral Guide*. New York: R. R. Bowker Co., 1979.
- Draper, James, and James Brooks. *Interior Design for Libraries*. Chicago: American Library Association, 1979.
- Focke, John W. "The New American Library: Technological, Educational and Social Changes are Redefining Traditional Roles." *Texas Library Journal* 73.3 (Fall 1997): 114-117.
- Hirvonen, Amy. Personal interview. 4 March 2002.
- Hurt, Charlene. "The Johnson Center Library at George Mason University." *Building Libraries for the 21st Century: The Shape of Information*. Ed. Terry Webb. Jefferson, NC: McFarland, 2000.

History of Lilly Library. 15 Sept. 2000. Lilly Library, Duke University. 30 March 2002
<<http://www.lib.duke.edu/lilly/lilhistory.htm>>.

Loder, Michael W. "Seating Patterns and Improvements in a Small College Library: A Case Study." *College and Undergraduate Libraries* 7.2 (2000): 83-94.

Metcalf, Keyes D. *Library Lighting*. Washington, D. C.: The Association of Research Libraries, 1970.

Murphy, Peter. "Making Libraries More People Friendly: Lighting for a Computerized World." *The Journal of Academic Librarianship* 22.1 (January 1996): 56-57.

Organ, Michael, and Margie Jantti. "Academic Library Seating: A Survey of Usage with Implications for Space Utilisation." *Australian Academic and Research Libraries* 28 (September 1997): 205-216.

"Standards for College Libraries, 1995 Edition, Draft." *College and Research Libraries News* 55.5 (May 1994): 261-272.

Wrightson, Denelle, and John M. Wrightson. "Acoustical Considerations in Planning and Design of Library Facilities." *Library Hi Tech* 17.1 (1999): 349-357.