IN THE KNOWLEDGE COMMONS:

UTILIZING USER EXPERIENCE TO INFORM FUTURE DESIGN

A Thesis in

Architecture

by

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ABSTRACT

The Knowledge Commons is an informal learning space in the central library of a large land-grant university. The space was designed after the widespread implementation of wireless Internet access and mobile digital technology. Its goal is to attract students from various disciplines of study for both collaborative and independent forms of learning in a technology-rich environment. This thesis investigates the experiences of people using The Knowledge Commons to inform the future design of spaces with similar goals. Aesthetics and technical aspects of the space will only be considered as they directly relate to user experience and interaction. After researching the experience of users, the space was found to be popular with a diverse group of users. Factors such as sound and table surface space were reoccurring themes that were expressed as both benefits and detriments. In addition, the needs of service teams could have been more fully addressed if all members had been part of the planning throughout the design process. By fostering a clearly communicated mission and addressing the needs of both students and service teams, the experiences of those using similar spaces can be greatly enhanced.
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Chapter 1

Introduction

This study focused on the Knowledge Commons, an informal collaborative workspace for students within the central library of a large land-grant university. The goal of the space is to attract students from various disciplines of study for both collaborative and independent forms of learning in a technology-rich space, essentially to meet student needs for technology and services. The introduction provides a brief overview of the need for The Knowledge Commons, followed by a description of the case study space, the different characteristics as well as services provided, and an explanation of this study.

Overview

Universities throughout the United States, both public and private, invest a great deal of effort and financial expense in the design, production, and upkeep of learning-oriented spaces on campuses. The nature of learning space now extends beyond the traditional classroom as pedagogical shifts have led to movement away from a teacher-centric model to modes of collaborative learning. With these changes, another significant change is the proliferation of technology used to assist in modes of learning (Brown & Long, 2006).

One academic facility strongly affected by these changes is the college campus library. Before widespread use of the Internet, the primary function of the library was as a place to house a large amount of printed information. The main architectural consideration was to provide space to access physical documents as well as places for people to read the stored material. Today, major shifts are occurring in thinking about the function of the library. The library not only serves
as a provider of physical print information, but also as an environment oriented toward collaboration with other students and an outlet to further explore internet-based information (Oblinger, 2006). Considering these and related changes in activity, it is important to consider how spaces must adapt in order to provide an environment that cultivates student needs as these relate to their life in an age of rapid technological change. One such space has been given many names, but in this text is referred to as a commons. Loosely defined, these spaces are typically technology-rich and aim to provide spaces for collaboration as well as independent study. Here the case study space was located within the central library of a large land-grant university.

This research focused on The Knowledge Commons, a renovated wing located within the university main library. The space is open to all campus students and encourages both collaborative and independent study. In addition, the space contains library-provided technology as well as intentional design provision to encourage user-provided technology. This space was renovated in 2011 in an existing library building and follows part of university’s strategic plan to “Establish knowledge commons at all campus library locations.” The design emphasis is on being “welcoming and comfortable and to have more technology-rich resources.” The mission statement continues: “everything must be fast, easy, and convenient.” Students can collaborate on: “research projects, digitize audio, videotape personal practice sessions, chat with friends, get help from a tutor, and have a snack, all in a 24-hour, one-stop destination” (Knowledge Commons at University Park, 2012).
The Knowledge Commons

Figure 1-1 is a floor plan of the Knowledge Commons, the space on which this study focused. The view looks into the bottom half of the space dedicated to informal study:

Figure 1-1. Floor Plan of The Knowledge Commons
The four primary categories of space that serve the general needs of students within The spaces include: breakout rooms, central tables, lounge spaces and quick access desks.

Figure 1-2. Image of Breakout Room

Figure 1-3. Image of Quick Access Desks

Figure 1-4. Image of Central Tables

Figure 1-5. Image of Lounge Space
Key Services

A variety of key services are offered in the Knowledge Commons. For this study, the technical aspects of each job were considered as they directly related to user experience and interaction. Figure 1-6 illustrates the location of key services within the space. Each service provider has a designated colored shirt and signage which help students to become more easily familiar with the different services. The services include “the Green Team”, officially known as I-Tech Support Services, which is responsible for assistance with personal hardware, which includes assistance with “on-campus wireless connectivity, virus/spyware detection, software installation, file transfer protocols, PASS & UDrive” (I-Tech Support, 2013). The “Blue Team” is officially known as ITS Lab Consultants, which is responsible for the desktop computers within the space as well as maintenance and upkeep of the printers. The “Purple Team”, officially known as the Tech Tutors, have a satellite consulting space within the Knowledge Commons; their self-described role is to provide:


Figure 1-6 depicts the location of each service.
Figure 1-6. Map Of Services Provided Within the Space

- Responsible For Help With Personal Hardware
- Responsible For Help With Knowledge Commons Hardware
- Responsible For Help With Personal Software
Purpose of the Study

With the notion of a “Knowledge Commons” constantly evolving with the changing needs of students, as well as the provision of several services within the space, it is important to understand how the experiences of people using The Knowledge Commons can inform the future design of spaces with similar goals. This study was designed to gain insights into the experiences of both student and staff users to obtain a clearer sense of how the space itself is working as an environment to meet those goals. The study used ethnographic tools to acquire an understanding of the complex space as a social object. Tools used in this research included: survey, time study, observation and interview. The primary research question was: how can understanding user experience inform future design of spaces similar to The Knowledge Commons?
Chapter 2

Review of Literature

This chapter has three sections: Human-centered Design, Trends in Learning Spaces, and Using Ethnographic Principles to Understand User Experience. The first section relates to people-centered design. This section seeks to assert the importance of design as a tool in gaining an understanding of how the building could affect personal behavior and experience. Extant literature was important to further consider factors such as sound, personal space, and other elements that can help inform fundamental contributors to user experience. The second section delved into reported trends from the point-of-view of educators, planners and students. Titled “Trends in Learning Space”, this section considers how space should be designed from the point-of-view of those investing in and using the space. The final section, “Using Ethnographic Principles to Understand User Experience”, focuses on the development of study methods in order to thoughtfully interpret user experience when in the field. In these sections, the need to rethink the spaces that house technology-rich resources as well as collaborative spaces.
Human-centered Design

According to Lawson in *The Language of Space* (2001 p.4), buildings can be viewed “as works of art, technical achievements, as the wallpaper of urban space and as a behavioral and cultural phenomena” The aim of this research was to view The Commons through the lens of social object. Personal and interpersonal factors such as stimulation, security, identity, and proxemics were factors that influenced whether people would find the space to be a comfortable and productive environment. In addition, sound, time, and ability to use technology within the space also were important factors in design success. This research focused on the people who use the space and their day-to-day experiences within it. As Lawson stated:

. . . space, and consequently that which encloses it, are much more central to all of us in our everyday lives than purely technical, aesthetic or even semiotic interpretation would suggest (p. 6).

Two of the most important social forces are privacy and community. Other forces at work include ritual, display, and surveillance. Through these lenses emerge the first and primary category of study: People and Space. In this study, both the functional needs of people using the space together as well as their own reflection on their experiences be valuable.

We need to be able to reach furniture, equipment and other facilities to perform some tasks. At a rather higher level, we need space to help us feel right about our current situation (p. 15).
Feeling right about a current situation is difficult to quantify; however, both the personal relationship with a physical environment and individual and personal feelings about the space were a focus of this study.

**Personal Space**

The needs identified with personal space as described by Arndey and reiterated by Lawson (2001) are stimulation, security, and identity. The text argues each can be satisfied by the careful design of the environment:

**Stimulation:** in a good environment stimulation is balanced. Too little stimulation of the senses can be “very painful psychologically” while over-stimulation can have equally displeasing effects. Attaining a sensitive balance varies from person to person as well as the desired level of focus required for the task underway. As it relates to The Knowledge Commons, people go into the space with different goals. Depending on the goal, the level of stimulation in the environment will differ. Which environments within the commons are more conducive for providing an acceptable level of stimulation for the various tasks performed?

**Security:** In the Language of Space by Bryan Lawson, the author argues that we enter certain spaces with a set of preconceived social norms. These expectations provide us with a sense of security. This study looked into The Knowledge Commons, a space that because it is new, may hold ambiguous social expectations. Some may feel the space should encourage talking while others may believe it should be quiet. Even though the space is within an existing library, since the function and explicit expectations differ, it is a new model. This raises several related questions: what are the expected social norms;
do some expect a quiet environment while others expect a loud collaborative environment and if they are variable when this does present a problem?

**Identity:** The ability for expression of identity within an inhabited space is an important factor in the well-being of a space that is inhabited for longer periods of time. However, how does this happen in a space that is so temporal? Identity may not apply directly in this case as a means of expression as it would in a personal home but may reflect specific needs. Each person enters the space with a specific ambition; does The Commons provide enough flexibility to meet the needs of each group?

**Proxemics:** “Both distance and actual arrangement in space come together in what is known as ‘Proxemics’. The way we arrange ourselves in space has much to do with this relationship, whether in the short term or over longer periods.” (Lawson, p.133) As this quote relates to non-formal learning spaces, people arrange themselves based on their relationships. These could include: Consorting Role, Confronting Role, and a Co Existing Role. All three of these relationships have been found within the Commons. However, each did not have the same prevalence in each space category. In gaining an understanding of relationships as indicated in seating, one can begin to understand how the collective users wish to use the space versus how the space was designed.

**Multi-Sensory Design**

In *The Eyes of the Skin*, Pallasmaa (2008) asserted the need for multi-sensory consideration in architectural design. “Ocular-centric” privileging of vision in western culture has led to sensual hierarchy in the way architects consider buildings. This privileging of vision has resulted in “a suppression of other sensory realms” (Pallasmaa, Summary). While speaking universally toward building spaces, this outlook could
pertain to a complex learning lab in which students need spaces that benefit from specific acoustic environments for both independent learning and collaboration. The realm of sound is described as “Acoustic Intimacy”, where each building has an acoustic identity as a result of the architect’s design. Often the architect gives this consideration little priority in contrast to the visual environment. Pallasmaa (2008) urged multi-sensory design, looking deeply into the rarely spoken architectural impact of the senses beyond what is seen.

In a lecture titled *Why architects need to use their ears*, Treasure (2012) asserted the need for greater acoustic consideration by architects. His argument was not just about the sheer annoyance of loud spaces but that the acoustic environment can affect our “health, social behavior and productivity”, which suffer in poorly considered spaces. Treasure keys two spaces as being particularly important when considering sound: learning spaces and hospitals. Understanding the acoustic environment in learning spaces is often under-considered. Contemporary open plans can lead to major sources of noise, while even the traditional classroom falls short of being an adequate acoustic environment.

Like the above-mentioned sources, an earlier and more general discussion may be found in *Experiencing Architecture*, by Rasmussen (1962, p. 225-237). In the chapter titled, “Hearing Architecture”, Rasmussen discussed how people generally do not consider the “reverberate expression” created by the shapes and materials of a design. Just as a room can be considered “warm” or “cool” by color choice, so can these feelings be amplified by the acoustic conditions of the room through the reverberation of material as well as shapes created. While not explicitly measured in this study, being aware of the
emotive qualities of room shapes and surfaces are important acoustic design
considerations when people need specific acoustic conditions for collaborative and
independent learning. Each surface must be thoughtfully considered as a visual element
as well as a portion of the acoustic envelope.

Trends in Learning Spaces

In chapter 9 of Brown and Long’s *Learning Spaces* (2006), titled “Trends in
Learning Space Design”, the authors affirm the need for design based on collaborative
learning in the context of technology. Brown and Long listed several trends that are and
could potentially further affect the design of learning spaces. Trend 2 is that of “Human-
centered design” which notes the trend toward spaces called “commons”; these spaces are
“increasing emphasis on users and the range of services learners require” (Oblinger, p.
9.4). Specified is the shift in The Commons’ emphasis from just a space for
collaboration, to an area that focuses on serving a multitude of uses, such as solitary
study, and the provision of many services such as English as second language training.
The chapter offers information on trends that indicate shifts from students confined to a
computer in a solitary environment, where talking and food were discouraged, to a setting
in which integrated support and collaboration are at the heart of the function.

Some of the additional noted changes that should take place include a “social
work setting” rather than individual workstations, and “integrated support” rather than
single-support delivery. In addition the space should include many white boards and
allow for talking—it should be a place where “no talking” rules would not apply.
<table>
<thead>
<tr>
<th>Previously</th>
<th>Currently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Downloaded</td>
<td>Information created, integrated</td>
</tr>
<tr>
<td>Individual Workstations</td>
<td>Social Work Setting</td>
</tr>
<tr>
<td>Isolated Support Delivery</td>
<td>Integrated Support</td>
</tr>
<tr>
<td>Students Only</td>
<td>Faculty Too</td>
</tr>
<tr>
<td>7 x 12 Access</td>
<td>7 x 20 Access</td>
</tr>
<tr>
<td>&quot;No Talking!&quot;</td>
<td>Whiteboards Abound</td>
</tr>
<tr>
<td>No Food</td>
<td>Cybercafe</td>
</tr>
</tbody>
</table>

Table 1: Adopted from chapter 9 by Brown and Long from Oblinger’s *Learning Spaces* (2006),

Oblinger first discussed the potential role of design in enhancing pedagogical goals: “Space can either enable—or inhibit—different styles of teaching as well as learning.” (p.1) She mentioned potential pitfalls such as an inability to adapt to change.

Not only are learning spaces a large capital investment, but the technology and personnel costs of designing and maintaining them are significant. The longevity of these spaces should be noted. A building (and its learning spaces) is designed to last 50 to 100 years; the curriculum and courses that are taught in those spaces may change every 10 years, and the technology may change every year. Clearly, the stakes are too high to risk settling for an inadequate design (Oblinger, p.1)

A “Knowledge Commons” often combines both technologists and librarians. When planning these spaces, “the physical attributes of digital technologies... may not be so apparent to policy makers and administrators” (Hess & Ostrom 2005, p.10). With this
in mind, those employed to work day to day within the commons become a valuable resource in understanding the changes taking place. Considering the role of the designer as the responsible party for crafting spaces that thoughtfully consider the physical and social implications of technological changes, architects could also benefit from the accumulated knowledge of technologists and librarians as the notion of the knowledge commons continue to develop.
Chapter 3

Research Methods

The primary research question answered in this study was: how can user experiences inform the future design of spaces similar to the Knowledge Commons? To answer this question, I undertook a qualitative study, primarily utilizing ethnographic tools of research, in an ethnographic case study of the Pattee Library Knowledge Commons. The research data were gathered and subsequently collected using: (1) a voluntary survey distributed to current students using the space; (2) a times study of occupancy; (3) observation and subsequent interview of users of the breakout rooms; and (4) interviews with the staff and architect. A diagram of the methodology tools may be found in Figure 3-1.

![Figure 3-1. Diagram indicating Methodology Tools](image)
Survey

The survey provided an understanding of the users, what they found to be successful and unsuccessful about the space, as well as perceptions of various aspects about The Knowledge Commons. The survey consisted of 15 main questions on a two-sided survey card printed on cardstock. The three open-ended questions were:

1. What did you like best about this space today?
2. What did you like least about this space today?
3. Do you feel you met your goals using this space today? Why or why not?

On the back side of the survey were more concrete, quantitative questions:

4. Today I used the following:
   Knowledge Commons Computer, My Laptop, Pencil and Paper, Cell Phone, Personal Tablet, Mounted LCD Screen, White Board, Headphones, Printer
5. I found the sound level to be appropriate <too quiet 1 2 3 4 5 too loud>
6. I found the amount of table surface space I used to be <too small 1 2 3 4 5 too large>
7. How often do you use the knowledge commons? times a week, times a month, times a semester
8. How many people did you study with in the knowledge commons today?
9. What classes did you study for in the space today?
10. Year Level:
11. Gender:
12. Major:
13. Time spent Studying:
Figure 3-2. Image of Knowledge Commons Survey
Time Study

I conducted time studies at both off-peak and popular hours of use. I noted each space as occupied by more than one person, one person, or vacant. This portion of the study provided the occupancy of each space as well as whether it is used collaboratively or in isolation.

User Observation and Focus Group Interviews

Using Tobin’s preschool in three cultures method as a model, (Tobin, 2009) the observations were videotaped to allow later reflection on events that took place. In addition, a series of ethnographic interviews were conducted to gather information needed to provide a better understanding of the observed experience as well as wider attitudes about the space. This work provided an intimate understanding of user experience: how people were using the space, why they chose the space and what they found to be successful about the space as well as unsuccessful.
Using Ethnographic Principles to Understand User Experience

Emerson’s Writing Ethnographic Field Notes (1995) serves as a key text in understanding how to write field notes so that the data recorded will lead to more objective findings. In an evaluation of case studies of student writing, the author pinpoints potential ambiguities stemming from the way people record and write field notes. In addition, he offers advice on how to conduct field notes on the adequate duration of testing, appropriate strategies for “jottings” and how best to interpret and write relevant findings. He also delves into the “complexities of representation in ethnography”.

Also discussed is the importance of visual language—“showing” the scene, not “telling”. Such analysis should include a focus on “size, space, noise, colors, equipment, movement, number of people in the setting, gender, appearance, race, dress, involvement, comportment, feeling and (voice) tone.” (Emerson, P.13) Further, both mundane patterns and situations that generate “strong emotional reactions” that could materialize as signs of frustration and events that cause others to stop and stare should be included. It is very important for the viewer to critically evaluate the situation both in real time and in reflection afterwards, considering moments of ethnographic significance.

The author provided advice on how to further elaborate on findings directly after the fieldwork in the form of more elaborate writing. This led to the scheduling of structured writing sessions directly after the fieldwork. This study’s analysis followed the questions brought forth in Emerson’s Writing Ethnographic Field-notes Second Edition (2011), some of the most valuable insight provided in the book was the encouragement to
develop an inner-dialogue, asking oneself questions directly after every field experience relating to the subtleties of what took place in the field.

**Staff and Architect Interviews**

Ethnographic interviews took place with the architect, Knowledge Commons Director, and the Assistant Manager of Information Technology Consulting. Each interview was designed to collect insights into their role in the space, what they believed to be working based on their own experiences as well as what could be improved in the future.

**Design Team, Architects**

This interview included a series of written general questions, as well as feedback based on images of specific design elements in relation to technology-based collaborative learning.

*How did the inclusion of specified technology in the space inform your design strategy?*

*Were you included in the conversation on what specific technology should be used in the space? How did this factor into the orientation of the space?*

*How did you formulate a design strategy for the space?*

*How did you determine what furniture would go into the space?*

*How did a focus for technology-based collaboration factor into your decision?*

*What precedents had you used to develop the scheme of the knowledge commons, was it your first time designing such a space or were you able to pull from personal experience?*

*What references did you research in developing this space?*

*What challenges did you face while designing within an existing space?*
Library Staff, The Knowledge Commons

As another valuable member of the commons design process, the staff were perhaps the users who spent the most time in the space. As employees who work in the space, they are tasked with helping students. Some questions that were asked include:

1. Where do you find to be the most successful spaces in the Knowledge commons are in terms of collaborative learning. Why did you select these spaces?

2. Where do you find are the least successful spaces are within the knowledge commons in terms of collaborative learning, why did you select these spaces?

3. Was the library staff involved in the design process? If so in what capacity?

4. Are there aspects of the design that weren’t considered that you wish had been focused on?

5. What patterns have you noticed in terms of user traits?

6. Do you find the flexible chairs to be well used for collaboration?

7. Do you find the bean shaped tables to be well used for multiple students to collaborate on curriculum-focused work?
Methodological Limitations

The survey and interviews served as a starting point to further inform discussion questions with the interviews—neither served as a statistically significant mode of data collection, but still retained value in gaining perspective on self-reported student experience.

Survey

As reported by the Penn State Statistical Counseling Center, the survey itself serves as a pilot survey and is not statistically significant due to the sample size relative to the number of students who use the Knowledge Commons on a daily basis. The survey cannot be generalized to all students who use the space since the data come from a self-selected sample of respondents.

The responses have been collected over a period of three weeks and we have 62 observations in total. The total number of students who can simultaneously work on these study spaces amount to several hundreds. Therefore, we see that the response rate for this survey is relatively small. But the information on these 62 observations might still be very useful as it comes from the students who wish to make their voices heard. There are no more than 4 responses except Nov-5, (which had 12). The reason for having many responses on Nov-5 is unclear to us as it could be due to many reasons such as students who used to come to knowledge commons had a midterm to study for during this time etc.’” (Penn State Statistical Counseling Center, 2013).
While the survey cannot offer conclusions on average attitudes toward the space, it can aid in identifying potential issues within the space for students who wish to make their voices heard.

**Time Study**

The time study followed the same exploratory principles as the survey and was not meant to serve as a definitive representation of continued patterns in the space. The time studies acted as a preliminary study for potential patterns observed within the space.

**Interviews**

The interviews were semi-structured, including a list of scripted questions given to the respondents.
Chapter 4

Findings

This chapter describes study findings and is divided into the following sections: methodology: survey, time study, observation, and interview. Each section focuses on the primary research question: how can user experience inform the design of spaces like the Knowledge Commons? Differences from section to section are due to different perspectives on the question. The first tool implemented was a survey, followed by the time study, in order to gain a broad understanding of how the space was being used and by whom, followed then by an overview of user impressions about the space as these related to their personal experience.

The second portion of the findings offers a more intimate understanding of how the space is being used according to observation and interview. This section is based on information gathered through interviews with groups currently using the space, in order to better understand why they chose the space, as well as how the architecture was supporting their use of it. In addition to student interviews, the director of the commons was also interviewed to ascertain how staff experience in the space can inform future design. The architect was interviewed to gauge initial intentions and expectations on space use.
Survey Findings

A pilot survey was conducted as an initial step in gaining an understanding of user experience and perceptions of space. The questions sought feedback on: demographic information, perceptions of sound and table surface space, as well as open-ended questions about aspects considered best as well as least well-received within the space. The survey was planted in several areas within The Knowledge Commons. Volunteers would reflect on their direct experience. In doing so comparisons can be made about perceptions of sound and space within different areas of The Knowledge Commons. The second portion of the survey contained open-ended questions developed to gain a more general understanding of what students appreciated about the space as well as what could be improved.

Demographic Information

An effective space-related study seeks to understand who is using a certain space and their motivation in doing so. The collection of general demographic knowledge offers insights into trends concerning who is using the space—whether a specific major or a particular year-level. Access to this information shows how a certain space may be meeting specific groups’ needs. If the aim of the commons is to provide services for the University as a whole, could strategies be developed in the future to better meet an underserved or unserved demographic?

The demographic information sought for this study included: User’s Academic Major, Year Level and Gender.

User’s Academic Major. Respondents to the fall 2012 survey claimed attendance in a broad range of majors. The most prevalent majors were in the Colleges of Science,
Health and Human Development, and Engineering. While these majors were more common, a wide range of majors were found to use the space from almost every college within the University.

**Year Level.** The most prevalent year level were seniors, followed by sophomores. There were somewhat fewer freshmen and juniors; graduate students made up a minority of respondents.

**Gender.** Gender appears to be split relatively equally, with slightly more males in the sample. However, the difference in percentage was minor. Gender did not appear to play a major role in attendance within the knowledge commons.

Overall, survey data indicated that students using the Commons space were from every year level. The group was diverse by major and nearly equal in gender. Some majors used the space more than others.

Figure 4-1 on the next page displays the demographic information previously mentioned.
Figure 4-1. Demographic Information of Survey Respondents
Perceptions of Sound

Sound is an important consideration in a study space. With the space being perceived as both an area for collaboration and independent study, the question was whether people found that the space provided a successful acoustic environment for both types of study.

Figure 4-2 is a histogram representing responses to the question about noise level; responses were from 0–6 on a Likert-type scale. The mean was well above a “3”, meaning that a majority of the respondents felt the space was loud. In addition, no respondents selected a 0 or 1, meaning no one felt the space was too quiet.

When these responses were compared with those to the question about time of day, the mean response was similar among morning; afternoon and night, meaning that attitudes were similar throughout the day. The largest variance was during the morning.

Overall, of those who volunteered to fill out a survey, perceptions were variable, with a majority of responses falling above the average level of sound. While many found the space to be loud, an additional number believed the space to be average or slightly too quiet. As indicated, however, more respondents found the space to be too noisy.
Figure 4-2. Perceived Noise Level

“People seem to think that the other rooms are sound proof”
Survey Response from Breakout room

“People are too crowded and loud”
Survey Response from Lounge

“There is a lot of foot traffic and noise at times”
Survey response from Quick Access Tables

“People, including the ‘help center’ workers were too chatty and loud!!!!”
Survey response from a Bean Table
Figure 4-3. Perceived Noise Level Based on Space
Perceptions of Table Surface Space

With the design incorporating various degrees of table surface space, a valuable question could involve how each amount of space was being perceived by users. Would certain groups benefit from more surface space, while others have the potential to be too large? In addition, the average number of people who actually use the space may play a factor in perceptions of surface space. The graphs depicted on the next page depict user’s attitude toward the extent of table surface space in each of the study spaces. (Figure 4-4)

Both the quick access and lounge surface spaces have an average lower than the middle response of “3”, meaning perceptions are that the surface space generally is too small. In addition, not a single respondent in either area had considered the table surface space of these two areas to be above the average value of 3.

The responses from the central tables tell a different story. Respondents did not answer below the average of “3”, indicating that all felt that the table was larger than what they needed or neither too large nor too small.

The largest variance in answers came from the breakout rooms; the average still centered on a “3” but answers were both below and above the desired amount of table space. One explanation may be variability in the number of people using the space at one time—as more people use the room, there is less space.

Summary

Pilot survey responses indicated a lack of space within the quick access and lounge spaces, while the central tables were believed to offer abundant surface space. Answers regarding the breakout rooms held significant variance in both directions.
[What do you like least about the *breakout room?]
“The shape of the table, because some people had less space.”

[What do you like best about the *lounge space?]
“Large white board and ample desk space”

“I liked that there was enough space for all of our group members and our belongings”

Perceptions of Table Surface Space

Figure 4-4. Perceptions of Table Surface Space
Reported and Observed Lack of Table Surface Space

Figure 4-5. Observed Lack of Table Space
Reported Technology Use From Survey

Laptop Use

Figure 4-6 indicates percentage of laptop usage within the Commons according to survey respondents. Greatest reported usage was in the breakout room, followed by the lounge space. These findings were expected considering that these spaces do not provide desktop computers. Clearly, many students bring their laptops into the space.

The laptop appears to be a crucial tool for many students. Multiple students were observed bringing their laptops into the breakout rooms and using them while working—as many as five laptops at one table. This popular tool should be seriously considered when designing a space such as this.

Consideration for Further Design

Many students felt the abundance of space impacted them positively in the breakout rooms and bean table areas, while the same positive feedback was not offered regarding the quick access and lounge spaces. One student submitting a survey in the lounge space said that what she liked least about the space was: “Limited number of computers, sofa, coffee table and table is not comfortable to use, not ergonomic.” The table space and ergonomic comfort for laptop use could be improved.

In the breakout rooms and at the bean tables, “what students like best” included comments about desk space; the same enthusiasm about the space was not expressed in either the quick access or the lounge spaces.
Figure 4-6. Laptop Use per Space
Outlets:

Survey respondents offered very few comments about the number of outlets considering the degree of personal technology used in the space; however, this could be because each space provided an abundance of outlets.

Pencil and Paper Use:

Even with a proliferation in study technology, pencil-and-paper is still a prevalent tool used in the space, according to survey respondents. However, a surprisingly small percentage used pencil-and-paper in the bean table space. This is not likely a result of table surface space—perhaps the pencil-and-paper was less important when students used desktop computers and studied by themselves. A total of 86% of respondents, a remarkably high number, said they used pencil-and-paper in the breakout rooms. The rooms themselves are mainly used for collaboration/group work.

Approximately 50% of the students said they used paper in the lounge space. It is possible that the lack of table space discourages student use of multiple tools for study. The rounded tables are only large enough for a laptop and the coffee tables appear to rarely be used for writing.

Further Design Considerations

Manual writing on paper was still considered a popular action while studying. This action requires ample desk space which is not provided in the lounge space and could be a contributing factor to low satisfaction with the amount of table space within these areas.
Figure 4-7. Pencil-and-Paper Use per Space
Cell Phones Use:

Cell phones were found to be highly prevalent in all areas except for the bean tables. Speculation as to why this occurred is uncertain.

Figure 4-8. Cell Phone Use per Space
**Printer Use:**

A series of printers have been placed at the back of the Commons space. Every desktop offers students the ability to print to these machines.

**Consideration for Further Design**

It could be beneficial to place the printers closer to quick access tables. It appears that many in this area use the printers more often than in the breakout rooms, lounge spaces, and bean tables. Changing this placement could cut down on noise—fewer people from the quick access stations would be at the printer location.

Another strategy could be to separate printers so that half the desktop computers are located at a printing station in closer proximity to workrooms. Given expressed concerns about the making of noise and discomfort people feel about the circulation, a future design could reflect alternatives to printer placement and address concerns.
Figure 4-9. Printer Use
**Time Study Findings**

A series of time studies were conducted at several hourly intervals, including midday, morning and evening. Detailed information on each study can be found in Appendix section B.

At no time was the space observed to be unoccupied; however, higher occupancy was found in the afternoon time studies than in the morning. In addition, each type of space appeared to follow different trends in terms of independent use and collaboration.

**Collaboration versus Independent Use**

Overall, a majority of students use the central tables and quick access tables independently. The maximum percentage of central tables used for single-study compared to collaboration was as high as 100%. The maximum percentage of tables being used for collaboration was ~13%. In addition, when it was documented that more than one person was studying at a table, this rarely exceeded two people.

In the breakout rooms, a much higher percentage of students worked together—the breakout rooms were used nearly 100% of the time for group purposes. The rooms also were at greatest occupancy in the afternoon and evening hours. The highest observed number of students using the space at once was seven students—it was not uncommon to see more than two students working together within each room.

In general, the central tables and breakout rooms appeared to be more occupied than the lounge space. For example, on Saturday, November 10, 2012, from 9:00 pm–11:50 pm, the breakout rooms saw a much higher percentage of students working together. What was surprising was how occupied the space was this late on a Saturday.
Compared to studies at other times, the extent of collaboration within the central tables was relatively high, but the maximum degree was below 10%. This did increase the amount of noise generated, which was documented. The amount of seating at the quick access desks was also high, with the maximum at 64%. The lounge space appeared to be crowded, yet when a look at the number of open seats versus occupied seats indicated that the total amount was a maximum of 27%.

- 87% The maximum occupancy of observed at bean tables
- 64% The maximum occupancy of quick access desks
- 27% The maximum occupancy of observed lounge space seating
- 14% The maximum percentage of collaboration at bean tables.
Figure 4-10. Time Study Indicating Collaborative Use vs. Isolated Study
User Observation and Interview Findings

To understand the intimate experience of how each breakout room was used, a series of observations took place. Each observation was directly followed by a focus group-style interview in which users were asked specific questions about the breakout rooms. In order to understand how experience can inform future design, each interview was designed to gain an understanding of the reasons that students chose to use the space, what aspects about the space were successful and what aspects were considered less successful. Beyond these three fundamental questions, a wider conversation about aspects about which students felt strongly was discussed in each case.

Experience 1: Studying For an Exam

A group of three left after being asked to leave by the group waiting outside to claim their reservation within the room. The group sat down—the female student sat in the north corner of the room while the two male students sat adjacent to each other in the south-east corner.

The female student began using her laptop. Among the items she brought with her were a water bottle and a backpack, which she placed on the rolling chair next to her. The two male engineering students had brought with them relatively more items, including two text books, a digital tablet and a plentiful amount of notebook paper. The students began by reading from their notes and text books by themselves. Later the two began talking to each other more frequently in a language other than English, appearing to be discussing the material. One of the students used the digital tablet briefly. He appeared to be searching for something on the tablet. He then lowered the screen to let the other student studying with him view the tablet as well. The second student leaned in to view
the screen and the two watched the screen while discussing what is on it, speaking in a low tone, perhaps not to disturb their friend that is with them.

The two went back and forth for an hour, alternating between reading separately, writing notes to working together and discussing with each other, referring to their study materials. Their work was spread out on their side of the table and appeared to take up much of the free space. The two leaned in when discussing something then lean away when working by themselves. In a few instances they talked to the other student across the table but for the most part discussed among themselves.

The only time the external environment appeared to distract the students was about 28 minutes into the observation when a high-pitched screeching sound was heard outside. At the time the sound was heard, the students appeared to carry on with their work but after the sound changes to a slamming sound the students briefly paused and looked out the window. The students then appeared to look at each other, seeming to be annoyed, and then continued on with their work. The sound was brief and did not cause the students to do more than briefly pause.

**Focus Group Interview**

After using the space for ninety minutes, the group mentioned that they were going to leave but they had time to discuss their experiences in the space. The two male mechanical engineering students decided to occupy the space to study for a test and the female friend was the girlfriend of one of the two. The group laughed about this fact, perhaps in part because this is a “study space” and her purpose for being there was not to study but to simply occupy the same space with people she knew well.
**Why did you decide to use this space?** The two students studying for the exam planned to quickly review and then to go directly to the exam destination. One reason the group selected the specific space in the Knowledge Commons was that it was within close proximity to the classroom in which their exam was to take place. Another important reason mentioned by the students was the quiet environment. The noise level was ideal for the students; the likely reason for this is that the lack of noise would lead to less distraction. While the quiet environment seemed to be an apparent reason, the sound barrier in the room allowed them to play lecture videos on a digital tablet and discuss them without distracting others.

In addition to this specific time these students had used the space, the students had been to the space before. Some of the reasons for using the breakout rooms included the ability to reserve a room in advance, as well as specific resources found in the room—this was articulated more clearly by the following question.

**What do you like best about this space?** When asked about the benefits of the space, one of the mechanical engineering students described the desirable physical attributes: “the screen, white board which is useful for writing equations while the group can watch and discuss the problem, and the adjustability of the room temperature”. The female political science major mentioned that she liked the sunlight coming into the room, so much that this impacted where she decided to sit within the room. Sunlight glare had never been a source of distraction for the group, although they admitted never using the space before 1 pm. In addition, they never found outside noise to be a source of distraction before that day when a brief bout of construction noise affected them. One
student mentioned that “If you close the door all the way, it gets really quiet”, as a positive aspect of the space.

In addition to the specific features of the room, two of the students described the social atmosphere within the room as an aspect that was best about this space: “It’s quiet and like you can do whatever here, because usually we get a room because we need to talk, like not individually because we need to work like group style.” Another student gave a similar response, mentioning how the space was quiet, making it conducive to solving problems together.

**What do you like least about this space?** After discussing what was liked best, the inverse was asked, regarding what was not satisfactory about their experience. One of the engineering students wished that room reservation was a more efficient process:

Uh, well usually if you want this space you have to reserve it a couple days before, and you can only reserve it by calling them, or you come up to the desk, you cannot go online and stuff.

In addition to this problem, those who do not reserve the space and use the space anyway and those who may not be aware of the reservation schedule were cited as additional problems. In this specific observation the students had to ask a student to leave before entering the room because they had previously reserved the room and the other student had not.

The frustration centered on reservations may be exacerbated by the reported increase in use of the space: “This (space) is becoming more popular and harder to reserve, like, you’ll come here and next week all the rooms will be reserved.” Potentially,
this student had expected to reserve a room upon entrance; however, when all rooms have reached a maximum capacity, this cannot be done.

With regard to room size, one student confirmed that the size of the specific room in which the observation was taking place was too big for what they were doing. While not necessarily a problem that affected their ability to study, the student stated that she would have preferred one of the smaller breakout rooms, which accommodated up to four students. She suggested that their current room was ideal for a group of about eight people.

Use of Resources in the Space

One of the design goals of the space was to foster the use of technology in collaboration. Two students were observed using technology to watch a lecture and discuss what they had seen.

Reflecting with the students on the use of a digital tablet while collaborating in the space, both students said they would not have used the digital tablet in the same way had they been using the device in the main space. One student said they may have still used the digital tablet but would have used a pair of headphones to listen to the lecture. The two agreed that this would have affected their ability to have a conversation about the lecture while viewing it.

While not mentioned in the interview, it was observed that the students had made use of the table space provided, spreading out their materials on the surface. Items placed on the table included laptops, books, and note pads, as well as using additional chairs as shelves for their backpacks. The placement and use of these items were not static, as the
extra space lent itself to flexibly accommodating the range of materials and tools used by the students.

**Do You Wish There Were More Spaces Like This On Campus?**

A resounding “Yes” came from the three students. They stated the breakout rooms are extremely crowded and popular. The two engineering majors wished a space like this existed even closer to the majority of their core classes. While the two students could not identify a specific space, they thought that break-out rooms within the engineering buildings would be ideal for them. The female was a political science major—she expressed a need for more spaces like this as well. Initially, she felt the location of the space “did not matter” since her classes were already spread out; however, she agreed a central location on campus would be ideal for her.
Figure 4-11. Illustration of Mixed Use of Breakout Room

Figure 4-12. Plan Indicating Seating of People within Breakout
[I sat where I did] because when we were walking in there was sunshine from this side. pointing to the window next to her chair. She laughs as if embarrassed, “Because, like ,I like the sunlight!”

Figure 4-13. Image of Breakout Room
**Experience 2: Taking Apart a Machine**

This observation occurred from a desk outside of the breakout rooms. Six male engineering students were in a smaller breakout room. Four were seated around the table while two were standing. They appeared to have taken a machine apart on the table. The pieces lay strewn on the table surface. The group appeared to be talking and could be heard from outside and seemed to be discussing the pieces. The two males standing were each holding a part of the machine. A third male stood up from his seat and began to talk about the hose element. Everyone appeared to be engaged in the conversation. The machine appeared to be the main focus of their attention—no other devices had been brought to the space and the LCD screens were not being used.

One-half hour later, all six males were standing; they were all picking up different parts of the machine and continued to discuss them. They were being very loud at this point and could be heard from approximately twenty feet away. Soon they all left the breakout room.

**Focus Group Interview**

After the students left, two students discussed their experience that day. The following is a brief interview with the two users.

**Why did you choose this space?** The students selected the meeting room in the Knowledge Commons because they were all familiar with the space and could easily find each other there. The students revealed that they were all industrial engineers. When asked why they were not using their own building for these meetings, the two replied, “There is no space for us.” Continuing the discussion, the two further elaborated: “There are classrooms, but we don’t know the schedules. Here we could schedule a time and
know that people won’t come in. The ability to schedule coupled with the identify ability of the space became the two most important factors for students.

**Do you wish a space like this existed in your building?** “Of course!”—the first engineer stated that there was only one computer lab in their building which serves as a space for group meetings. The space is so crowded that students rush to the room after their classes end in order to occupy a seat before the space reaches maximum occupancy. There are no other spaces in which students may meet for group study.

**Quality of Environment**

The two students thought that the amount of space was perfect for the six-person group; in addition, the space was deemed “very quiet” which was exactly what they needed. What was interesting from this group was that the students were not using the technology in the space. They simply needed a space in which to gather and discuss. For the group, the needed resources were a large table and enough space around it. The group said while in the space they each took a part of the machine back with them to later produce a digital model. When complete, they would merge the pieces into one complete model. The two respondents said it was likely they would come back and use the screens to discuss a collective model as the end result.

**Experience 3: Informal Class**

The group met as a “conversation group”. The informal instructor went into detail about the situation:

This is a conversation group program organized by global programs, so its… they have offices (in another) building for international students. Actually they have one to one, face to face talk so that international students can build a relationship
with American students. This way we can practice our English, but at this time there are a lack of volunteers so we organized this group. (Points around the table) we are all from different countries.

The class began after three of the students were seated with the instructor at the center of the media scape table. She leaned back in her seat while describing the nuances of cultural practices in American restaurants. The students appeared to be engaged, as she was able to make eye contact with each of them. In front of the instructor was a folder with notes; in front of each student on the table was a self-made nametag. Backpacks, bags and coats were all draped on the back of the seats.

When the discussion of tipping comes up, the instructor got up from her seat and went to the white board to illustrate a mock receipt. She showed how to simply calculate a tip. At this point, two other students entered and took available seats around the table. The instructor sat back down and re-introduced the topic of that lesson. Now five students surrounded the instructor at the table. In general, all students appeared engaged and able to make eye contact with the instructor as she discussed tipping. She again got up and returned to the white board to illustrate tipping strategies.

This process of group discussion, with the instructor occasionally returning to the white board, persisted throughout the lesson. It was observed that two students with their backs to the white board had to turn to see the board. The students did not rotate the seats, instead turning themselves in the seat that still faced toward the table. The conversation continued for about an hour on this topic, mostly held at the table. In general the students remained attentive—the conversation extended to safety issues on public transit in US cities, among other general discussions.
Focus Group Interview

**Why did you choose this space?** The instructor mentioned that her first decision would have been to have a room within the Global Programs building; however, since she was not a student she could not do so. The space had been recommended to her by an employee of Global Programs. All others in this informal class were students. The two confirmed reasons for continuing to use the space was the ability to reserve the room as well as a central location on campus that was easy to get to.

**What do you like best about this space?** One of the students mentioned that the space was comfortable for a group discussion, and that the screens were useful to her to show new material. The student also explained that the location was a positive aspect for her group: “For me this location is, good. Because it is really convenient for us, we are in different departments. If we were to meet downtown, some people would have to go really far. The location is in the center of the campus.”

In addition, she mentioned the thermal comfort of the room, being able to adjust the room controls was important to her. She thought the central space, which she referred to as the “computer lab” in the knowledge commons, was often too hot. In the discussion rooms she mentioned that it is “fresh to talk”. While this was a perceived benefit, the instructor was unaware that temperature control existed.

**White Boards**

Another component was the provision of white boards: “I think another thing is that, they have boards. Yes, Because last time Kirsten mentioned something about medical things, like teeth and such, words we didn’t know, we didn’t [know] these words that are very useful.” The student indicated that had they not had the white boards they
would have had to write the words down on paper, which would not have been as
effective for the entire class.

**What about when the instructor was using the white board, and I noticed you two had to keep turning around how was that?** Student 2: “inconvenient!” He mimics turning around.

**What would you suggest differently? How would you re-orient this?** “I mean maybe, they could have a board that can... I don’t know... its like, a wheel? And it’s a structure that you can move. And like, we sit here and when we use it we could put it there (points) and when we don’t use it we can put it over there, or other places. So there is no need to....”

White boards again were cited as a valuable resource in the space. Since the space was being used this time as a classroom, the white board became a way to engage students in activities, such as drawing maps of the students’ hometowns and countries in order to gain a better understanding of each other as well as adding an important activity to the lesson.

If there had not been a white board, a student suggested they would have to resort to writing on a piece of paper, making it difficult for the entire class to see the content and write it all down. While the white board was an improvement for this activity, two students were observed having to turn around and strain to look at the board while they attempted to write everything down. The instructor and students agreed that perhaps a more flexible placement of the furniture could help solve this problem.
Transparent Walls

The topic of the room’s physical elements began with a discussion about the transparent dividing walls. When asked if the transparent walls were distracting, a student disagreed and said that she liked them:

I like that its clear because, um, you know one time we were in that, room (points to room next door) and we knew there were people in this room and we didn’t walk in on a group and embarrass ourselves. You can see what’s going on, that’s very reassuring, even with a restaurant, if you can look inside its more inviting than just a solid wall.

The student mentioned the “inviting” feel the transparent wall gave the space. The added function of being able to see in so other students are not being disturbed was also a positive aspect. This positive, however, also results in a reportedly uncomfortable feeling when students are watching them from the other side:

I think just one problem, maybe, I remember every time before we need to go there is another group, and people from that group were staring at us for the last ten minutes. It kind of, putting us, it uh, how do you say that, its like… A stress! And at that time we feel yeah, we need to go, very quickly.

Placement of Breakout Rooms

One issue was the placement of the rooms themselves within the larger knowledge commons. One student mentioned that she did not like having to cross through the larger knowledge commons space in order to get to the breakout rooms. There were two reasons: first, she felt it was a hassle to walk through the space, and second, she felt she was being rude by distracting those working in the main space.
And I always wonder, why this location, I mean, every time I need to go to this room, I need to like, cross a lot of people and go across that room and for me I don’t like to do my homework at this space, so it so not have privacy and a lot of people go, and come by me and I do not like that. So I wish that we could go to this room, not across so many people.

However, the student liked the integration of the breakout rooms and the main space. The ability to see and be seen was a positive factor; also, the visual connections to an active space were positive but the student suggested the circulation be thought of differently.

**So you wish these rooms were isolated completely?** One student said: “No it doesn’t need to isolate completely, just so there is a door closer, so we could just use this door here so we wouldn’t have to, go across them. I think its not, its also not good for them, you know, because we just need this room without disrupting them. Every time I go across that room, I just try to be quiet.”

The focus group abruptly ended since its room reservation had come to an end—the students collected their things and another group entered the space.
Figure 4-14. Illustration of Informal Class in Break Out Room

Figure 4-15. Plan of Informal Class in Breakout Room
Breakout Room Experience Summary

The first apparent aspect of these three experiences is the diverse way in which the break out was used. In the first group two students studied together for an exam while a third member occupied the space as well. The second group met in a breakout room simply to congregate and delegate tasks. The third group was conducted as an informal class, with one volunteer instructor and a small class of students. With each of these, the space was subtly used differently. While there were differences, each group was generally satisfied with the space and felt they met their goals.

While the uses were diverse, each group had similar goals in selecting the space. One reason was the ability to reserve the breakout room for a set amount of time and lack of disruption by other users. This made it easy for groups to plan ahead and coordinate with the guarantee of a space.

The second reason was the room’s central location. Every group cited proximity to offices, classrooms and living as a reason for selecting the space. In addition to proximity, the visible location in the university’s main library made it easy to communicate the space’s location to groups.

In addition to location and ability to reserve the room, a series of other qualities were appealing to the groups observed. One of the most prevalent responses was the quiet environment. This important factor gave each group the ability to focus on tasks and to talk without concern about disrupting others.

Other positive design provisions included the white boards. The boards have been reportedly a valuable resource for communicating information ranging from questions to studying for a test, to drawing maps as a warm-up exercise for a class. The screens were
considered a positive aspect; however, none of the three groups had used them during the observation. Temperature was mentioned as a positive design aspect, yet some students were unaware that they had the ability to adjust the room’s thermostat. Perhaps the controller was not visible enough.

In general, each group found the space to be comfortable to work in for a number of reasons. Day lighting and transparent walls generally appeared to be positive elements. At no point in any of the focus group interviews did the students find the windows to be distracting. The transparent walls were found to be slightly distracting for students who could see those waiting outside the room; for the students who were waiting, however, it was perceived as a benefit. The next page shows an image of the special breakout room, a room with a bar stool setup instead of other seating.

“I think this space is comfortable to have group discussions, we have a screen that you can project any representation of new material and mm generally the conversations we have in this room is very nice.”
Experience 4: Graduate Student Using Breakout Room

This student preferred to use the knowledge commons because it was quiet, at least “more quiet than his office.” He liked the equipment within the breakout rooms, like
the big screen. He found the ability to reserve the room was the first priority. He used one of the collaboration rooms to discuss his dissertation with a faculty member. He appreciated that the walls made the room quiet without external distraction. He did not have a preference regarding whether it was opaque or transparent. He had never used the central table space or the lounge space. He did not give a reason for never using the central tables; however, his reason for never using the lounge space was that the furniture was not very comfortable.

**Experience 5: “Skyping” in the Lounge Space**

On a Monday around 7:00 pm, a student studied in the lounge space toward the entrance of the space; he wore headphones on and spoke loudly to students through the Skype program. He continued with the conversation and then ended it. He took off his large headphones and closed his laptop, which was sitting on one of the coffee tables. At this time he agreed to be interviewed. He first described why he decided to use this space:

> I was running between classes and I had to Skype a few friends who go to another university to coordinate getting an apartment in DC because we all working there until August. I couldn’t go to my apartment because it was too far, I just needed a semi public space that wasn’t too far, now as I’m taking off my headphones I am now realizing I am not sure if I was talking really loudly or really quietly.

The student began to explain his reason for using the space—he was “in a convenient location that was quiet enough to converse.” The student also mentioned that the outlet was convenient for him, and he liked the fact that he could grab food and rent headphones in order to Skype. He found the table and chairs to be comfortable for what he was doing; however, he “probably wouldn’t do school work” in the lounge space,
because of the chair height. He felt he would have to crouch too much and it would not be comfortable.

The student had used the space for Skyping before. He also had used the central space before—he liked the large desks for computer use, however, and he had not bothered to come into the space because the computers were always occupied: “These computers offer everything, the big screen, the desk”.

**Sound**

“The sound level is good; you can talk to someone on the phone without feeling terrible, at the same time everyone is courteous not to yell and scream.”

**Breakout Rooms**

According to the student, “I’ve used the rooms before but I’ve never had to reserve the room so I am not sure how that works.” He then mentioned that one time the students went there but none could remember the room number so they had to ask for help. Once they cleared up what room to use they were generally happy with it. However, the student did not know how to hook up the laptop to the screen. He also was unaware that each room had the ability to be thermally controlled.

**Quick Access**

The student said that “A while a back, I liked how you could elevate the desks, and it was nice that you could just come in and come out, but now they are low and used the same as the rest.” He mentioned how it was nice to have quick access to tables.

**Experience 6: Leaving Knowledge Commons due to Noise**

Around 8:00 pm on a Wednesday during finals week, a student was observed asking another student if he wanted to switch computers. His rationale seemed to be that
doing so would allow the other student to talk to his friends. The student declined and continued to stand next to his friends, speaking loudly to his seated friends. The student making the suggestion was annoyed—he continued to work for roughly ten more minutes and then suddenly packed his belongings and left, stopping briefly for an interview.

**What do you like best about this space?** He appreciated the renovation: “The surroundings, the light, the ceiling, a space that others spaces in the library don’t have.” In addition, the student summarized what he likes best as “the atmosphere, the feeling that it gives me”.

**What do you like least?** He mentioned that people who “talk a lot can be very rude”, and that it happens frequently: “some people don’t understand what the library is here for”. He continued, “It has nothing to do with the structure, it is just the people.” He felt the people around him were rude by talking to the point that he was forced to relocate: “If they were not there I would have stayed there the whole night.” The student would like to see a policy enacted for people to keep their voices down, while noting this would be very difficult to do.

The student had been to the space before, but had only used the central desks and the quick access desks. He used the lounge space once. He had not used the breakout rooms before nor had he used any of the services. While he had not used the services, he felt that it was obvious where the services were located. He felt the space itself was perfect, stating “This is by far my favorite place to study.” However, in this specific instance he felt it necessary to relocate because of the noise level.
Central Space Experience Summary

The students appeared to have two different social expectations of peers within the space. The student speaking on Skype perceived it to be acceptable for people to talk and felt comfortable doing so, while the second student left the space because of others talking and felt a rule limiting talking should be enforced.
Interview: Knowledge Commons Director

Another significant user of the space in addition to students were staff who worked within the space. The following interview focuses on the experiences of the Knowledge Commons director and was developed to gain a better understanding of overall staff experience. As noted earlier, the function of the Knowledge Commons is “evolving” in both the way students use the space as well as the services provided, and future design can respond to previously unforeseen issues that may not have been apparent during the planning process.

Services include one provided by librarians and several information technology groups; each has been assigned different responsibilities as they share the space. Over time, selecting a service became confusing to students. This problem was addressed by giving different colored t-shirts to each service so that students can easily identify them. These services and their specific “colors” are as follows.

**Blue team:** Responsible for handling in-house hardware and software issues that may arise in the space. This includes printers, computers, monitors and other technology that require routine maintenance.

**Green team:** Responsible for assistance with hardware issues students may have with their personal technology, items such as laptops are brought into the space by students, where the technologists work.

**Purple team:** also known as “tech tutors” this group is stationed within one of the breakout rooms during the day, their primary responsibilities are to assist with software questions students may have and to walk them through learning how to use programs.
Librarians: Librarians assist in helping the students “not only find the information they need but be able to package it in new and creative ways.”

Sitting down with the director in his office, the first question was asked: What is your main mission as director of the knowledge commons?

The director first explained his primary goal: “For students to be able to utilize the space as it was intended, or how we envisioned it to be.” He further explained that much of the focus of his job involves day-to-day operations, monitoring how students use the space and to promote the different services provided in the space. For example, the breakout rooms tend to be very popular, yet students may not be aware of the media scape technology within them. He spends a portion of his day promoting the different technologies and services provided within the space.
Figure 4-17. Location of Services

- Green: Responsible For Help With Personal Hardware
- Blue: Responsible For Help With Knowledge Commons Hardware
- Pink: Responsible For Help With Personal Software
With regard to the integration of services into the space, the director mentioned that, “It may had been a very different space had we thought about these teams when we were planning it.”

**Services**

One of the goals within the space is to bring services together to help students:

. . . not only find the information they need but be able to package it in new and creative ways.” [He continues to elaborate] “when we looked at creating the knowledge commons we found that students were having to go to different parts of campus in order to complete projects, we wanted to bring everything together that we knew at that point would help students in completing whatever assignment they may have.

This is achieved by the inclusion of library support staff who are available from Sunday at 10 am to Friday at midnight and during the day on Saturday. In addition, units from the campus Information Technology Services (ITS) are also stationed in the space. The several teams are color-coded within the space; the “blue” team are ITS equipment consultants who help with hardware issues that occur within the Knowledge Commons, which include the computers, printers and monitors. The “green” team is located at the far desk next to the director’s office; “They are lab consultants who provide support for things that you personally own”. The “purple” teams, also known as “tech tutors” are situated in the first break out room and help with any software issues. In addition to technologists, spaces are reserved for writing and math tutors. The final group are the media consultants, which work with campus equipment, which occupy the north half of the Knowledge Commons.
How has the design of the space assisted in the overall mission with the space? The director mentioned that the media commons was a key partner from the beginning, so this space had been designed well for the function. The project had evolved over time after the design—from the beginning the directors knew they would have the “blue” team. However, the green or purple team were never integrated into the design. As the project evolved, decisions were made after the initial design:

What has evolved is how we bring in the IT consultants, we weren’t sure where the blue team was going to be, we didn’t know actually where any of the other teams were going to be, in the design of this. They were never part of that design, they came in almost after… they were always a part, but in the planning of it since I wasn’t involved in the planning, I’m having to inherent that, I didn’t have a clear direction as to where we are going to put these. From the very beginning we knew we were going to have the blue team, we didn’t know we were going to have the purple team or the green team or the tutors, but the vision was this one-stop shop, so the vision always had these units involved but never... thought through where they would be in that one area. So we had to kind of make some, decisions that have worked for us, but it may have been a very different space if we were thinking about (each team) when we were planning it.

Purple Team and Tutors

The purple team they need to be able to sit down with students to provide consultation, and this consultation may last any where from 30 minutes to an hour and half, so putting them out in a public desk wasn’t going to work, so they
needed to be in a group study from, however this isn’t what the study rooms were intended. The tutors can assist with software questions and assist students in learning them.

The purple team, and math and writing tutors, all needed spaces for group work. Initially all tutors were in the leisure reading room and not in a designated area. Over time these services were given a reservation within the breakout rooms. The director explained that he had to reserve three of the collaborative rooms for tutor use. While this was not the intended purpose of these spaces, these groups needed to be included in the space.

**Green Team**

The greatest demand for the green team is in the first few weeks at the semester; students come to this space with new technology with which they need help: “Lines form around the IT service desk, where this is only one point of contact.” Due to this demand, the administration began reserving group study rooms to provide three contact points rather than just one: “The desk wasn’t intended to have that amount of traffic.” With regard to the amount of traffic, the director cited the noise level around the desk. The director even mentioned that he can clearly hear some conversations from his office: “Because a raised floor and ramp, you have a railing that cuts off half the service desk.” The director wished more spaces were provided for the green team for more quiet consultation. Also, due to the design, lines form into the circulation area, creating problems with movement: “We are using the space differently than how it was envisioned.”
From what we learned it would have been nice to have an easy consultation room, in order to direct people... actually multiple consultation rooms because we have people whose problems will take more than a few minutes and you want to be able to talk to them without broadcasting this throughout the floor. Also, some way to allow for the people working at the desk to be able to talk to people. You’ll have four consultants working at the desk simultaneously, when you have a conversation next to someone else, you have to speak louder, the next person does as well… Definitely if there was going to be a redesign… it would be important to understand how the space would be utilized and how to deal with the noise, how to deal with the traffic.

Do you think it is still important for the services to have a visual connection to the central space? “Yes, definitely.” The director mentioned that the signage on the columns has helped direct people to the different spaces.

Blue Team

At first the blue team was designated to “two large kidney shaped tables with the intention that students could feel like they were part of the space”; however, since there was no distinction students would sit down at these tables because they were unaware that these were different spaces than the central work tables. This later was changed to larger tables that looked different than the student desks. Lines form to talk with library staff; these lines are composed of students seeking to reserve a breakout room. The “blue team” lab consultants do not typically have lines because they handle problems with the equipment that the kids are using, so they often meet with the students where they are having problems.
Before using the raised floor system, one of the tables was lost to the blue team. This was perceived as less than ideal since one of the members had to be placed at another desk somewhere else within the space. At first, this additional space was at the green team desk; however, this led to too much traffic because of two services sharing one space. The director moved the blue team member to a front desk.

Librarians

Lines tend to form for room reservations in front of the librarian desk, near the entrance of the space.

So in future design, space should be taken account for these services?

Yeah, and especially with the green team, from what we learned it would have been nice to have multiple consultation rooms, who have problems that would take more than just a few minutes, and you want to be able to talk to them without broadcasting it throughout the floor. As well as technologists working at the desk generates noise… so definitely if there was going to be an other design, I would involve the architect in how these spaces could be utilized, deal with the noise, deal with the traffic.

Do you feel it is important to have visual connections between the spaces?

“Definitely, and it has helped with the signage directing people”

Central Space

How did you envision this space being used versus how it is being used? “One thing we went with was we went with large work surfaces and larger monitors, so that students could work together, two, three four or even five people. It is easier for two people beyond this it gets crowded.”
The director noted that students really liked having a lot of space on which to put their books and things. According to the director, students spend more time at computers where they have more space versus a similar area with less surface space. The director noted the flexibility of the central space and hoped that students would be able to create their own space in the central space through flexibility of desks. Currently, only the chairs are flexible, which creates some adjustability, but perhaps less than had been hoped:

The one thing in the design, students create their own spaces in terms of moving the chairs to the table, however the tables are fixed. The chairs are flexible, but students can’t create their own space beyond this.

**What sorts of problems arrive from people collaborating at a table?**

My hesitation is identifying it as a problem, I think it is a change in how libraries operate. Once you get more than two people at a workstation, it gets louder. I’ve noticed kind of a trickle effect where if it is only one isolated group, the noise stays the same, but as you get more groups in the space, the louder people get. So if you’re here at different times of the day, you see a tendency for more groups to form later in the day. I’ve been very much amazed at how many people can be in this space and how quiet it can be. There is a tendency for more groups to form in the after noon and in the evening. There is still an image where they are in the library, so I need to do serious work, as opposed to you know I’m in this space and I can watch the latest YouTube video, play games or whatever, the recreational aspect that you would find with computer labs connected to
dormitories. Because of the association with the connection to the library, there is a seriousness associated with the space.

I’ve noticed a trickle effect where if it is only one isolated group, the noise stays the same, but as you get more groups in the space, the louder it gets.

There is still an image where they are in the library, I need to do serious work, as opposed to... what you would find with the computer labs.

Is this aligned with the mission of the commons?

The mission is to be one of the most student centered learning spaces, unlike the innovation studio, or the learning factory, we don’t designate how students use the space. We are providing this space for them then letting them use it.

Breakout Rooms

The director explained that one of the emphases of the knowledge commons was student collaboration. The anticipation was that the media-scapes would be heavily used, but this was not the only resource being used.

What has been a surprise to me was how often the white boards get used. We thought students would use the white boards, but sometimes they are just filled with everything from outlining a project, to formulas and mathematical equations. In the larger seminar room, sometimes you’ll see people working at a different board, but they’re in different groups.

How do the reservations of the breakout rooms work in your opinion?
“It has been amazingly smooth; I anticipated people coming to us more frequently, but we rarely have to intervene.” The director then mentioned an event management system (EMS) that had been currently implemented; in the near future small screens in front of each room would inform students of reservation times. This was being done to help users keep track of their reserved time: Students may not remember how long they reserved the room for, or they’re not conscious or think about the time… having that digital device in each room would help remind students.

**Spatially, do you think there is enough space for people waiting for the breakout rooms?**

I am not sure how we get around this transition of one group leaving and one group going. It’s nice to have a large group study room, but it may be larger than we need… But it has been nice when you have the capability of 6, but I’ve seen 25 people in that room… the U-shape table doesn’t allow for a lot of flexibility, whereas at innovation studio they have a monitor attached to a wall and a separate conference table, I thought that would have been nice, a separate conference room with an oval table with a device to connect to the monitor. Maybe in our next renovation…

**Who did you expect to use this space the most?**

We created a space that would be appealing to the undergraduates. We have subject libraries that focus on the upper level and graduate students so you know if you’re a business major and your working on projects, you might concentrate
on the business library. Our target audience was undergraduates. Now, with that said, I don’t have a good means for measuring that… but I have noticed doctoral students using this space… I’ve seen a mix.

**How would you describe the flexibility for the different functions of the space…what diversity of actions have you observed?**

I do see a lot of students who are very focused working on a computer work station, very spread out, I’m always amazed with seeing students with the number of headsets on… To me it seems to be a generational issue, but it also might be something that they might know it could get loud in here, or .. I rarely have a headset on, I’m not listening to an ipad… so seeing the number of kids who usually have something plugged in is interesting, but the area seems to be very attractive or appealing to students who want to work on their own but also want to be in a very visible space... I’m amazed at how many students who want the group study room to work on a project, who want the privacy, the sense of privacy, but also want to be able to be seen if they see someone they know, is in the space in case someone wants to join them, or they want to see what’s going on in the space. The glass walls have been very popular, and I continue to hear from students how much they enjoy the element of being seen and seeing other sand the sense of openness it gives and at the same time the sense of privacy. But you get a big mix of people working at a work station. I mean I saw yesterday how it was interesting to see how they were using the media scape unit by themselves, they wanted the large monitor, the big screen effect even though it was just a word document, they were at their laptop but they were at the big screen.
Lounge Spaces

I have gotten some reaction that the little tables don’t work very well as work surfaces, and that it would be nice if we had things that were larger. The coffee tables with electrical outlets have been nice; they’ve been fairly successful as places to sleep... There are times which students make different arrangements of things. They’re a little bit heavier, the idea is for students to move things around… they’re a little bit heavier for that, they don’t wheel, they’re solid. You’ll see them pushed into group study rooms, where students will bring them into there, which happens at night.. Which could be a sleeping aspect.

In the planning, there was the sense of the space being dynamic and lively, we have screens… occasionally people put it on the Disney channel, which can be very distracting with bright colors that jump out at you. It is kind if a visual thing that makes it very lively, I have wondered if those could be used as another work area for people to work when they can’t get into the group study rooms.. but that would change the dynamic, they’re passive… when events go on, people will gather around them.

Do you foresee the lounge spaces changing to an informal breakout room? “It seems to me, people would like to see more informal study rooms.” “We don’t have any large work surfaces for students to work at a table; it would change the dynamic quite a bit from the lounge space to a work surface. I’m not sure we want to do that, because then it would say, okay make as much noise as you want.”
What do you see as being the most successful thing about the knowledge commons that is unique?

Well one of the things that has really fascinated me is that the appearance and the function, the students love. We did not do any marketing or get the word out when the space was finished. It started off a little slow, but by the fourth week of being open we saw the maximum numbers we can hold, and it just took off. We heard students were tweeting about it, it showed up in the collegian, social networking tools as just a great place for students to be in, and it has been a real testament to those who were planning that has been so popular. We still need to figure out how students are using it, and we’ve seen data that it is being used.

Director’s Office

From a personal perspective, as the manager of the space, I really like having the glass office and really like being able to see what’s going on and being able to intervene and interact with students when I can see if they aren’t quite getting the media scape to work. However it has proven to be a very bad office to deal with problems. I have had to talk to staff and people using the space with things that have to be changed, and this is not I’ve discovered, I’ve had to find a different way to not reprimand, but counsel someone to change their behavior. You can’t do it while people are walking by or walking in.

So you could see a more semi private space for more of the administrative end of your job? “Yeah, and since space is so limited in the library, I have to find.. the HR department has found a small office I could use… but to go that far…”
It’s almost going to the principal’s office? “Yes, almost the principal’s office, and I’ve thought of using the staff office, but it’s a public space too, and I also find that I enjoy this aspect but if I’m trying to concentrate on something, people who don’t need to talk to me and feel like they need to wave….”

It can be distracting. “Right, The architect mentioned they could put the frost, all the way up, but id rather deal with the inconvenience with being distracted… (the frost) would interfere with my ability to interact, and I think someone in this position needs to be able to interact. That’s the reason why they put the managers office in the middle of this space and made it glass, I actually wish that one end section was more glass. “

But you wish you had….“But I need some place that wouldn’t be intimidating, I’m getting ready to do staff evaluations for the first time and I’m realizing I can't do them here…”
Fig 4-18. Described points of vision seen from the director’s office

From a personal perspective, as the manager of the space, I really like having the glass office and really like being able to see what’s going on and being able to interact with students.

**ITS Help Desk Manager**

"**Green Team**". The green team deals with hardware issues that students may have with their own computers. The team does not handle cellphones; students are hired to handle questions. If a question cannot be solved within ten minutes, the green team member then asks if the hardware can be kept overnight in order to solve the problem, asking the student to return the next day.
**What do you like best about the knowledge commons?** The manager mentioned that the central location on campus is the most positive aspect. The ITS service has increased 40% since relocation to this space. In addition, the manager believed that centralizing ITS services has been a great benefit in terms of communication between services: “being co-located is a huge benefit because we can deal with problems face to face.” Another benefit to centralizing services is that if one service is not the best fit, it is easy to redirect students to another location.

**What do you like least about the knowledge commons?** Initially, the manager indicated that more desktop computers could have been provided in the main space. The second problem stems from being located in the shell of a space designed for laptop rentals. This means that it has been a challenge to adapt the space to meet the needs of ITS consulting.

After some reflection, the manager mentioned that he would change the space in which staff worked with students. As a general rule, staff attempts to fix a problem within ten minutes. Also, the space in which these consultations occur would be greatly served by an acoustic barrier: “We are loud, there are a lot of conversations that go on, and in a library it’s not super great.” A glass wall would help them be seen but not heard: “if I had the chance to redesign the space it would be with an enclosure.” (figure 4-19)
The manager also felt the desk should be shaped and placed differently—the column near it presents a large problem by making the space less visible. He mentioned that the circulation area is not a very inviting space, with students having to go past the railing in order to enter the space. He suggested turning the desk in the opposite way to invert it, so that students would come into a consulting space, rather than be stopped at the desk.
Figure 4-20. Separation from IT Service to Customers
Figure 4-21. Separation from IT Service to Customers
Color Shirts

The manager mentioned that the color coding came about by accident, but has worked: “if you are in IT you are aware of your own infrastructure, when you’re on the opposite side you see people that can help you with computers and that’s it”. As the services began to integrate with library staff, the colors helped easily identify the different services within the space. “It has been a really good bridge for us on the IT side to interact with people”. He believes that starting from scratch, a subtle integration of color coding through the architecture would enhance the way students identify with the different services.

Integration of Input with Services in Design

He felt that it would absolutely help to “collate services with their support structures.” He mentioned that they were working according to a five-year design, so that "different players came in and out." Within a month of the opening of the space, the former service backed out of the space and the green team stepped into the space: "With support models, support Is usually thought about last, and it needs to be the other way around. If you pair designers and support, then the support usually ended up being better."

In addition, the sustained communication of different services was very important. "In this space the staffing and the merging of service is working because the managers of those groups are able to communicate. (The director) has been a lynch pin between merging the library and ITS". He noted that the director had been integral to bridging the divide between library staff and ITS services.
**Location of Service Space**

The manager considered their location to follow a casino model, meaning that the students have exposure to all of the spaces as they are led back to IT services. While a plus for exposure for the library, he believed that it created a problem in terms of visibility for his services: "I think the library would prefer if we were closer to the front."

He noted that at the beginning of the year the librarians had to constantly tell students where the green team was located: "Their arms are permanently cocked with their finger pointing down toward our desk." He considered having an external desk toward the front at the beginning of the year just so students would find the green team.

Figure 4-22. Preference for Front of Knowledge Commons for Greater Visibility
Fig 4-23: The highlighted column reportedly obstructing visibility

At beginning of the year the IT group typically has 20–25 people waiting. He mentioned that he worked with the director to alleviate this by using three of the break out rooms for their services at the beginning of the year. That flexibility has been a big plus.

**Private Space**

The manager had requested privacy film for his entrance and believed he was fortunate to have this. He cited a need for an area that is more centrally defined as a staff meeting room that would be close to service locations. The current location of these spaces is too far away, or spaces geared toward students are too far away for him.

**ITS Perspective on Central Space**

The manager came into the planning phase later and would have liked to see more computers within that space. He also mentioned that during the planning process the
belief had been that "kidney shaped tables would comfortably hold two or more people, which is certainly not the case, it’s a little bit crowded." He wished the tables could be smaller. He mentioned that the group study spaces have been tremendously successful and the provision of a screen that shows appointments would improve the space.

“Blue Team” Director

The “blue team” group focuses on lab-consulting services. While these services are available throughout the campus, there are two dedicated staff members within the Knowledge Commons. The primary focus of this team, “the blue team”, is responsibility for desktop computers as well as the 15 printers within the library. These members will routinely check paper levels and the status of printers.

The Service Desk

Initially the service desk was going to be used for a media tech rental office, but it became part of the “Green Team”. The services work together with the other services in the team. According to the director, “The IT services have had a presence in the library for a considerable amount of time. We’ve supported the library for over a decade, so it was very natural for us to be a part of this space.”

What was most successful in the new design? “The library is always busy”, in the assistant director’s opinion, and the most successful aspect of the space is that “the space is very welcoming”; while the old space was busy, it was not as welcoming and the lab was completely enclosed. “The reserve reading room was a gigantic space, from my recollection it didn’t get the same amount of traffic.”
The second reason was: “The many different services that are combined in to one area”—computers, places for people to sit, rooms available by reservation, the service desk for IT assistance.” In other words, “there’s a lot of different aspects for people to use . . . “we were worried about (the integration of services) early on, whenever you combine space like that, we have combined five consultants into one space and its very confusing for the customer because they won’t know who to go to.”

What has been the least successful in the new design? “One of the things personally, where our consultant is located, is far away from the printers, we wanted it but it just wasn’t in the cards.” He noted that the consultants have to wait until someone tells them that the printer is down. If they are helping someone and it is called to their attention they can deal with it more easily. This was the “one big thing”, which continued to be mentioned that it hasn’t been a big problem: “I think if one thing from a support standpoint, being next to the printers, would have been better for us.” Since this group rarely consults students at the desk, rather at their own computer, the placement of the printers would not interfere with consultation.

Lounge Space

People use them, but I think the students would have preferred computer stations, I think that is not an area where students just hang out, there are other places students can do that. If students want to sit down and just do work, this is not it. This is a computer lab that has IT support, reference support where students are doing more intense work. If they were to redo or reconsider the plan that is something they can get rid of…” “I think those areas, where students are just
sitting and lounging, I don’t think its as useful… its over fill for students waiting for computers.” “Its an overflow area, I Think they could better use that space.

**Orientation of “Blue Team” Services**

Having us be at the entrances might even had been better, so when they pass us they know where we are, so maybe if we had been put at the middle of the locations, I’m guessing on that but another thing is maybe next to the printers.” “You want to be close enough to the printers, close enough to the entrance.” “We could be by the front, but where we could fit four, five, ten people there that wouldn’t block the entrance or the printers.

He did not believe a barrier would be necessary, but space that would separate them from the students’ central desks would be helpful. He felt a study space would be more ideal in another building: “we currently have the consultants at a desk at the front… there’s a big walking space, the printers, then the computers, so its like everything is laid out in front of the consultants than the big rooms are laid out around the back, it is a very ideal set up for us.”

**Color Scheme Identifying Services**

I think color schemes would be interesting, if there was a green color scheme in the backdrop as sort of a subliminal identifier, with the shirts. Oh yeah I think something like that, being subtle enough so it works with in the space, but identifiable enough. What the colors mean at a rudimentary level is that these people are different from those people.
With the architecture, the purple team being in a more quite space lends itself to tutoring, the blue team, being by the entrance and the printers lends itself to kind of, we’re in charge of the lab, the service desk for the green team is kind of tricky, with how many different things they do, whether its personal or wireless, I’m not sure there is a good architectural solution for this, other than being in their own separate place, where they are separate from these other areas.

“One of the things personally, where our consultant is located, is far away from the printers, we wanted it but it just wasn’t in the cards.”

Fig 4-24: Preferred Location of Printers by Blue Team Director.

“The blue team, being by the entrance and the printers lends itself to kind of, we’re in charge of the lab.”
“They need more space, they need separate space, but they certainty need to be part of the group.”

You have mentioned sound could you speak more about that? “During parts of the day when it gets busy, its just talking, its just chatter . . .if you have 200 people whispering, the acoustics are going to cause things to get amplified especially in a closed space like that.” He continued, speculating, “Students today I feel like are more
easily able to distance themselves from sound.” He mentioned the use of ear buds:

“Students are a little different, so I’d be curious to find out if they think it is a problem, IT a generation difference, I think its loud, but do they think its loud? they have their ear buds in and are so focused so I don’t know if it is a problem.”

**Sound**

According to the director, “I can definitely understand where people are coming from where they have to be quiet, and I think that is probably one of the downsides in having so many different things in one area. You have the tech tutors, they are a little more controlled, but the service desk, our consultants have to talk to people it’s a part of their job, and librarians… and people having normal conversations.” He believed that the noise level spikes in the afternoon.

**Defining Knowledge Commons**

When asked to define the concept of a knowledge commons, the director stated that “It is a place where people can go to use the technology at hand to get their work done. The problem is identifying, what is the technology at hand, what is there work, from the libraries and point I think they want to have a place that is attractive to students, that is very comforting, welcoming that has all the different aspects to gain knowledge that students need.”

**“Purple Team” Director**

The meeting with the Technology Tutor director began with a briefing on changes being made in another building, which borrowed some ideas from the Knowledge Commons, including increasing the amount of collaborative space. However, responses to a survey conducted in house indicated that students would prefer more machines in the
Pollock space as well as a bigger desk. Looking at the knowledge commons as a precedent, the director found that “the kidney bean shape of the knowledge commons desk is really appealing but the problem is they have that high shield, so four desks take up an awful lot of space.” He described how the tables were changed to be larger than what exists, but not quite as large as the knowledge commons desk.

**Tech Tutors in the Knowledge Commons**

According to the director, “We have really unique service, especially in ITS, its unique because the nature of our consultation demands more time.” He continued: “The fact that where it is positioned is key for us, near the entrance.” The provision of the flat screen can be set up as a sign so people can know it is a tech tutor space. The Tech Tutor director mentioned that the service has evolved in the space—“a space can be inviting, but if you don’t have an inviting demeanor, a space can only go so far.” With regard to the addition of glass: “I think having the glass cubicle has been a major asset for us, you are visible but not audible.” The director was appreciative of the fact that the current room is spaced away from all other services to provide space. If the space was larger, he would recommend consolidating services into one area.

**The Planning Process**

In spring 2012, The Knowledge Commons became available to students. At the same time, the Tech. tutors began to offer their services. Initially they were a small service, so the director of The Knowledge Commons asked that the tech tutors consider being associated with the space. At the beginning, the purple team opted out of being within the space, but this decision changed by fall 2012: “having boots on the ground so to speak, in a high profile, high traffic area is worth its weight in marketing gold”.
**If the process were to start, what would you change in the design?** “What leaps immediately to mind is, I would include machines in the space”: for the purposes of the tech tutors, a native machine would help them logistically. Currently a laptop is used and stored off site during hours when the tech tutors are not in session. In addition, when students ask for help from their respective desks, the tutor has to take the laptop with them out of the space so it is protected. “The students generally come in one of two ways, either they need help and ask people to come with us, which raises another problem, with equipment.” Beyond the provision of a native machine, he does find the media-scape setup to work well.

**Would you prefer the room to look different than all of the other breakout rooms?** “I would absolutely, I mean that’s a branding issue and that matters.” “I’m not necessarily asking for something completely different, so again in The Knowledge Commons I would want it to have a common theme, but something to set it apart.” He imagined one wall potentially being purple glass to denote the tech tutors: “I wouldn’t want it to be something radically different because that would detract from the overall feel… you want to stand out but you want to keep within the overall spirit of the space.” He noted that they have signage now, but is not sure how effective it is.
Fig 4-26: Shaded Zone Indicates Potential Signage That Could Be Added to Make the Space More Identifiable.

The director felt that the space provided worked well for its purposes. He also indicated that adding more space would make the spaces too awkward. In the spring semester the maximum number of students who came in at a single consultation time was three individuals plus the consultant.
Fig 4-27: Shaded Zone Indicates Area Where Purple Team Would Prefer to Be, In Between Both Entrances

**Visual Cues and Color Coded Services**

The color purple was selected for the tech tutor team. The Tech Tutor director expressed another concern: “How do we help with advice that doesn’t relate to our team?” Early on each team mentioned that they must have an appropriate hand-off to another team in a professional and appropriate matter. Sometimes the purple team will field a basic issue that may not be a part of its own respective scope while at other times it provides assistance when another group is overwhelmed. The application of different
colors has, in the director’s opinion, helped with communication between services in general. The director would have liked to see a color-coded directory for different services at the entrance because he believes that this would be of great service to future, similar spaces. Corresponding signage in each area with the entry sign would help identify each service: “I would jump at the opportunity to have some kind of sign hanging from the ceiling, that would be enough of a distinguishing feature.”

I think the space from standing should be quite clear, so you can survey the area, that is the difficulty with the shields in the central space. I think you need to have as few obstructions of visibility not just for the sake of the students but as well for the sake of the people who are servicing the area, that would help us with students who need help.

**More Space**

“I would love to have another cubicle” “If we could have two cubical back to back, our service would be much smoother, we have had a number of people waiting.” “our average student consultation is about a half-hour” “Having a secondary space during a peak time would be very valuable to us, and that peak time is from 1pm-2pm and slowly plateaus to about 6pm” “Tuesdays and Thursday are always slow than Monday, Wednesday and Friday”

**The Term Knowledge Commons**

While the term Knowledge Commons is unique, the idea is not. The Tech Tutor director recounted an experience at another university: “When I first saw the space at another university, and I thought nobody is every going to use this, but it was busy.”
Do you think the association with the library has affected some of the perception of how to act within The Knowledge Commons? “Surely, most definitely. That is what I have been most impressed with The Knowledge Commons is the integration of what would otherwise be a fairly sophisticated computer lab with the library, the fact that The Knowledge Commons director is there and is a librarian really matters.” The Tech Tutor director mentioned that in looking at future design elements: “I think proximity to a library matters. I think that they are under one room matters. Students will leave get their stuff and come back. The association with the library is an asset; the geographic location on campus is an asset.” “I think the library, the architecture and the location matter, are these the only things, certainly not, the bottom line is, students want computers and secondary they want to print, I think the third priority is having enough computing space.” In a survey conducted by his area, hundreds of comments were submitted concerning finding a way to render students unable to stay logged on a computer and leave.
Fig 4-28: Shaded Area Indicates Current Placement of Services
Lead Architect

The head architect of the project described his role as the project manager and designer. His primary goal from the architectural side involved looking at codes and working with a designer on the interior design. The project also involved other phases within the library, including the central lobby and reading room.

What were your main design goals for the Knowledge Commons? The architect mentioned two primary design goals. The first was to make the space flexible in order to change over time, while the second was to function as a space that fosters collaboration: “Flexibility, functionality, the fostering of collaboration and inclusion in the 24 hour zone.” The university provided the architects with a report conducted by students which served as a “spring board” to begin the design. The premise was to create a space for students to come together and to collaborate—“not a white walled space”. The designer professed having little library-related experience prior to this project however his firm had created several student unions, computer labs and lounges. The idea was to maintain flexibility for future technology changes.

The architects expected students, faculty, staff and public to all use the space. Students were expected to use the space for collaborative projects as well as independent study. To better understand how collaboration was to be achieved, the firm worked with several sources, including a student report, examples of other knowledge commons spaces on similar campuses across the country, and the opinions and insights of librarians and technologists.
The use of technology was reported to be an initial design parameter. The provision of outlets was very important to the designers, so that students could plug in and charge their laptops, tablets and cell phones when they needed to do so. In addition, flexibility was an important factor in ensuring the ability to respond to future changes as well as unpredictable technology changes. A raised floor system was also an aspect of the design to allow for greater flexibility in the future, as wires run underneath the floor system rather than being imbedded in fixed columns.

**Transparent Wall Surfaces**

According to the architect, “Students today like to see and be seen”—this was offered as one of the reasons for the heavy use of glass for wall surfaces. Although not pursuing LEED certification, the architect mentioned using guidelines as a resource for ideas in creating the design. One aspect cited as an inspiration from LEED was a focus on day lighting and views to the exterior. The use of glass partitions and the shape of the breakout rooms were used to provide more views outside: “You’ve got the ability to see the sunlight to come through.”

In addition, the architect offered that: “The transparent walls also were designed to be easily removed and easily changed to an opaque or translucent surface if that became desirable in the future. The partitions are non-load bearing and could be removed entirely with little issue in the future as well if this was decided to be done.”

**Breakout Rooms**

In addition to day lighting, the architect continued, “We generally like the shape of the breakout rooms”—had the shape been rectilinear, it may have been too small, limiting the space inside of each room. When asked what they expected students to do in
the breakout rooms, one main goal was to create spaces based on the curriculum of collaborative work as well as the rise in laptop use:

. . .we have been hearing, plus the students who recently graduated and work (for the firm) mentioned how many more collaborative projects the professors give the students and that there really aren’t places that students could get together and use something like this (the room).

The architect proceeded to mention, previously, students would often work together in environments that would require them to be huddled around a single laptop screen. The design of the media scape with the LCD screens provided a more appropriate way to work together and achieve their goals: “So the types of projects the faculty have been giving students, and the pervasive use of laptops and technology, creating spaces that support that was a main goal.”

**How do you see students using the central space in comparison to the breakout rooms?** According to the architect, “(The break out rooms) have a bit more acoustic (treatment) so you could have more meetings in here and have a lot of back and forth. Where (the central space) is more seat yourself, and the ability for kids to get together and groups of whether its three people at one desk.” . . . “so my understanding is during finals or whatnot, is you could get kids pulling out chairs, I mean we have pictures of five or six around these tables. Also if kids were lucky enough to get [the four tables], you could get eight kids working around one grouping.”

The grey screens are adjustable—the architect wanted to keep the screens low so you could see other people, so when you walk in it is not a “sea of grey screens”. The
height was determined to provide a certain amount of privacy to allow for kids to work in groups.

The architect noted the assumption that many students would use headphones which would block out sounds of loud neighbors: “We took into account headphones, even if this group is talking, there is a very good chance the group, or individual next to them might have headphones on and just be oblivious to what is going on.”

What about circulation, was that a concern? In response to this question, the architect stated, “That’s why we made the corridors a bit wider, we wanted to provide the ability to survey the space when you come it.” He then discussed how the angle of the ceiling and surface texture helped to define the differences in program. Canted ceilings were used in spaces used for studying, while flat ceiling tile was used for circulation. “When you walk in you’re going to see a sea of heads, and so how do you define these spaces?” The acoustic treatment was also to create acoustic ceiling panels that cover the ceiling, carpet and people themselves to control acoustics. In addition, not having parallel reflective surfaces reduced “bounce back.” The angles of the breakout rooms in part took into account the acoustics, where lounge spaces could be buffered for the angles.

Lounge Space

The spaces were designed for flexible conversion into breakout rooms if this became desirable later on. Currently, they were designed as a collaborative space. While the architect planned for more chairs in the lounge spaces, the planners waited to see how the space worked and whether the lounge spaces were successful. Proximate to the chairs were outlets so students could use the space for long periods of time as well as to charge
phones. The architect also discussed the provision of outlets in the furniture rather than in columns to allow for flexible movement as well as the flexibility over time: “The kids need power, power, power.”

“From a flexibility standpoint the round tables were used to fit over the armrest and could be used for a laptop but also suitable as a stool.” The LCD screens were provided in part so that space could be converted into breakout room-like spaces.

**Services**

Initially the space was going to be a place to rent cameras and other media technology. It was changed because the media tech space needed more area than what was being provided. The solution was to turn the space over to an IT service desk because it still fit with the mission of the commons.

This space wasn’t going to be an IT service desk, it was going to be something else. This was always going to be a storage room, which it still is but its also an office which we felt was do-able because the guys aren’t always occupying the room.

The architect mentioned that during consideration of visibility for the librarians, or “technologists”, one solution was to provide signage on the columns within the space to help students find help. The “Ask” text was added later to provide further visual communication: “From a program standpoint, the media technologists was a real good program feature for The Knowledge Commons piece.”

**So was this proximity (to the IT desk and the study desks) a concern for people studying, or did this go back to the argument of people using headphones?**
“Yeah, it went back to the argument of the headphones, and the opportunity to provide a lot of queuing space here, because we knew you could get rushes of people in between classes, or if you had people with quick drop off and some consulting space, generally we felt like it was going to be enough acoustic separation, and uh overall this wasn’t meant to be a real quiet space, I’ve walked in here when its been dead quiet and I’ve walked in when it has been quite lively, the idea is there would be enough white noise to mask any confidential white noise that goes on here.”

**Design Summary**

The main focuses of this design were collaboration, the provision of technology supporting spaces, as well as the flexibility to adopt future changes. Within the breakout rooms, transparent surfaces with views and day lighting were considered: these spaces were intended to foster collaborative activity while in a sound isolated space while still being able to “see and be seen”. The shape was decided in part to allow for extra room to accommodate more students and flexible use. The central space was meant to accommodate both collaboration and independent use; however, single users expected not to be bothered by noise because of the assumption they would use headphones. Visibility of the desks from the entrance was important, as was the spatial demarcation, represented through ceiling design.

The lounge spaces were perhaps the most “experimental”—the space was also meant to have the same goals as the rest of the space: to foster collaboration and technology use. Further, the space was designed to allow easy adaptation into a more collaborative space if later deemed necessary. The IT desk was initially allotted for another function since it was believed at the time that this design would provide the right
type of space for IT services and enough acoustic separation since it “wasn’t meant to be quiet”. Signage was later added to help identify special services.
Chapter 5

Conclusions

Based on this study’s findings, the Knowledge Commons is a popular space for a diverse cross-section of students on campus. The users are diverse in major, gender and grade level. Use within the space is also diverse. While the space can be considered a valuable asset to many students on campus, several of this study’s findings could contribute to the design of future spaces similar to the Knowledge Commons.

First, clear communication and planning with all vested stakeholders is critical to the development of a design that provides an optimal environment for all users, especially students and staff. Both students and staff members should have an environment that both allows them to do their job and enables them to clearly communicate with each other as well as having access to an architecture that assists in the communication of amenities and services to students. A series of guidelines pertaining to the specific case study space are offered below—these statements also could contribute to an understanding of how to achieve a design that enhances the experiences of both students and staff.

Student Spaces

Conclusions regarding student spaces were derived from survey responses, time study observations, interviews and other observations:

1. Collaboration in the Central Space is Relatively Low: Desks are often heavily used.

While the findings suggest that collaboration is occurring in the breakout rooms, the extent of collaboration in central spaces according to the time study was between 0%
and 14 %. If central space is to be used to provide a space for collaboration, then it may be occurring much less than intended.

While the study cannot verify the reasons for this, the data collected suggest a few possible contributing factors to the relative lack of collaborative activity. The first has to do with the way in which survey respondents answered questions relating to sound: those who filled out the survey while in the central space averaged above “3”—the average. While the space was perceived to be loud by many who filled out the survey between 1 pm and 12 am, others noted that the space was quiet and very loud at different times. This trend was further affirmed in the interview with the Knowledge Commons director.

In addition, the central space was often heavily used while some respondents using the breakout rooms appreciated the ability to reserve the room as a factor in selecting the space. Partners seeking to meet in the central space may find it difficult to secure a table during certain planned meeting times.

In future designs, if the space is to be used to maximize collaboration, the central desk space should be smaller or acoustically divided into several spaces to avoid a “trickle effect” of sound. In addition, since the space is associated with the library, some people enter it believing it to be a quiet space. If the intention is to foster a mixed use of both isolated study and collaboration, the space may still be better served by being broken into smaller areas and providing greater visibility to all desks.

Next, if the space is to be used for more independent study, desk space could be reduced. While students commented on the positive aspects of having ample desk space, the benefit to providing more computers would reduce crowding.
2. The ability to reserve breakout rooms was seen as an important factor in its selection.

One reason for space use noted by all three interviewed groups was the opportunity to reserve space. The need to definitively define a space for a given time was important to these groups. In addition, survey respondents who submitted a survey in the breakout rooms found the sound level to be about a “3”, with a variance of 1 either way. This means that most found the space to be neither too quiet nor too loud, but an acoustic environment suitable for their purposes.

While reservation was a key factor in selection, some respondents wished there could be better visual communication about reservations. If a group was running late for their reservation, some students assumed the space had not been reserved and occupied it. In addition, waiting students would sometimes glare into the breakout rooms, causing the occupied group to feel uncomfortable.

It is strongly recommended that other spaces like the breakout rooms also adopt a reservation system. The transparent walls help students see which rooms are occupied; however, a more intuitive reservation system and way to identify which rooms are available would help alleviate misunderstandings.

3. The central and identifiable location on campus was seen as an important factor in choosing to use a Knowledge Commons breakout room

According to each of the three focus group interviews, students felt the location was a factor in their decision to use a breakout room. Positive aspects of the location included its centrality on campus, being close to offices, classrooms, dorm rooms as well as apartments in the downtown area. Further, its association with the main library made
them attractive; one of the groups noted that students found that it was easy to coordinate group meetings because it was easy to provide the location.

When considering where to build an informal, collaborative, technology-based hub on campus, it is advantageous to position the space within proximity to many other services on campus and easily identifiable. The association with a well-positioned main campus library is advantageous in this regard.

4. Breakout Rooms are heavily used; use is diverse

According to the three observation/focus group interviews, breakout rooms had been used as an informal classroom, a laboratory to take apart a machine and a place for mixed group study. In addition, based on observation, the room had also been used by single users. The use of technology was diverse. In addition, the white boards were observed and described to be valuable assets for people using the breakout rooms; they were observed and described to be used for to teach students phrases, draw maps, and write math equations for group study, for example. None of the three groups observed used the LCD screens. Two of the groups claimed they planned on using this technology in the future, while the other group claimed they had used it in the past.

Future design of breakout rooms should take into account the diversity of potential users. Considering this space was found to be popular with a vast cross-section of students, spaces similar to this could have a broad appeal to many specialized majors in areas closer to core classes. White boards should be seriously considered as a collaborative tool.

5. Thermal control seen as positive: some were not aware that they had this capability
Many student respondents felt the thermal control was a positive aspect of breakout rooms; however, some students were unaware that they existed. Greater visibility of thermal control devices could raise students’ awareness of their ability to change room temperatures to ensure their comfort.

6. Some students were observed manipulating the Lounge and Quick Access Spaces to achieve more work surface space

While not the observed norm, in some instances students adapted the space to gain more surface space. In the quick access area, some students used the ledge behind them as a secondary storage place for study materials and food. In the lounge space, students used more than one round end table for surface workspace; in addition, the armrest of the chair at times became a writing surface. The coffee table served as a footrest, as well as storage for study materials and food. This finding is reflective of attitudes toward table work surface space. When surveyed on attitudes toward table surface space, the lowest average was found for lounge space. Future designs that include end tables should consider making them larger in order to accommodate writing and laptop use.

7. The quick access tables would be better served in proximity to the printers

Those who did submit their surveys at the quick access tables indicated a relatively high percentage of printer use. While this was the case, the quick access tables are actually the furthest from the printers. Since quick access tables are marketed as being for quick use, it makes sense for students to use them to print something quickly. Placing the printers far away, then, causes students to spend more time getting to them while
generating more noise and visual distraction (stimulation) for those studying in central space and breakout rooms.

If quick access-style tables are to be used, it is important to place the stations near printers so students can quickly print. In addition, future research should be done about the best position of such furniture.

**Service Spaces**

Conclusions relating to service spaces are based on findings from interviews with the directors of each service space. The following quote from the director highlights an overall theme regarding the need to integrate services into the design:

What has evolved is how we bring in the IT consultants, we weren’t sure where the blue team was going to be, we didn’t know actually where any of the other teams were going to be, in the design of this. They were never part of that design, they came in almost after… they were always a part, but in the planning of it since I wasn’t involved in the planning, I’m having to inherent that, I didn’t have a clear direction as to where we are going to put these. From the very beginning we knew we were going to have the blue team, we didn’t know we were going to have the purple team or the green team or the tutors, but the vision was this one-stop shop, so the vision always had these units involved but never... thought through where they would be in that one area. So we had to kind of make some, decisions that have worked for us, but it may have been a very different space if we were thinking about (each team) when we were planning it (Interview with Director of the Knowledge Commons, 2013).
8. All services recommended designed signage that incorporates color-coded distinction in future design

In every interview with the directors of each service, each expressed interest in incorporating signage into the design. In addition, each director felt that the color-coding system that has evolved has worked well to easily inform students about differences between services.

Future designs should adopt a similar visual color-coded system when an array of services is stationed within the Knowledge Commons. The design should easily communicate the different services and be easily identifiable upon entrance.

9. All services expressed a wish to be located differently within the space

When asked, each director cited benefits in being located in a different area within the commons. The following guidelines reflect these desired changes:

a. The “blue team” ITS services would be better served in proximity to the printers and entrance.

The blue team indicated that a portion of its job is maintenance and upkeep of the printers; currently, the blue team is far away from the printers, making it difficult to know when the printers are running low on ink and paper. The employees must walk to the printers or be informed by a student that an issue has occurred. In addition, while the blue team is responsible for the printers, the green team is closer to the printers, reportedly creating a false association with printer maintenance. In addition, the director would have preferred to be in-between the two entrances, to give the service desk more of a presence so students
would immediately know what service was responsible for the desktop computers.

In future design, the service desk should be closer to the printers. Additional time spent maintaining the printers would be eliminated, providing employees with more time to handle other responsibilities. In addition, the association with the printers would more clearly communicate one of the roles of the Blue Team. A location between the two entrances would also more strongly communicate to users which service is in charge of the central space.

b. The “green team” ITS services would be better served with inclusive consulting space, transparent sound barrier and visible location

The green team director expressed interest in being closer to the entrance of the Knowledge Commons space, citing greater visibility and the opportunity to prevent new students from asking librarians where ITS services are located. Currently, the space is at the back of the Knowledge Commons and partially obstructed by a large column. The location reportedly is most problematic at the beginning of each semester, when librarians at the front of the space have to constantly inform students of the ITS location. In addition, the director thought the consultation space would be better served by having an enclosure that would prevent noise from his service into study spaces, as well as a space that would accommodate students better when they require consultation.

In a future design, a service similar to the “Green Team”, which helps students with their own hardware, would be better served by a more pronounced entrance that is more visible to the entrance.
c. The “purple team” wishes to have a second breakout room, with views toward more students working in the space

The purple team director indicated a desire for a second space next to the first for consultation. The space would be centered so that each would look out on students working in the central space so that they could be helped when they needed it.

10. The ability for services to see other services is beneficial for communication and coordination

As noted in the interview with the tech tutors director, the services located in the commons would benefit from the ability to see each other. This would be especially beneficial at times when one service may have a greater customer flow and therefore may need additional support from other services.

Figure 5.1. Visual Connections Between Service Stations
11. Proximity of staff desks to study spaces may contribute to some students’ attitudes toward noise

Among complaints about noise, at least one student indicated that the noise was being generated by the staff. This person was proximate to the IT desk.

12. Director appreciates transparent walls, but wishes he had a semi-private space

The director of the Knowledge Commons believed that the transparent walls and central location of his office were great strengths. However, he wanted a space where he could conduct private meetings with his employees. Future design should consider this function in administration spaces.

13. Definition of the “Knowledge Commons”

Each director had his or her own take on what was meant by the concept of the Knowledge Commons. It may be beneficial in the future for each team member to sit down with the architect and define what they are trying to achieve so that a meaningful dialogue can take place. Another solution may be to further define the space in a more specific way. The term could mean the inclusion of some services, but is too vague to clearly define the mission. By defining the mission more clearly, the social expectations and norms of the space may be more clearly defined. If done appropriately, the space could then be viewed as a center for help from services, a collaborative space, or an independent study center. If the goal is to incorporate all of these services into one space, it may be best to further break it up so that there is ample space to meet user needs.

14. Communication during the planning process
Engaging every stakeholder in active dialogue at the beginning of the design process is crucial. To achieve a balanced design that optimally meets the needs of every user, both services and students, this dialogue must take into account not only the isolated needs of each service, but holistically consider how the positioning of each service and space can strengthen the whole design.

**Summary**

In the design of future spaces similar to the Knowledge Commons, it is important to define the scope of the particular “Knowledge Commons”, with each stakeholder present at the beginning of the design. Whether it is Librarians, Technologists or Students; each member should be present and actively communicate their needs from the beginning of the process to the end. A design that balances input and needs in an integrated manner will ultimately lead to a designed environment that supports cohesive relationships among all space users. In a complex social space such as the Knowledge Commons, active participation among members is not just encouraged—it is vital. A design that fosters a clearly communicated mission and addresses the needs of vested stakeholders can greatly enhance the experiences of those using similar spaces.
Figure 5.2. Diagram of Design Process
Figure 5.3. Diagram of Integrated Process for Future Design

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Appendix A

IRB Approval

October 02, 2012

IRB Protocol ID: Follow-up Date: Title of Protocol:

The Office for Research Protections - FWA#: FWA00001534 Stephanie L. Krout, Compliance Coordinator

Alex B. Donahue Determination of Exemption

41020 October 1, 2017

The Campus as Classroom: Designing for On Campus Collaborative Learning Spaces in an Era of Technology Proliferation.

The Office for Research Protections (ORP) has received and reviewed the above referenced eSubmission application. It has been determined that your research is exempt from IRB initial and ongoing review, as currently described in the application. You may begin your research. The category within the federal regulations under which your research is exempt is:

45 CFR 46.101(b)(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.
Appendix B

Time Studies and Qualitative Responses

The following diagrams are for a series of time studies covering various times of the day and days of the week. The main focus of the studies is to provide further understanding of trends in collaborative versus independent use as well as occupancy of the four types of space.

Time Study:

October 7, Sunday 10:00 am - 1:30pm

observed from the opening of the commons at 10:00 am to 1:30 pm. The rational is again to understand off peak use preference, considering that no one is able to occupy the space until 10 am, we get a clear sense of where people sit given the chance to sit anywhere.

By 11:00 the bean shaped tables and the large and small breakout rooms are occupied. Neither the lounge space nor the quick access areas were selected for use. During this time it should also be noted that none of the bean shaped tables are being used for independent use.

By 12:00 pm, there is an observed instance of collaborative use at the bean shaped tables, however it is just a singular instance. There are still not any observable instances of use within the lounge spaces or the quick access desks. At 1:00 pm the first instance of use at the quick access desks is achieved. This is also the first time that there is an instance of use within the lounge space. At this time the occupancy of the bean shaped tables is at 91%.

91% The maximum occupancy of observed at bean tables
8% The maximum occupancy of quick access desks
4% The maximum occupancy of observed lounge space seating
5%  The maximum percentage of collaboration at bean tables.
56%  Percentage of occupied stations by 1:00 pm

Time Study – Sunday, October 14, 2012. 10:20 am – 1:00 pm

The rational is again to understand off peak use preference, considering that no one is able to occupy the space until 10 am, we get a clear sense of where people sit given the chance to sit anywhere.

10 minutes after opening we clearly see that the bean shaped tables are selected over other unoccupied study spaces. We also see no instances of collaboration in the observable zone. However, preference is shown for other spaces by 11:00 am with at least some use shown in all of the areas other than the large breakout room.

While others do prefer the larger space, it is important to compare occupied space with available occupied space. Through this understanding, we see the most saturated space to be the central space with a maximum observed occupancy of 77% of tables. The maximum table occupancy for the quick access is 38% and the lounge space maximum at just 8%.

In terms of collaboration, other than the breakout rooms it appears a strong favoritism to work independently in the other spaces.

77%  The maximum occupancy of observed at bean tables
38%  The maximum occupancy of quick access desks
8%   The maximum occupancy of observed lounge space seating
5%   The maximum percentage of collaboration at bean tables.
55%  Percentage of occupied stations by 1:00 pm
Time Study – Saturday, October 20, 2012. 10:20 am – 1:00 pm

50% The maximum occupancy of observed at bean tables
0% The maximum occupancy of observed lounge space seating
0% The maximum percentage of collaboration at bean tables.
50% Percentage of occupied stations by 1:00 pm
Time Study – October 20, 2012 10:20am-1:00pm

Time Study – Saturday, October 28, 2012. 1:40-4:40pm

77% The maximum occupancy of observed at bean tables
38% The maximum occupancy of quick access desks
8% The maximum occupancy of observed lounge space seating

Time Study – Saturday, November 6, 2012. 6:30 am

77% The maximum occupancy of observed at bean tables
38% The maximum occupancy of quick access desks
8% The maximum occupancy of observed lounge space seating
Time Study, Saturday, November 10, 2012: 9:00 pm – 11:50 pm

This is a rare instance observing the hours leading up to the closure of the knowledge commons. What is surprising is how occupied the space this late on a Saturday.

Compared to studies at other times, the amount of collaboration within the central tables is relatively high, however the maximum amount this occurred at is below 10%. This did increase the amount of noise that was generated, which was documented.
The amount of seating at the quick access desks were also high, the maximum in this instance is 64%. The lounge space appears to be crowded, however when we look at the amount of open seats versus occupied seats, the total amount was a maximum of 27%.

87%  The maximum occupancy of observed at bean tables
64%  The maximum occupancy of quick access desks
27%  The maximum occupancy of observed lounge space seating
9%   The maximum percentage of collaboration at bean tables.
### Qualitative Survey Responses

**A. What did you like the best about the space you used today?**

<table>
<thead>
<tr>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large white board + ample desk space</td>
</tr>
<tr>
<td>I like the privacy and the space in general</td>
</tr>
<tr>
<td>I liked that there was enough space for all four of our group members and our belongings</td>
</tr>
<tr>
<td>The set up, table, lighting. Chairs, everything.</td>
</tr>
<tr>
<td>The tech. help</td>
</tr>
<tr>
<td>The people in it</td>
</tr>
<tr>
<td>Table space. Personal room, quiet</td>
</tr>
<tr>
<td>Space</td>
</tr>
<tr>
<td>Being away from normal day to day interactions from other people.</td>
</tr>
<tr>
<td>I like how it is quiet and allows us to work together at the library</td>
</tr>
<tr>
<td>Computer Desk (rounded one)</td>
</tr>
<tr>
<td>Screen (Check) Quiet (Check)</td>
</tr>
<tr>
<td>Its integrative and allowed for productive work in our group situation</td>
</tr>
<tr>
<td>The couch</td>
</tr>
<tr>
<td>Quiet</td>
</tr>
<tr>
<td>Clean</td>
</tr>
<tr>
<td>Its comfortable, there is enough space between computers</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>The fact they have adjustable heights</td>
</tr>
<tr>
<td>The staplers next to the printers</td>
</tr>
<tr>
<td>It was pretty</td>
</tr>
<tr>
<td>I love being able to stand and still work at a computer but then sit down and not have to switch locations.</td>
</tr>
<tr>
<td>Group study rooms and technical support team</td>
</tr>
<tr>
<td>The chairs are comfortable for sleeping, the computers have Japanese + German spell/grammar check dictionaries in work, its open when I get on campus at five.</td>
</tr>
<tr>
<td>Comfy sets/ Couches, easy space to work in.</td>
</tr>
<tr>
<td>The chairs are comfortable and lots of outlets</td>
</tr>
<tr>
<td>Always open space, and a rather quiet environment</td>
</tr>
<tr>
<td>its pretty</td>
</tr>
<tr>
<td>I loved it. It as nice to have a space where I can study.</td>
</tr>
<tr>
<td>It was very comfortable</td>
</tr>
<tr>
<td>The chairs, the small stands to plug my laptop in.</td>
</tr>
<tr>
<td>Couches, Computers</td>
</tr>
<tr>
<td>Nice scenery, atmosphere</td>
</tr>
<tr>
<td>The wooden chairs on the second floor</td>
</tr>
<tr>
<td>Sofa</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>Desk space, outlet</td>
</tr>
<tr>
<td>Feature</td>
</tr>
<tr>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Large monitor</td>
</tr>
<tr>
<td>Large desk space</td>
</tr>
<tr>
<td>How large the computer and desk is</td>
</tr>
<tr>
<td>I had room to spread out all my handouts and packets to write my exam paper</td>
</tr>
<tr>
<td>The adequate space and computer</td>
</tr>
<tr>
<td>AT&amp;T Room</td>
</tr>
<tr>
<td>The ability to use notebook and see the screen with space</td>
</tr>
<tr>
<td>The table is really big, screen is really big, Two people can work together</td>
</tr>
<tr>
<td>Quiet</td>
</tr>
<tr>
<td>Large Counter area to spread notes/books on</td>
</tr>
<tr>
<td>Big computer screen. Actually got a computer plus it was near the bathroom and I have to pee a lot. This is not a joke btw.</td>
</tr>
<tr>
<td>Spacious Table</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>Big desk, wide screen computer unlike other computer lab areas, personal space is guaranteed.</td>
</tr>
<tr>
<td>A lot of workspace</td>
</tr>
<tr>
<td>big computer screen</td>
</tr>
<tr>
<td>Big computer screen</td>
</tr>
<tr>
<td>It has ArcGIS on it</td>
</tr>
<tr>
<td>The desk</td>
</tr>
<tr>
<td>Everything is perfect about the space in terms of the computer, work room and outlets</td>
</tr>
</tbody>
</table>
Computers with big monitors and big desk!

It was sick. Nice TV

### B. What did you like the least?

- People seem to think the other rooms are sound proof
- It is cold, there is a draft.
- The shape of the table, because some people had less space
- n/a
- The smell of the people next to us
- X
- Kind of Dirty
- The carpet
- I dislike how the neighbors are playing loud music.
- N/A
- Nothing, everything is great.
- N/A
- The high chairs
- Cramped
Find a seat with a computer

| X |

So few of them

| No computer available |

| No vending machine |

There is a lot of foot traffic and noise at times

| Limited number of computers, sofa, coffee table and table is not comfortable to use, not ergonomic. |

There isn't enough storage space on the computers the large muted TVs can be distracting, and the motion activated lights are too sensitive. The widows outside muffle no sound at all, so leaf blowing, cross cutting is always audible.

| Sometimes conversations are loud. |

| There aren't enough Desktop computers |

When people talk

| People are too crowded and loud. |

| A little noisy. |

| How few places available there are. |

| Not enough tables for studying/open computers |

The displacement I experienced after midnight, when the 1st floor became my only study option and there not being a "quiet/silent zone"

| Nothing |

<p>| X |</p>
<table>
<thead>
<tr>
<th>Time spent waiting for computer (people like to &quot;camp out&quot; at computers, leave them locked for hours while gone or sit at computer without using it. Beyond frustrating!!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area is overall a little bit noisy, a lot of commotion with people walking around.</td>
</tr>
<tr>
<td>People, including &quot;help center&quot; workers were too chatty and loud!!!!</td>
</tr>
<tr>
<td>The noise of people surrounding</td>
</tr>
<tr>
<td>That I had to write a paper</td>
</tr>
<tr>
<td>The noise level and behavior of the students</td>
</tr>
<tr>
<td>Its too cold here</td>
</tr>
<tr>
<td>A little too much talking, Not bad at all though</td>
</tr>
<tr>
<td>Headphone jack on computer didn’t work</td>
</tr>
<tr>
<td>Feel like there may be fewer overall computers than before</td>
</tr>
<tr>
<td>Chair couldn't rise/sink/recline</td>
</tr>
<tr>
<td>Nothing</td>
</tr>
<tr>
<td>Im here to do a quiz for my bio course, which worked fine.</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>Noise level is sometimes too loud. (especially Group study near sofa lounge + sofe areas.)</td>
</tr>
<tr>
<td>Area can get a little too noisy at times.</td>
</tr>
<tr>
<td>A box kept popping up saying I had to delete items to free up space, and they would keep coming back, even after freeing up space.</td>
</tr>
<tr>
<td>noise and other students logging off my computer because I went near the printers for a second based on information given by the tech support that said that I was away for 10 mins</td>
</tr>
<tr>
<td>Distractions in peripheral vision, noise</td>
</tr>
<tr>
<td>Not enough computers</td>
</tr>
<tr>
<td>The carpet</td>
</tr>
<tr>
<td>The people who do not respect silence and others in the library</td>
</tr>
</tbody>
</table>

**NOISE**

| The Noise |
| Always crowded, and often no computer available |
| No speakers for blasting music |

**C. Do you feel you met your goals using the space today? Why or why not?**

| yes |
| Yes, I was able to study with a group of friends. |
| yes, because the goal was to do work with friends |
| Sort of, I came when my group had 1hr 1/2 left |
| X |
| Yes! Because we're done |
| Yes |
| Yes! |
| X |
| X |
| Yes, I was able to concentrate. |
| Yes. |
| Definitely, through the use of the large computer screen/hookup situation, we were able to book our group presentation and practice. |
| Yes, because it’s a good room for group study. |
Yes, I could focus and had all of my materials

Yes, I'm writing an essay and finally found a computer

Yes, I came at 8 am and was able to perform all of my tasks.

X

Yeah. Shared a pc earlier, then I found this one after 5-10 minutes

Yes, the gods are good.

Yes, I had two papers to finish and print and I did both of those things

No, I’m not comfortable doing my work at the sofa and coffee table here and I don’t get any computer to use

Yes, I am always able to work on my homework or catch a nap in the morning before my early classes.

Yes, got most of my work done.

No, needed a desktop computer but it is difficult to find one

Yes, got a chapter of test review done

Yes, every time I come here I always get a lot of work done.

Yes because I was actually studying.

Yes. I was able to have a decent work environment.

Yes, I did my math homework.

Yes, come to study, I studied.

Yes, b/c I found a spot to study

Yes, because I work hard and this library is great.

No, I need to print some paper, but there are no spare computers for me to print out.
<table>
<thead>
<tr>
<th>X</th>
<th>Yes. I had the space and resources to do so.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes. Feel more prepared for tests.</td>
</tr>
<tr>
<td>yes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes I still got studying done</td>
</tr>
<tr>
<td>(Eh I hope) But yes, I did. I felt more relaxed being less crammed.</td>
<td></td>
</tr>
<tr>
<td>Yes.</td>
<td>I finished my work.</td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Yes, I got everything done.</td>
<td></td>
</tr>
<tr>
<td>Yes! Lots of space to study with a friend</td>
<td></td>
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<tr>
<td>Yes, I was productive</td>
<td></td>
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<tr>
<td>Yes, got to a computer right away without waiting</td>
<td></td>
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<tr>
<td>Yeah, great success.</td>
<td></td>
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<tr>
<td>Yes.</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
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<tr>
<td>Yes</td>
<td></td>
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<tr>
<td>Yes, needed to type a paper and felt like the large private space helped me focus.</td>
<td></td>
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<tr>
<td>Yes, I got a good amount of work done.</td>
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<tr>
<td>Some however, I didn’t like some peoples disrespect by talking on the phones while other people worked.</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Yes, got my work done.</td>
<td></td>
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<tr>
<td>-----------------------</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Yes. I finished my work.</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
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<tr>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Hopefully! :-)</td>
<td></td>
</tr>
<tr>
<td>Yes, we were productive.</td>
<td></td>
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</tbody>
</table>