# CIT / University Libraries

## Future Learning Spaces at UB

August 31, 2007

*"As we have come to understand more about learners, how people learn, and technology, our notions of effective learning spaces have changed. Increasingly, those spaces are flexible and networked, bringing together formal and informal activities in a seamless environment that acknowledges that learning can occur anyplace, at any time, in either physical or virtual spaces. We have also come to understand that design is a process, not a product. Involving all stakeholders—particularly learners—is essential."*

*Diana Oblinger*

# Table of Contents

# Executive Summary

During the 2006-2007 academic year, staff responsible for public computing and library spaces began the annual review that usually leads to incremental changes to the computing spaces. It became apparent, however, that incremental changes were not sufficient to support learning activities described in current literature or to respond to the issue of personal device ownership.

Over the spring semester, an extensive review of needs was undertaken. The review process included assessment of UB specific needs through student focus groups and current service benchmarking as well as examination of practices at other universities.

We have found that changes in technology and in teaching-learning strategies demand a new approach to the design of spaces for learning, not just computing spaces. We concluded that:

- Learning spaces should be designed for people, not to house technology. Students reject a traditional institutional look and feel to learning spaces and dislike crowded spaces with no regard for privacy.

- Learning spaces should be different for different learning activities. Spaces should support different modes of work, such as collaborative and individual; and should offer different levels of interpersonal interaction from quiet to highly social.

- Technology should be accessible and visible. Technology must be integrated and planned for students' personal devices. Effort must be made to minimize the effort students have to make to use technology and to maximize the ease of its use. Provision should be made for providing access to resources outside the reach of students because of cost or effort of ownership.

- Technology availability should span the 24-hour day. This availability demands a transformation of the support model and for increased infrastructure support.

Our recommendations for the next planning phases include:

- Design of tools and applications for group collaboration to support the processes and spaces we design.

- Design of technology that helps students integrate their personal devices into learning spaces.

- Modification of existing computing spaces in alignment with students' expressed preferences for space and comfort and current usage information.

- Creation of new spaces that reflect current teaching-learning strategies for interactive and collaborative learning.

During our research we were impressed with how important the collaborative design process was to the success of the finished facility and to the success of its operation and to student support. Where we found highly collaborative effort in design and operation, we also found clearly articulated student support and shared operational standards. We recommend this approach to our planning and operational phases.

# Introduction

The last revitalization for public computing at UB occurred in 1999 with the creation of Cybraries in the University Libraries as part of the Access99 initiative. At that time, CIT and the University Libraries collaborated to create a computing environment designed to support both individual and group work. Eight years later, the University at Buffalo is preparing for the next phase of technology-enabled learning spaces.

With that in mind, a team of staff responsible for public computing and library spaces developed recommendations for designing learning spaces at UB. As we began to examine the issues, a broader picture than computing labs emerged. This document summarizes the functional needs assessment, and is the first of three planning phases for envisioning learning spaces at UB. It will be followed by a technology feasibility assessment and space design recommendations.

The group used a variety of mechanisms to inform its work on the design of learning spaces, including:

- Reviewed current services and usage statistics and patterns
- Collected ideas and feelings from UB stakeholders (students and faculty) through meetings, surveys, and focus groups
- Reviewed best practices at other universities through literature reviews and site visits

In the opening chapter of Educause's e-book *Learning Spaces* (http://www.educause.edu/learningspaces), author Diana Oblinger reminds us that

> Learning is the central activity of colleges and universities. Sometimes that learning occurs in classrooms (formal learning); other times it results from serendipitous interactions among individuals (informal learning). Space—whether physical or virtual—can have an impact on learning. It can bring people together; it can encourage exploration, collaboration, and discussion.

The design and establishment of learning spaces at UB are critical elements in support of its mission. The newly-created undergraduate academies at UB feature collaboration and cross-disciplinary activities, with a goal of:

> …promot[ing] the exchange of ideas and scholarship crossing academic discipline, role (student and faculty), and physical (in and out of classroom) boundaries. Academy activities will promote intentional collaboration between and among students and faculty in formal and informal activities.

Spaces to support collaboration for the academies as well as other disciplines and university activities are essential. Attractive and functional spaces to support collaboration and learning are high on parents' recruitment checklists and will also contribute to the ongoing retention of students.

# Summary of Findings

Our findings are made in the context of Long and Ehrmann's "Future of the Learning Space" (*Educause Review* 40(4), July/August 2005, http://www.educause.edu/er/erm05/erm0542.asp). The authors describe seven characteristics of the well-designed classroom:

1. Design learning spaces for people
2. Optimize space for learning activities
3. Create technology-enabled learning spaces
4. Create flexible spaces
5. Create soft spaces
6. Operate spaces across the 24-hour day
7. Zone spaces for sound and activity

The work of the group leads us to believe that these same concepts are also true in effective learning spaces, and we used these principles to organize and summarize our findings. Each finding summarizes information from student focus groups, the LibQUAL+™ survey, and site visits to selected institutions.

## 1. Design learning spaces for people

Learning spaces should not be designed merely to house technology. Learning spaces should facilitate one or more types of learning.

### Student Focus Groups

UB students in focus groups on learning spaces (See Appendix *Report of Student Focus Groups*) described the characteristics they liked in their learning spaces. The comforts they describe are not exotic, but rather everyday amenities someone might consider for optimal personal work space. The majority of respondents included adequate lighting as an important element and favored individual lamps. They remarked on the positive contribution color made to learning spaces and did not like use of bland colors. Spaces with non-institutional looks were called *intriguing* by some students. They disliked chaotic looking places that reminded them of their rooms. Work space to lay out study materials was important. Avoidance of any space that would induce claustrophobia was also important. The most positive responses by our students were to small group and individual spaces found at Cox Hall at Emory University, where they particularly liked the lighting, comfortable furniture, and the privacy afforded by the space arrangement. In response to images of the Alfiero Café at UB, students did not think the furniture looked comfortable.

### LibQUAL+™ Survey

Preliminary reports from this survey include suggestions to improve uncomfortable furniture, update wall colors, improve lighting, and update furniture.

## Site Visits

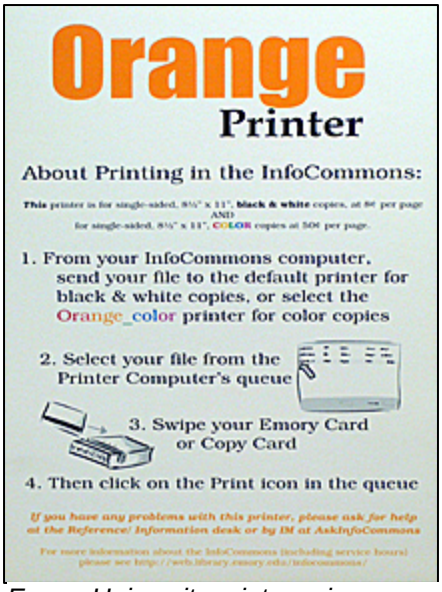
During site visits to universities, many examples of designing for people were evident. Emory University's spectacular Computing Center at Cox Hall was designed by an architect who had experience designing restaurants to create customer appeal in the space. The lab included small group and individual work spaces and used a variety of lighting sources to create the effect of personal work space.

Natural elements of design, use of color and patterns on walls and floors were pleasing to our visiting staff.

*Cox Hall Computing Lab at Emory*

*Use of curved lines, bold color and modular furniture characterized the Chemistry Library at Emory.*

Both Emory University and the University of Arizona had excellent examples of signage for way-finding and service guidelines that empower students. All sites had service points for help.




*Emory University print service color coding,*


*University of Arizona combined IT and Library service point.*

## 2. Optimize space for learning activities

Learning spaces should be designed to make it easy to engage in learning activities. This is a logical design principle, but there is a need to partner and communicate with faculty to determine the range of learning activities which need to be supported.

### Student Focus Groups

Students choose a type of learning space for a variety of reasons, including preference, need, and assignment. One size does not fit all for students. They may use most or all of the learning space types at different times.

Images of large traditional computing labs presented to students received the fewest positive responses of any type of learning spaces. Students acknowledged the need for multi-user labs but disliked clutter, noise, lack of privacy and the lack of work space.

Students liked many features of the group study and collaborative spaces they viewed and affirmed the need for white boards in group work areas as well as wireless access and sufficient electrical power. They preferred enclosed group areas over open collaborative spaces for the privacy provided.

### LibQUAL+™ Survey

Recommendations include more quiet spaces and more group spaces. Respondents noted a need for clear signage and enforcement of posted policies about the purpose of individual spaces.

## Site Visits

All sites visited maintained traditional computing labs in addition to collaborative work spaces. Temple University reported student requests for more desktop computers.

In addition to desktop workstations, three of the universities we visited had laptop loan programs that they described as successful. Students at Temple University and at the University of Georgia informed IT leadership that they chose not to carry their personal laptops because of the weight, risk of theft, and need for electrical power.

*Temple University used incidental spaces for browsing stations.*

*Temple University's Tech Center maintains a large traditional computing lab as well as social spaces, special purpose, and group spaces.*

*Temple University's Tech Center includes glass-enclosed group collaboration spaces embedded within learning spaces.*

*At Cox Hall, Emory University, some group collaboration spaces were in open spaces.*


*University of Arizona integrates tutoring into its Integrated Learning Commons.*

*Informal learning spaces with non-traditional classroom furniture are used for seminar rooms.*

### UB Current Computing Sites

Usage statistics for computing sites for the 2006-2007 academic year show a heavy reliance on Cybrary workstations. Recorded at 80 minutes intervals, daytime usage is, on average, at 90% of capacity in each of four Cybraries in Capen and Lockwood libraries. (See Appendix, *Current Computing Sites Usage.*) The total capacity of these areas is 244 workstations. Given the sample interval and the effects of averaging, it is possible that usage exceeds 90% and there may even be unmet latent demand.

In smaller labs, such as in residence halls and Diefendorf Hall, usage is much less, averaging from 30-40% of capacity during peak usage times.

## 3. Create technology-enabled spaces

Learning spaces must be smart spaces, so that the burden of accessing technology is on the provider rather than on the learner. Spaces should be uniformly enabled and flexible to allow easy reconfiguration of space to accommodate changes. Learning materials for students should exploit available technologies.

### Student Focus Groups

Students cited very basic technology needs, with wireless access and electrical power for personal equipment the leading items. Projection screens and large LCDs were also desirable in group spaces.

### LibQUAL+™ Survey

Suggestions include: wireless printing, reservable study carrels, power for laptops, charging stations for laptops, increased number of workstations, faster workstations, improved wireless access quality, better remote access to authorized resources, and access to specialized departmental software.

### Site Visits

Most sites visited included special purpose areas in their learning spaces. All had some graphics support areas such as Temple's Tech Center with its media production lab (*right*).

Technology support, such as printing for wireless access devices, was limited.

Technology support for group spaces scheduling or for online assistance was also minimal to none.

Virtualized software provision was not available at any site we visited.

## 4. Create flexible spaces

Learning spaces, not technology, are now the constrained resource. Spaces must be easily reconfigurable, both for immediate use and to respond to usage changes from semester to semester.

### Student Focus Groups

One of the students' least favorite types of space involved students using mobile furniture and panels. They also commented negatively on the color and style of furniture so it is not clear which features they disliked. In general, students in the focus groups rejected extreme examples of any furniture or configuration models.

### LibQUAL+™ Survey

Respondents commented on the need for updated, comfortable, functional furniture and spaces which could accommodate a variety of activities.

## Site Visits

Each site we visited displayed examples of flexible design or use.

*Students at Cox Hall can use movable panels and furniture to create custom work spaces.*

*All sites had areas with soft movable furniture for individual or group work such as this at the University of Arizona. Some lounge furniture was wired for Ethernet and/or electric.*

*Some classrooms at Cox Hall (left) and the University of Arizona (right) were furnished with movable furniture. At Emory, laptops could be delivered to informal classrooms. Classrooms at both Emory and the University at Georgia were embedded in informal learning spaces to invite faculty to visit.*

We were advised to create and saw examples of modular service areas so that service points could be modified without major facility rehabilitation. At the University of Arizona (*right*), this service point could be modified easily for shape and size. Relocating permanent ceiling signs was the only action needed to reconfigure the area.

## 5. Create soft spaces

The institutional look and feel of learning spaces has been over-lit, hard, straight and bland. These spaces have not been comfortable.

### Student Focus Groups

Students used words like “comfy” and “cozy” to describe places that made them feel positive. They remarked about furniture being optimal for study purposes, for example, but not overly comfortable when serious study is required.

### LibQUAL+™ Survey

Suggestions include coffee shops and food service areas in learning spaces, and a combination of lounge-like and more formal furniture.

### Site Visits

All sites had some soft sites and all had social areas with coffee or food service areas. At Temple University, Starbucks was integrated into the Tech Center; at University at Georgia they provided a university food service area (*see cover*) within the Student Learning Center with large seating capacity, attractive lighting, and tables large enough to work and socialize.

*There were many examples of soft spaces at sites we visited. Cox Hall (left) furnished a sunny hallway with sofas. At Temple University (right), coffee tables had power and Ethernet connections. Floor pillows were also used at Cox Hall with work tables about 18” from the floor.*

## 6. Operate spaces across the 24-hour day

Students work all hours of the day for all kinds of reasons. Students use learning spaces when students are ready and able to work.

### Student Focus Groups

A student in one focus group shared with the group how students had gotten a change in service hours in the Capen Cybrary by presenting their case to the UB Faculty Senate.

### LibQUAL+™ Survey

Suggestions include a South Campus 24-hour/7-days-per-week location.

### Site Visits

No sites we visited had 24-hour availability except during exam periods at some universities.

Emory, Temple, and the University of Georgia had substantial and visible security presences in their facilities. Access by campus card at Emory (*left*), the presence of campus police and library security aides, and use of security cameras were evident.

At the University of Georgia, student groups were encouraged to use classrooms in the Student Learning Center after hours to maximize use of space.

### UB Current Computing Sites

Acting on a request from the UB Faculty Senate on behalf of students, service hours in the Capen first floor Cybrary were extended from 24-hours/5-days-per-week to 24-hours/7-days-per-week beginning in the Fall, 2006 semester. While usage from 1:00am until 8:00am Sundays through Friday ranged from 40-65% throughout the night, Saturday and Sunday night usage was only slightly less.

## 7. Zone spaces for sound and activity

Shared learning spaces need guidelines for use such that any use is effective for its purpose.

### Student Focus Groups

Students were clear about needing quiet, uncluttered spaces for study. When one group was asked if they preferred to enforcement of quiet zone rules by students themselves or UB staff, all agreed that UB staff should have that responsibility.

### LibQUAL+™ Survey

Respondents cited the need to have enforcement of quiet study area rules.

### Site Visits

Most zoning was achieved by enclosing groups and individual study spaces. Cafes, such as at the University of Georgia (*right*), were assumed to be social and conversational spaces.

Headphones were being used in some places; earplugs were offered to students at University of Georgia.


*Group spaces were often enclosed to permit discussion or practice as at Temple University (left) or to support quiet study as at the University of Arizona (right).*

# Summary of Learning Space Needs

Learning spaces must have a significant, visible, attractive presence at UB. Our current students have verified this need for us and prospective students will recognize and expect the advantages offered by such spaces. Students are opportunistic about their learning activities, using space on the floor, on window sills, in community bookstores or wherever they find the electrical outlet, quiet, or the chair they need for the purpose. They also do this whenever they need a space, regardless of its intended purpose. We need to make the same flexible and inviting learning spaces at UB, located where students congregate and mingle. Sufficient space needs to be dedicated to this purpose to avoid the institutional crush that causes current students to find alternate spaces. Specific recommendations for planning future learning spaces at UB are listed in *Table 1* below.

*Flexible* and *comfortable* should be the overriding design principles for future facilities planning. Physical structures outlive all their components several times over, mandating that the ability to easily reconfigure a physical space for a new or revised use is imperative. Providing comfort in learning spaces acknowledges the impact of context on effective learning.

*Transparency* is a critical criterion for technology provision and planning. Technology should be accessible and visible, but not require undue effort to use. Its implementation should reinforce the illusion of simplicity. Learning spaces should be *smart*. Technology does not have to be slick and shiny; it does have to be aware of the user. Technology should be ready for the user, streamlined, and effective.

Technology services must also be transformed. From our surveys and focus groups, we know that students own portable technology. Technology should be integrated and planned around these devices and it should be clear to students how they can integrate into learning spaces using the devices. Offering virtual technology to students, such as software access, supports use of their personal devices and makes technology affordable for students.

Technology should be used to empower and support users over the 24-hour day. It should not rely on intermediation by staff. It should inform the user about how to use it in friendly terms. Virtual technology effectively meets these criteria.

We need to use current best practices as guide, but also begin planning to move to the next level. Planning and design take time, and the university must plan to create an environment which accommodates and maximizes anticipated and unanticipated technological changes. Emory University's Cox Hall Computing Lab took two years to design and implement; the University at Georgia Student Learning Center is now five years old. We should be compelled to achieve examples of these best practices to take us to an acceptable standard, and then take aggressive steps to move forward.

To make the best use of flexible spaces, the technology infrastructure must support the degree of freedom afforded by the space design. Wireless access must be built out in all areas and extend beyond laptops to printers and presentation devices such as projectors. Tools and technologies to facilitate easy collaboration among students and faculty are essential complements to collaborative learning spaces. Effort should be directed towards minimizing the effort of software maintenance through use of Web 2.0 technologies. We have achieved a level of individual learning support and must build on that and also develop new ways to provide support for collaborative learning.

*Table 1: Recommendations*

| **Principle** | **Recommended Design Actions** |
|---|---|
| **1.** Design learning spaces for people | ▪ Create learning spaces in locations where students gather<br>▪ Create spaces in traditional places like libraries and in non-traditional places like hallways, cafes, and lounges<br>▪ Reorganize current cybraries to reduce congestion<br>▪ Refresh current cybraries to optimize the effects of color and light<br>▪ Use non-institutional lighting for comfort and personalization<br>▪ Install large or dual computer monitors<br>▪ Ensure learning spaces are clean and temperature controlled<br>▪ Install clear, branded signage to empower people<br>▪ Use student and faculty advisory groups to regularly review learning spaces |

| Principle | Recommended Design Actions |
|---|---|
| 2. Optimize space for learning activities | ▪ Create spaces that support and encourage:<br>o Group study for formal and informal groups<br>o Group collaboration<br>o Quiet study<br>o Presentation practice<br>o Tutoring<br>o Consultation among students, faculty, librarians, tutors, IT support staff, etc.<br>o Media creation, editing, and viewing<br>o Social/conversational opportunities<br>▪ Create formal classrooms within informal learning spaces<br>▪ Recognize the need for privacy in all space designs<br>▪ Create both reservable and non-reservable spaces<br>▪ Equip group collaboration spaces with:<br>o White boards<br>o Projectors or wall-mounted LCDs<br>o Conference tables and chairs<br>o Sound systems for practice spaces<br>▪ Avoid the sense of confinement in group space design<br>Create library services to support *learning anywhere, anytime* |

| Principle | Recommended Design Actions |
|---|---|
| **3.** Create technology-enabled spaces | ▪ Provide wireless access everywhere<br>▪ Maintain computers in currently heavily used areas<br>▪ Supplement computer availability with laptop loan program<br>▪ Convert low use computer labs to service points<br>▪ Provide IT help nearby and using knowledge systems<br>▪ Implement *print anywhere* services to support wireless use<br>▪ Provide electrical support in study spaces<br>▪ Develop web 2.0 technologies to reduce dependence on versioning and maintenance of applications<br>▪ Provide access to high end software<br>▪ Provide tools to support collaboration<br>▪ Design spaces in a manner that facilitates technology upgrades<br>▪ Provide online services to support spaces such as reservation tools and resource availability lookup |
| **4.** Create flexible spaces | ▪ Use modular furniture for service points to facilitate reconfiguration<br>▪ Use mobile furniture for serendipitous groupings<br>▪ Design fixed connections for flexibility to avoid constraint by technology<br>▪ Create inviting and open spaces |
| **5.** Create soft spaces | ▪ Use furniture comfortable for the space<br>▪ Use color and design to create interest<br>▪ Integrate cafes into learning spaces<br>▪ Use color, patterns, and light to promote personal comfort |
| **6.** Operate spaces across the 24-hour day | ▪ Provide for personal security and for personal belongings<br>▪ Facilitate use of spaces for UB community activities during low use times<br>▪ Provide vending machines for IT and learning supplies<br>▪ Staff learning spaces during non-business hours appropriately<br>▪ Use Web 2.0 technologies to expand services |

| Principle | Recommended Design Actions |
|---|---|
| 7. Zone spaces for sound and activity | ▪ Provide and support clear guidelines for sound and activity<br>▪ Review zones regularly and re-adjust zoning as needed<br>▪ Design spaces to enhance or minimize sound as needed<br>▪ Provide clear signage<br>▪ Enforce policies for the use of zones |

# Recommendations for Technology Feasibility Assessment Phase

**Facilitate integration of students' personal devices into learning spaces creating an attractive proposition for bringing their devices onto the campus**. Criteria for success include ease of use, availability, and consistency on and off campus.

- Plan for wireless availability across the campus.
- Develop access to printing.
- Assure access to all academic resources including library and department.
- Develop delivery of virtual software to students' devices.

**Develop group tools and applications for collaboration**. We must enable the collaboration processes as well as the spaces.

- Develop applications for sharing information such as Google Docs for easily creating, editing, and uploading documents quickly and from anywhere.
- Create storage space for shared documents with a user-friendly interface.
- Develop tools to identify available group work spaces.
- Develop group space reservation tools.
- Design a smart interface for group collaboration spaces so that a minimum of staff intervention is required.

**Align the technology interface across all campus spaces**. Multiple efforts are under way to create student spaces. Students must be able to move from space to space seamlessly.

**Align on and off campus technology access.** To encourage students to bring personal devices onto campus, their transition from home to campus must be easy.

**Develop technical management for laptops for loan to students.** Laptops for loan to students to supplement personal and provided resources should be easily managed to facilitate their availability.

# Recommendations for Space Design Phase

**Update existing service areas with high volume use.** The four Cybrary areas in Capen and Lockwood have extremely high usage. The universities we visited had not been able to reduce their reliance on these traditional spaces. Our students acknowledged the need, but they rejected the lack of work space and privacy they afforded. UB's spaces require attention to their attractiveness.

**Redefine spaces with low volume use.** Several computing areas have low volume. We recommend:

- Aggregating public learning spaces on the south campus into the Health Sciences Library where learning spaces other than traditional labs can be designed and 24/7 availability can be safely offered.
- Transforming Residence Hall labs into different small group work spaces with a print service point.
- Collaborating with the College of Arts and Sciences to re-design Fronczak room 408.

**Create learning spaces that exhibit the recommended design features.**

Design features that support group collaboration are particularly important for both faculty and students. Faculty have told us that we need collaborative spaces for graduate and undergraduate students along the lines of study carrels but designed for small groups of students. Faculty also encouraged us to create showcases to encourage wide usage and to facilitate displays of student work.

In addition to collaborative space amenties such as tables, faculty advocated technology for group spaces that meets pedagogical needs including tools for collaboration such as webex and user-friendly smart boards to:

- Capture annotations
- Display and capture projected images (either from a laptop or dedicated computer)
- Download group effort through portable USB drives and laptops

Faculty also suggested specialized spaces should be created for:

- Video-conferencing
- Multimedia/video editing
- Simple capture system for self review or presentation submission

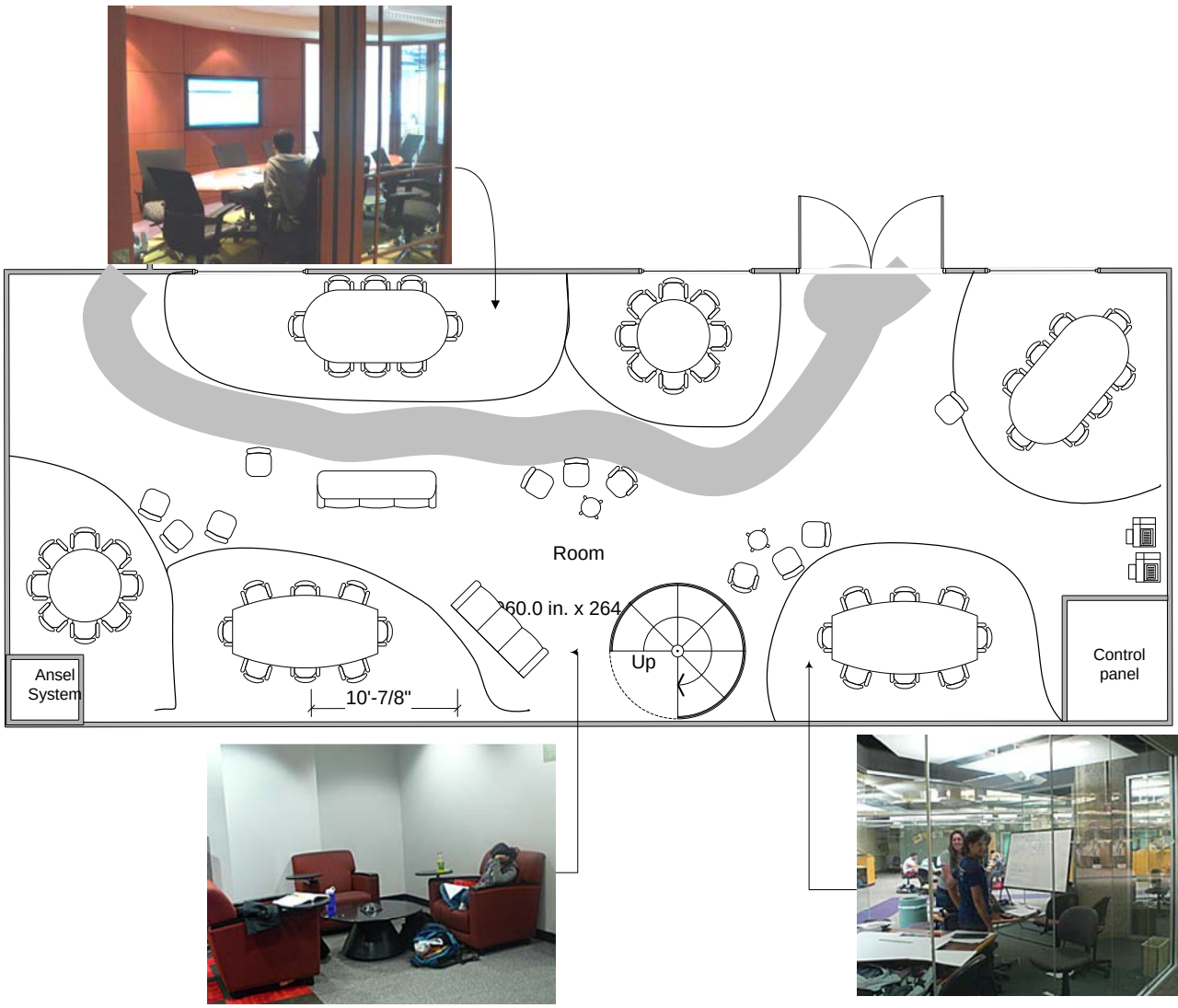
Current student behavior in libraries and around campus demonstrates the need for collaboration spaces. They create group work areas with whatever movable furniture they can find and whatever space is available. They have recommended explicitly during our discussions with them that they need these spaces. They have also anticipated installation issues by recommending that UB build sufficient spaces that are easily scheduled and readily available. The success and popularity of collaboration spaces at other universities that were visited lend additional credibility

to this recommendation. Support of students' personal devices is another recurring theme and any future demonstration project needs to keep in mind that students need access and support for their own devices.

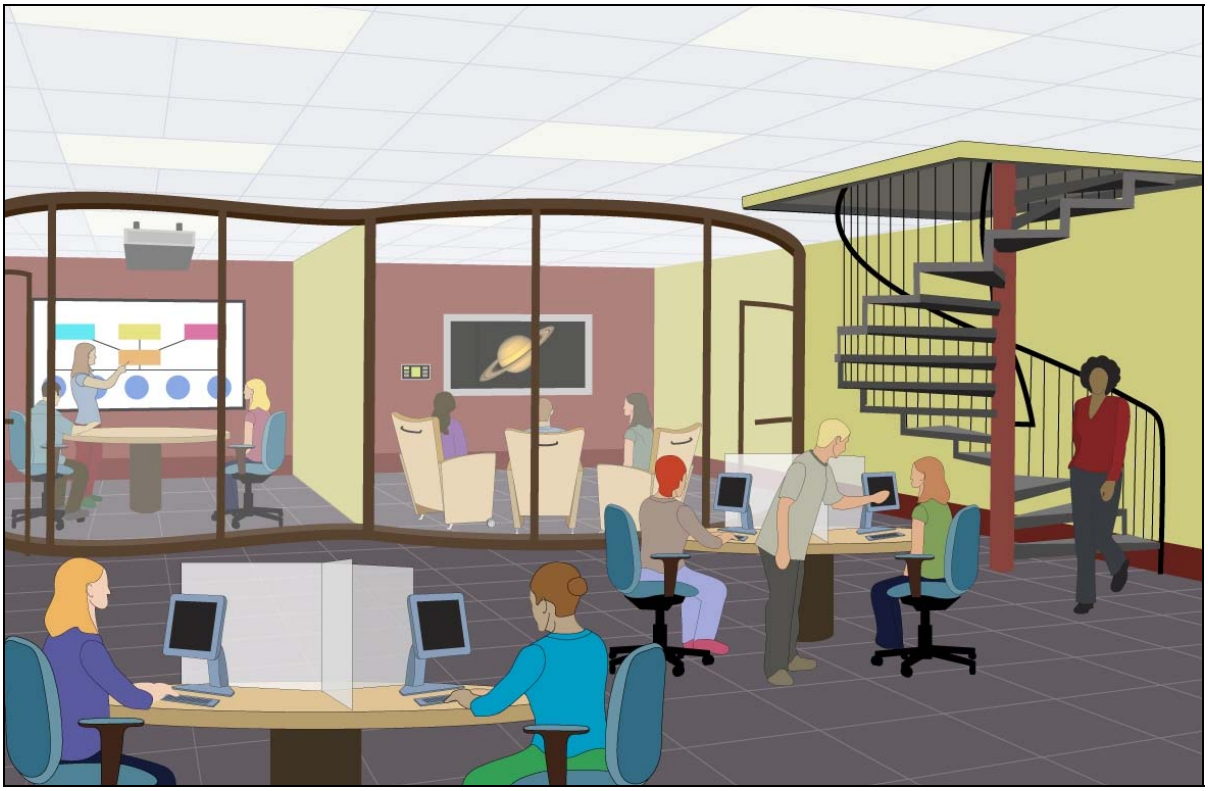
Several space opportunities on campus invite exploration of new ideas. In Norton, rooms 15 and 118, are ideal for development: they are in high traffic areas, they have machine room floors that help make technology seem invisible, and they are large enough to create an open and inviting IT landscape.

**Envision Norton 15 as a *Collaboratory***

The large room now houses numerous glass-walled group work spaces. Projectors or LCD panels are mounted on their walls.



Collaboration rooms are accessible by UBcard swipe devices that are tied to a central scheduling system. The machine room floor now has carpeted tiles and the pathway of a contrasting material guides students through the area. Casual furniture invites students to wait gather informally or wait for their group space.



The room is bright and and visible activity is stimulating and motivating to students.

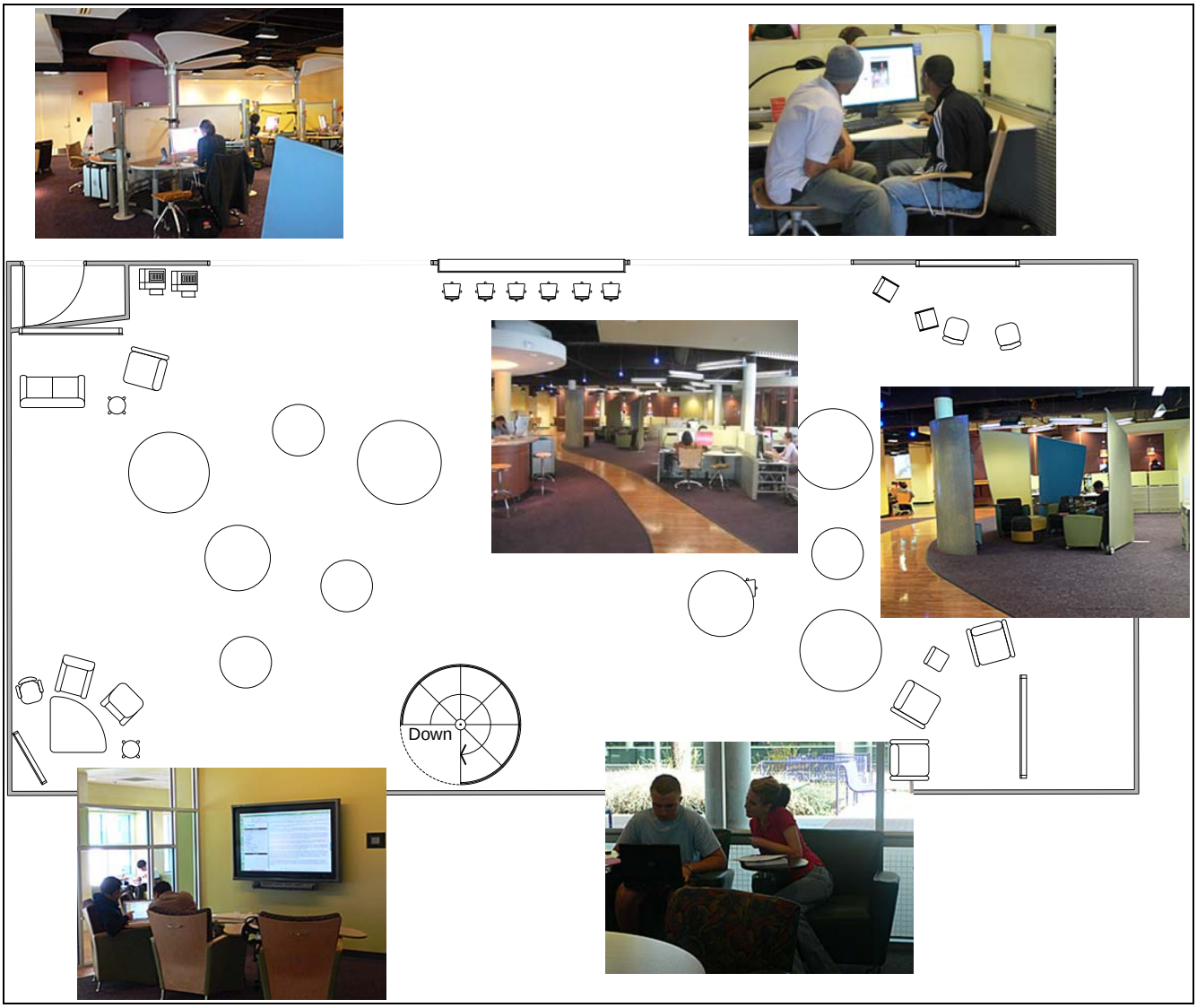
| Item | Approx Cost |
|---|---|
| Rehab of Facility | $245,000 |
| Electrical support | $75,000 |
| Technology | $118,500 |
| Equipment | $65,500 |
| Furniture | $68,450 |
| Signage | $2,500 |
| **Total** | **$560,550** |

The cost of developing this space in this way would be approximately $560.5K exclusive of the cost of professional design advice.

The project could be underway immediately and the space could be available when students return from spring break 2008. While construction is underway, the technology is being developed for scheduling the space and the best practice for installing projection equipment in such an open space is determined, campus partners can determine the best way to operate this space.

**Imagine Norton 118 as a *Tech Mall***

The room is open to the corridor through 2 large archways which can be closed with mall-like grating. Some furniture is fixed, such as the round tables with personal lighting; Chairs are movable with handles and wheels. There are some movable partitions and a number of projection screens or LCDs.




Students in this space can work together or individually and modify the space to meet their needs by moving furniture as needed.

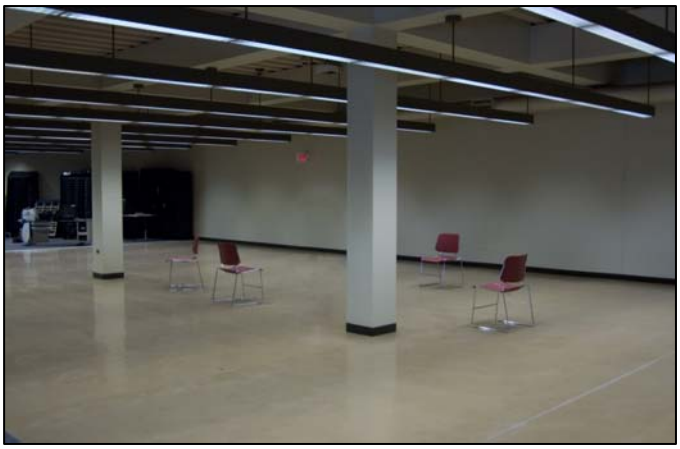
The primary design strategy in this space is to make it feel less institutional by providing personal lighting and interesting colors. The space seems inviting because of the wide open entrances that are mall-like. The approximate cost, exclusive of professional design, is approximately $420K.

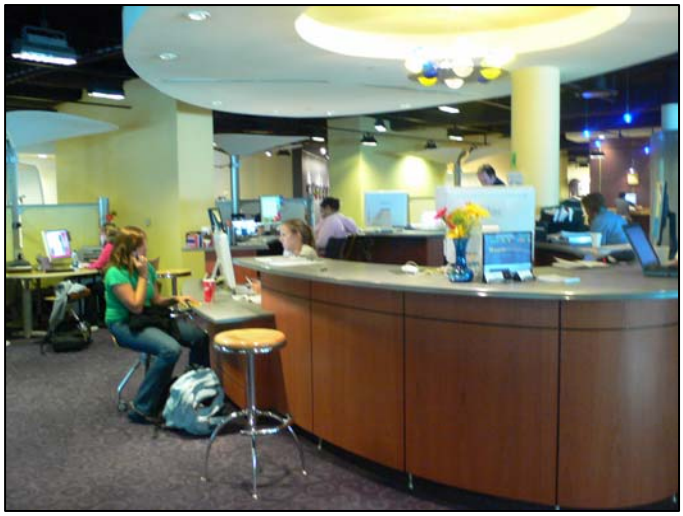
| Item | Approx Cost |
|---|---|
| Facility rehab | $182,200 |
| Electrical power interface | $60,000 |
| Technology | $96,500 |
| Equipment | $45,500 |
| Furniture | $32,450 |
| Signage | $2,500 |
| **Total** | **$419,150** |

As with Norton 15, work could begin immediately. The space could be available as early as the spring 2008 semester.

**Conceive of Lockwood 2 Cybrary as a full service *Tech Center***

Lockwood 2 Cybrary has enjoyed some growth with the addition of a makeshift Help Desk walk-in office and a successful print service counter to the original Cybrary. Still there is space to develop.

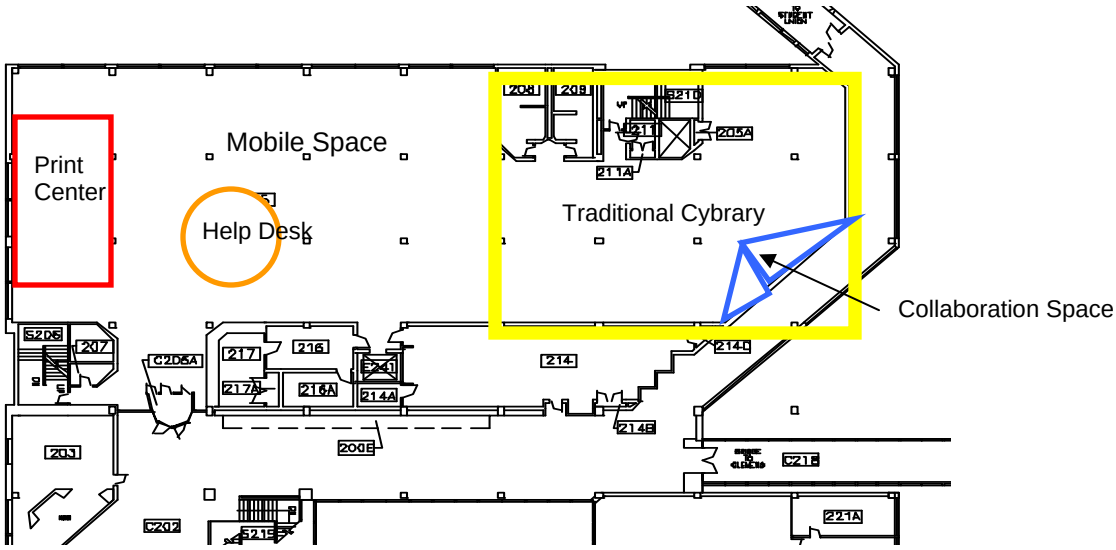




The current CIT Help Desk is not very visible in a closed space behind a door. Imagine it were re-created in an open space in Lockwood 2 adjacent to the Print Center. The new Help Desk could look similar to the Help Desk at Cox Hall Computing Center at Emory University.

The Cybrary workstation units which continue to experience greater than 80% usage are moved to the relatively quiet end of the space where a few collaboration rooms have also been installed.

Between the service points at the entrance (the CIT Help Desk and Print Center) there is now an area for mobile device users to work together and independently in a variety of settings that are all comfortable and have a personal feel about them.



With the addition the new *free form* space, Lockwood Cybrary is transformed into a Tech Center that offers a full range of tech services and is complemented by the Library located across the hall.

| Item | Approx Cost |
|---|---|
| Rehab of Facility | $245,000 |
| Electrical support | $75,000 |
| Technology | $118,500 |
| Equipment | $65,500 |
| Furniture | $68,450 |
| Signage | $2,500 |
| **Total** | **$560,550** |

The Lockwood Tech Center will cost approximately $560.5K to create. Rehabbing the site includes modernization and upgrades to the facility as well as extension of the power infrastructure.

Planning should take place during the academic year, some rehab readiness can be done during the Spring semester, and construction must begin immediately at the close of the spring semester in order to re-open for fall 2008.

# Methodology

## Student Focus Groups

Staff from the Office of Institutional Analysis consulted with us to describe a protocol for conducting focus groups to discover student needs for general-use learning spaces on campus. They then engaged the UB Advocates Program coordinators to conduct three different focus groups. (See Appendix: *Campus Learning Spaces: Assessing Student Needs with Photo Feedback and Focus Groups.*)

## Site Visits

Four universities were selected to visit from among universities that contributed chapters to Educause's ebook *Learning Spaces* (http://www.educause.edu/learningspaces/):

- Emory University
- University of Georgia at Athens
- University of Arizona
- Temple University

All except Temple were examples of collaboration between libraries and IT organizations similar to the current UB partnership.

A subgroup of the team visited each university, making a tour of the facilities and meeting with support staff to learn how each site was conceived, designed, and operated. Observations have been categorized and summarized in Appendix: *Site Visit Observations*.

## LibQUAL+™ Survey

The LibQUAL+™ survey is a nationwide research project developed by the Association of Research Libraries to define and measure library service quality across institutions to aid in planning for the future. The University Libraries conducted this survey from April 2 through April 20, 2007, and are currently compiling the results.

## Current Public Sites Usage

User authentication logs are used to identify periods of workstation usage at evenly spaced intervals (usually 13) during a range of service hours. Fall semester usage is averaged over the period from 9/8/2006 through 11/17/2006 to avoid non-typical peaks at semester startup and low usage over fall recess periods.

# Acknowledgements

We are indebted to Carol VanZile-Tamsen from the Office of Institutional Analysis and to Kathleen Bissonnette from Student Affairs for their valuable assistance consulting with us, arranging and conducting the student focus groups, and providing us with a comprehensive report.

We extend our thanks to the students in the UB Advocates Group who demonstrate a commitment to UB by participating in this leadership activity.

We are also impressed and grateful for the gracious welcome and assistance provided by the staff at the universities we visited. Many staff shared ideas and their time, organized by:

- Charles Forrest, Director; Office of Library Facilities Planning, Emory University
- Jerry Hinkle, Director, TECH Center, Temple University
- Florence E. King, Director, Student Learning Center, University at Georgia
- Dan Lee, Team Leader, Undergraduate Services Team, University of Arizona

The team members who have collaborated in this research phase include:

Daniel Arrasjid, CIT
Dan Deakin, CIT
Amy DiMatteo, University Libraries
Linda Kingsbury, CIT
Rick Lesniak, CIT, Sponsor
Sandy Peters, Office of the CIO
Phyllis Parisi, CIT
John Pfeffer, CIT
Karen Senglaup, University Libraries
Don Stein, CIT
Margaret Wells, University Libraries

# Appendix 1: LibQUAL+™ Survey Comments related to Future of Public Sites

The University Libraries offered the LibQUAL+™ survey, created by the Association of Research Libraries, to University at Buffalo faculty and students from from April 2-20, 2007. The survey results are currently being compiled and will be available in June. A preliminary scan of the comments revealed many positive and constructive comments and suggestions about services and staff in the University Libraries' public spaces.

- The poor overall condition of library study and computer spaces, including:
  - Outdated, ugly, uncomfortable furniture
  - Lack of cleanliness (especially Capen 24/7 area)
  - Colors need updating (walls, furniture)
  - Bad lighting
  - Insufficient power for plugging in laptops
  - No charging stations for laptops
- Late night areas:
  - Lack of coffee shops and food services
  - Need for a 24/7 facility on South Campus
- Study spaces:
  - Not enough group spaces
  - Need better signage for group and quiet areas
  - No enforcement of quiet rules; many quiet spaces are not quiet
  - No enforcement of food and drink policies
  - Undergraduates should be allowed to reserve individual carrels for research and study
  - Not enough quiet spaces
- Print services:
  - Too slow
  - Quota too small
  - Should be able to carry iprint credits for longer periods
  - Need for more two-sided printing in Law Library
  - Iprint has improved printing
  - Need wireless printing for PCs and Macs
- Staff in public areas:
  - Generally helpful
  - Sometimes do not have the correct information to answer questions
- Equipment:
  - Dirty keyboards on public computers
  - Computer startup takes too long (some comments singled out express stations)
  - Not enough computers – lines for public computers are too long
  - Need more computers in quiet spaces
  - Macs should be available in public areas
  - Repair service is slow, and broken computers are out of service for too long
- Server problems (overload) during finals sometimes loses work
- Weak wireless signals in some areas
- Remote access problems for library databases and journals – UBVPN problems from off-campus
- General need for coffee & food services in many areas
- Lack of engineering software in cybraries is a problem

# Appendix 2: Site Visit Observations

## *Design Elements*

| Design Elements | Emory | Emory: Cox Center | Emory: Chemistry Library | UGA | Temple | UA |
|---|---|---|---|---|---|---|
| Comfortable chairs | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Counters and service desks modular, not built-in | ✔ | ✔ | ✔ | | ✔ | ✔ |
| Pleasant updated use of color and patterns on walls, furniture, and carpet | ✔ | ✔ | ✔ | | ✔ | |
| Spaces are open and bright through use of glass and access to windows, including offices and break-out rooms | ✔ | | ✔ | ✔ | | ✔ |
| Corridors, paths and walls not in straight lines | | ✔ | ✔ | | ✔ | |
| Moveable furniture (desks, chairs, wheeled stools, bar stools in counter areas) | ✔ | ✔ | | | | |
| Concealed cabling and power with machine floors, pull down power cables, mesh cable covers) | ✔ | | ✔ | | ✔ | |
| Excellent signage (some digital) | | | | | ✔ | ✔ |
| Non-traditional seating (floor cushions, small low stools) | ✔ | ✔ | | | | |
| Designed by restaurant architect for customer appeal | ✔ | | | | | |
| Color-coding for areas to find available workstations, coordinate meet-ups | | | | | ✔ | |
| Use of compact shelving to conserve space (music, media library) | ✔ | | ✔ | | | |
| Movable panel walls and canopies for privacy | | ✔ | | | | |
| Use of non-rectangular shapes in partitions (triangular and trapezoidal) | | ✔ | | | | |
| Tiered levels of work areas make work areas look less expansive | | | | | | ✔ |
| Coffee shop (some with extended seating and food service) | ✔ | | | ✔ | ✔ | |
| Earplugs available | | | | ✔ | | |

## *Space Purposes*

| **Space Purposes** | *Emory* | *Emory: Cox Center* | *Emory: Chemistry Library* | *UGA* | *Temple* | *UA* |
|---|---|---|---|---|---|---|
| Group collaboration work areas (some with screens) | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Breakout rooms for presentation practice, group project work w/projection or LCD's | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Social work areas | | ✔ | | | ✔ | ✔ |
| Classrooms embedded in learning space | ✔ | ✔ | ✔ | ✔ | | |
| High end equipment in presentation rooms for students: cameras, theater sound | | | ✔ | | ✔ | ✔ |
| Special purpose labs: multi-media | | | | ✔ | ✔ | |
| Large event space for campus use (video, kitchen) | ✔ | | | | ✔ | ✔ |
| Eating area outside work space. | | | | ✔ | ✔ | |
| Group study rooms (some reservable) | | | | ✔ | | ✔ |
| Quiet study areas | ✔ | | | ✔ | | |
| Rooms used for multiple purposes (classrooms used by student life evenings) | ✔ | | | ✔ | | |
| Special purpose spaces (quiet areas for students with attention deficit disorder) | | | | | ✔ | |
| Special purpose labs: music | | | | | ✔ | |
| Special purpose labs: graphics | | | | | ✔ | |
| Student services nearby | | | | | | ✔ |
| Video conference room w/ 2 separate screens, surround sound, white board, sound dampening | ✔ | | | | | |
| Café space open when food counter closes | ✔ | | | | | |
| Special purpose lab: language | ✔ | | | | | |

## *Classrooms in Learning Spaces*

| **Classrooms** | **Emory** | **Emory: Cox Center** | **Emory: Chemistry Library** | **UGA** | **Temple** | **UA** |
|---|---|---|---|---|---|---|
| Movable furniture (tables and chairs) | ✔ | ✔ | ✔ | | | ✔ |
| Dual projectors | ✔ | | | | | |
| Laptops for distribution | ✔ | ✔ | | | | |
| Very comfortable seating with "removable" desk plate for left or right handedness. | ✔ | ✔ | | | | |
| Glass-walled classroom | | | ✔ | | | |
| Room divisible by partition (e.g. garage door) | | | ✔ | | | |
| Room darkening shades | ✔ | | | ✔ | | ✔ |
| Tiered seating lecture halls | | | | ✔ | | |
| Same instructor stations from room to room. | ✔ | | | | | |
| No classrooms | | | | | ✔ | |
| Large presentation/classroom for orientations, library training | ✔ | | | | | ✔ |
| Non-traditional furniture (e.g. café tables) | ✔ | | | | | |
| No wireless purposely | | | | | ✔ | |

## *Security*

| **Security** | ***Emory*** | ***Emory: Cox Center*** | ***Emory: Chemistry Library*** | ***UGA*** | ***Temple*** | ***UA*** |
|---|---|---|---|---|---|---|
| Access by campus card | ✔ | ✔ | ✔ | ✔ | ✔ | |
| Professional security staff | ✔ | | | | | |
| Library staff responsible for security | | | | ✔ | | |
| Lojack on laptops | | | | ✔ | | |
| No security cameras | | | | ✔ | | |
| Security cameras | | | | | ✔ | |
| Campus police rove through building | | | | ✔ | | |

## *Infrastructure*

| **Infrastructure** | *Emory* | *Emory: Cox Center* | *Emory: Chemistry Library* | *UGA* | *Temple* | *UA* |
|---|---|---|---|---|---|---|
| AV in classroom and group area. | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Power to furniture | ✔ | ✔ | ✔ | | ✔ | |
| Desktop re-imaged 1-2 times a year | ✔ | ✔ | ✔ | ✔ | ✔ | |
| Campus file storage provided | | | | ✔ | ✔ | |
| Pod casting; iTunes University | ✔ | | | | | |
| Pervasive wireless access | ✔ | | | ✔ | ✔ | |
| Insufficient power outlets | ✔ | | | | | |
| "Wimba" BB plugin | ✔ | | | | | |
| Use learnlink | ✔ | | | | | |
| Data and power from spiral cords dropped form the ceiling | | ✔ | ✔ | | | |
| Wall clocks all atomic clocks | | | | ✔ | | |
| Availability of workstations using Big Brother | | | | | ✔ | |

## *Printing*

| **Printing** | *Emory* | *Emory: Cox Center* | *Emory: Chemistry Library* | *UGA* | *Temple* | *UA* |
|---|---|---|---|---|---|---|
| Allocation: pages per year | 300 | | | 0 | 800 | 0 |
| | | | | | | |
| Wireless printing | ✔ | | | | | |
| Value added printing (color, posters, multi-page) | | | | | ✔ | ✔ |

## *Computers*

| **Computers** | *Emory* | *Emory: Cox Center* | *Emory: Chemistry Library* | *UGA* | *Temple* | *UA* |
|---|---|---|---|---|---|---|
| 95% own laptops, 10% bring to campus | | | | | ✔ | |
| 90% of students come with their own laptops | ✔ | | | | | |
| Laptop ownership >80% | ✔ | | | | | |
| Laptop adoption of 45% but only 10% would bring on campus because of weight, theft, etc. however students could get laptop loaners for up to three hours. | | | | | ✔ | |
| | | | | | | |
| Desktop workstations in same or increasing numbers | ✔ | ✔ | | ✔ | ✔ | ✔ |
| Laptop loaners for students | | | | ✔ | ✔ | ✔ |
| Laptop carts for classrooms | ✔ | | | | | |
| Variety of workstation types in 1 place | ✔ | | | | ✔ | |
| Dual monitors | ✔ | | | | | |
| All LCD monitors | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Browsing workstations available | ✔ | | | | | |
| Adaptive workstations | ✔ | | | | | |
| Large plasma screens in collaborative areas | | ✔ | | | | |
| Replacement cycle: 4 years | | | | ✔ | ✔ | |
| 4 year total replacement cycle. | | | | | ✔ | |
| Loan of cables for break-out rooms. | | | | | ✔ | |

## *Design and Plan*

| **Plan and Design** | *Emory* | *Emory: Cox Center* | *Emory: Chemistry Library* | *UGA* | *Temple* | *UA* |
|---|---|---|---|---|---|---|
| Design concept: space is a system | ✔ | | | | | |
| Design concept: offer heterogeneous spaces that can be reshaped and configured as time and needs change. | ✔ | ✔ | | | | |
| Design plan: “Use technology to teach culture” | ✔ | | | | | |
| Design plan: Use as “experiment”. | | | ✔ | | | |
| Design plan: include classrooms to bring faculty into space | | ✔ | | ✔ | | |
| Design plan: consolidate many decentralized labs | | | | | ✔ | |
| Design plan: freshmen center | | | | | | ✔ |
| Design plan: Use surveys and focus groups to plan | | | | ✔ | | |
| Amount of learning space was increased | ✔ | | | | | |
| Lesson learned: secure storage is critical | | | | ✔ | ✔ | |
| Lesson learned : build incubator spaces | ✔ | | | | | |
| Lesson learned: under estimated demand/not enough space | | | | | ✔ | |
| Recent survey: longer hours | ✔ | | | | | |
| Recent survey: more computers | ✔ | | | | ✔ | |
| Recent survey: more social space | ✔ | | | | | |
| Recent survey: more collaborative space | ✔ | | | | | |
| Recent survey: don’t want TV in café | ✔ | | | | | |
| Student survey: More power per seat | ✔ | | | | | |
| Student survey: Do want quiet space. | ✔ | | | | | |
| Design (ECIT): by Campus facilities interior design group | ✔ | | | | | |
| Design: by architect w/ experience with restaurant design giving the place an inviting and social look and feel. | | ✔ | | | | |
| Design: Inspired by Cox Center | | | ✔ | | | |

## *Operations*

| **Operations** | *Emory* | *Emory: Cox Center* | *Emory: Chemistry Library* | *UGA* | *Temple* | *UA* |
|---|---|---|---|---|---|---|
| Self-checkout | | | | ✔ | | |
| Security aides are students; during finals are commercial security guards | | | | ✔ | | |
| Operation is collaboration among library, center for teaching and learning and EITS (enterprise Info Tech Services) | | | | ✔ | | |
| Hours: not 24 hours (except exams) | | | | ✔ | | |
| Hours during finals: 24 hours | | | | ✔ | | |
| Café operated by campus food service contractor | ✔ | | | | | |
| Operated by organization under the CIO | ✔ | | | | | |
| Equipment by IT organization | ✔ | | | | | |
| Staffing by library | ✔ | | | | | |
| Usage tracking: Of 11,000 total students, 1,000 unique users visit daily | | ✔ | | | | |
| Operated collaboratively by 3 separate groups collaborating on support for the building & services: Library, Center for teaching and learning, and campus computing. | | | | ✔ | | |

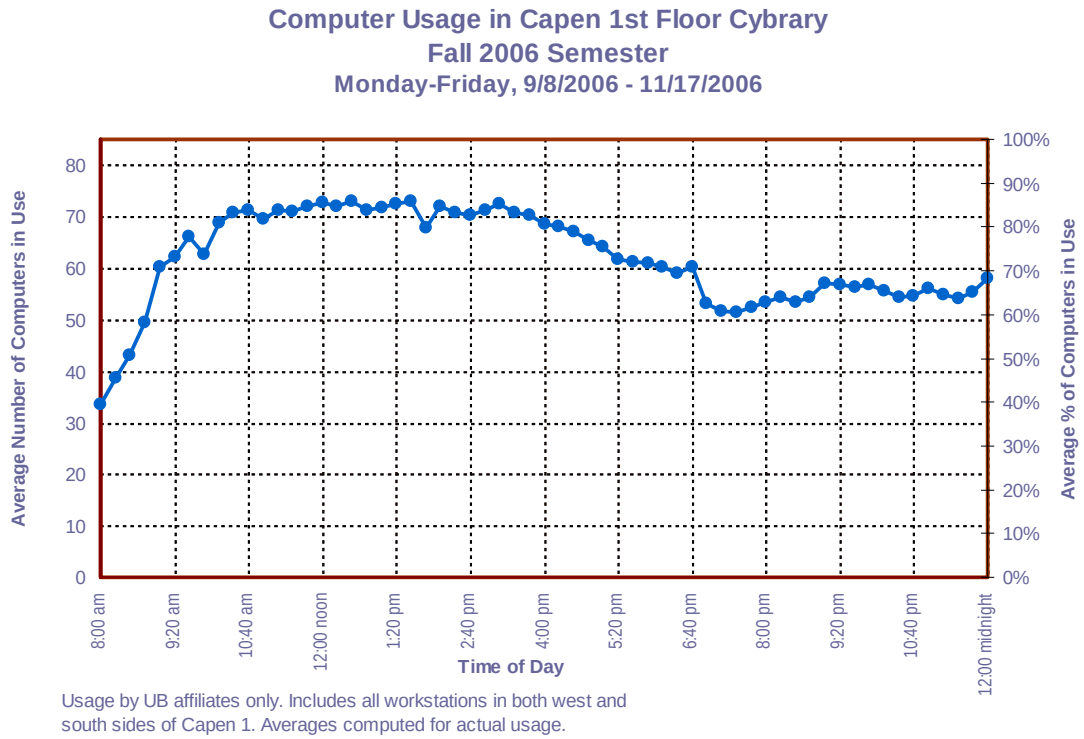
### *Help*

| Help | *Emory* | *Emory: Cox Center* | *Emory: Chemistry Library* | *UGA* | *Temple* | *UA* |
|---|---|---|---|---|---|---|
| Remedy used for tracking at Help Desk | ✔ | | | | ✔ | |
| Help Desk staffed professionals, phasing out SAs | ✔ | | | | ✔ | |
| Help Desk integrated into facility | | | | | ✔ | |
| Computing consultants, circulation and reference staff collocated | | | | ✔ | | ✔ |
| Reference help: virtual reference with IM | | | | ✔ | | |
| Workstation availability displayed | | | | | ✔ | |
| Help Desk (OSCAR) nearby | | | | | | ✔ |
| Large student computing presence. | | | | | | ✔ |
| Staff works with students and faculty. | ✔ | | | | | |

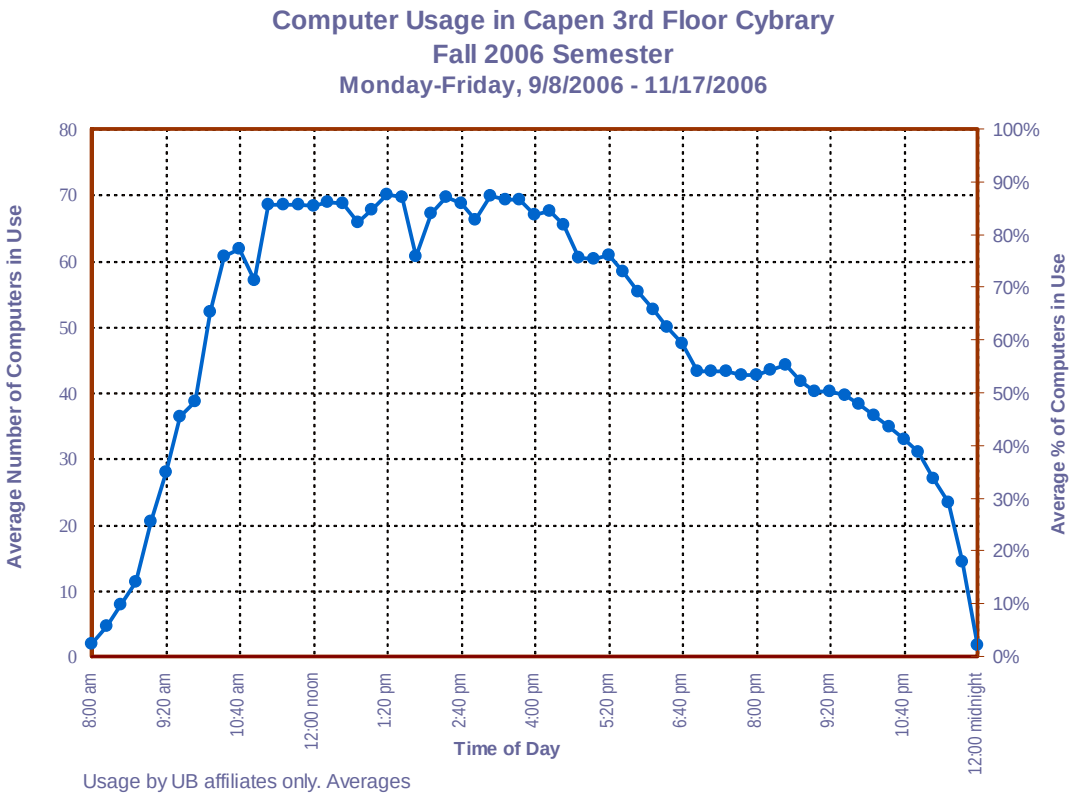
### *Faculty Support*

| Faculty Support | *Emory* | *Emory: Cox Center* | *Emory: Chemistry Library* | *UGA* | *Temple* | *UA* |
|---|---|---|---|---|---|---|
| Programs to assist graduate students with teaching skills. | ✔ | | | | ✔ | |
| ECIT: They have statistical staff | ✔ | | | | | |
| Classes offered, like BB for faculty | ✔ | | | | | |
| Teaching Learning Center | | | | | ✔ | ✔ |
| Faculty prep rooms w/ workstations, lockers, for grad and faculty | | | | ✔ | | |
| Teaching theatre facility – used for working on a production | ✔ | | | | | |

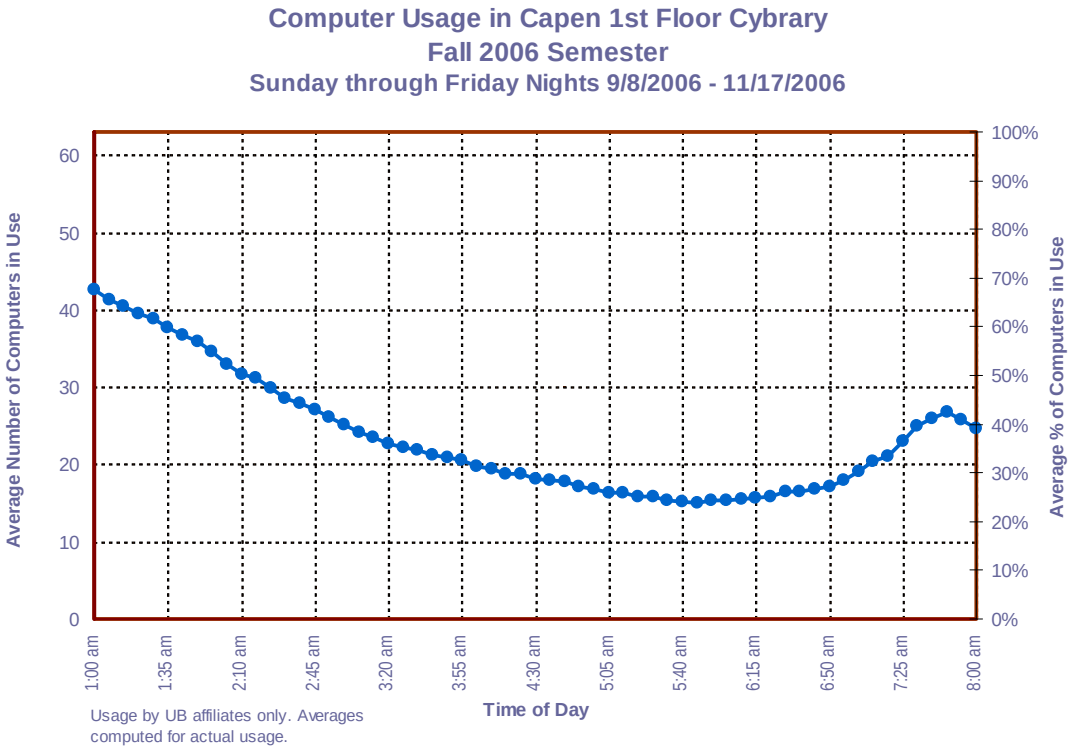
# Appendix 3: UB Computing Sites Usage

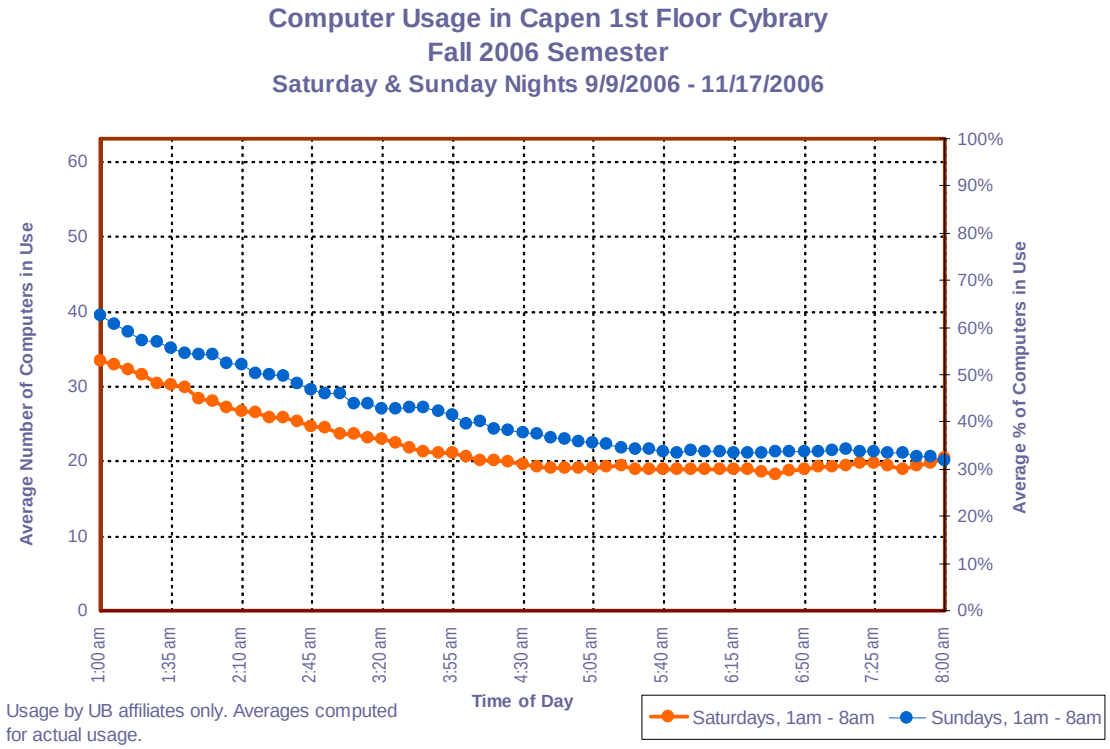


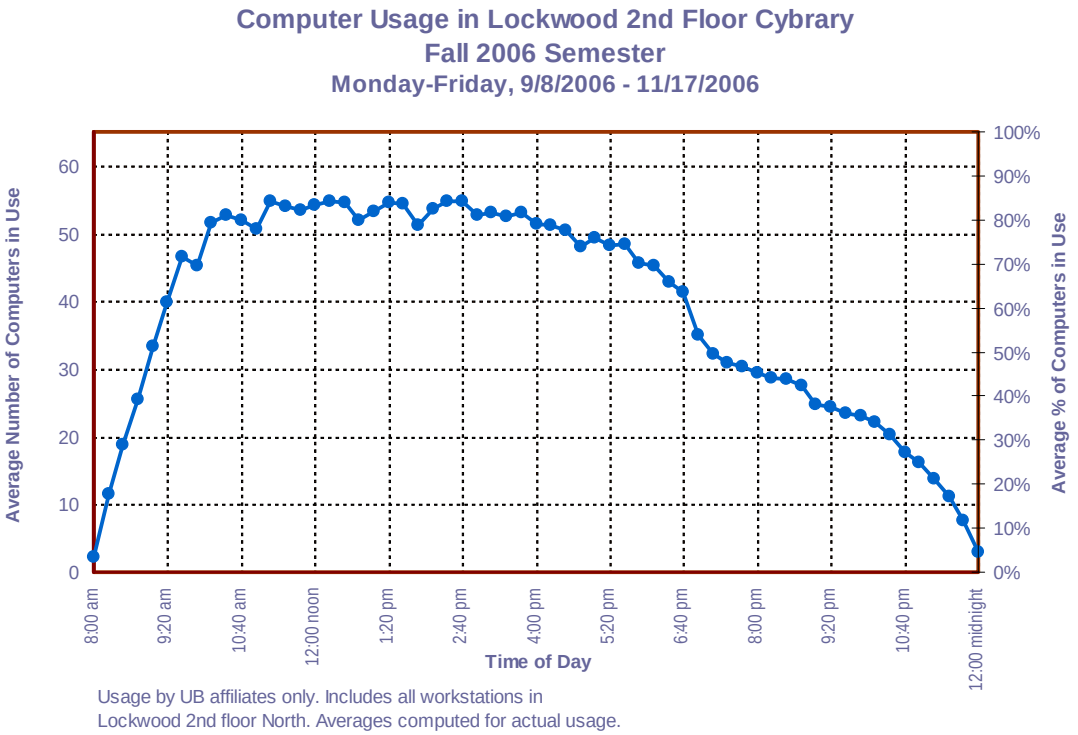

Usage by UB affiliates only. Includes all workstations in both west and south sides of Capen 1. Averages computed for actual usage.



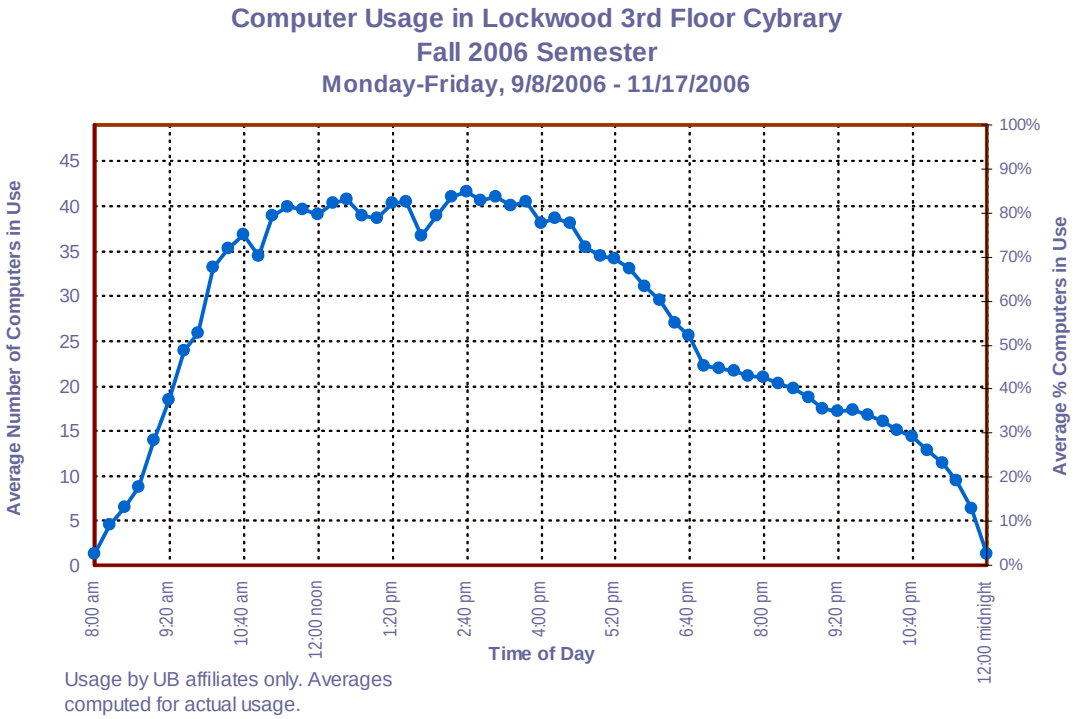

Usage by UB affiliates only. Averages computed for actual usage.


Computer Usage in Capen 1st Floor Cybrary
Fall 2006 Semester
Sunday through Friday Nights 9/8/2006 - 11/17/2006
Average Number of Computers in Use
Average % of Computers in Use
Time of Day
1:00 am
1:35 am
2:10 am
2:45 am
3:20 am
3:55 am
4:30 am
5:05 am
5:40 am
6:15 am
6:50 am
7:25 am
8:00 am
Usage by UB affiliates only. Averages computed for actual usage.

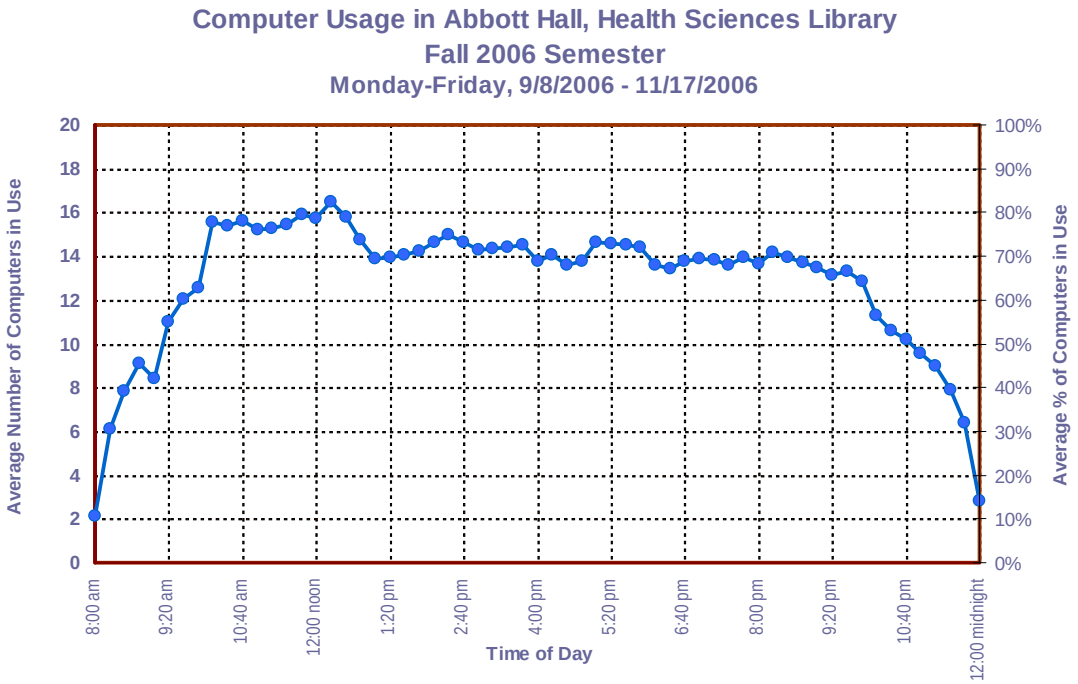

Computer Usage in Capen 1st Floor Cybrary
Fall 2006 Semester
Saturday & Sunday Nights 9/9/2006 - 11/17/2006
Average Number of Computers in Use
Average % of Computers in Use
Time of Day
1:00 am
1:35 am
2:10 am
2:45 am
3:20 am
3:55 am
4:30 am
5:05 am
5:40 am
6:15 am
6:50 am
7:25 am
8:00 am
Usage by UB affiliates only. Averages computed for actual usage.
Saturdays, 1am - 8am
Sundays, 1am - 8am



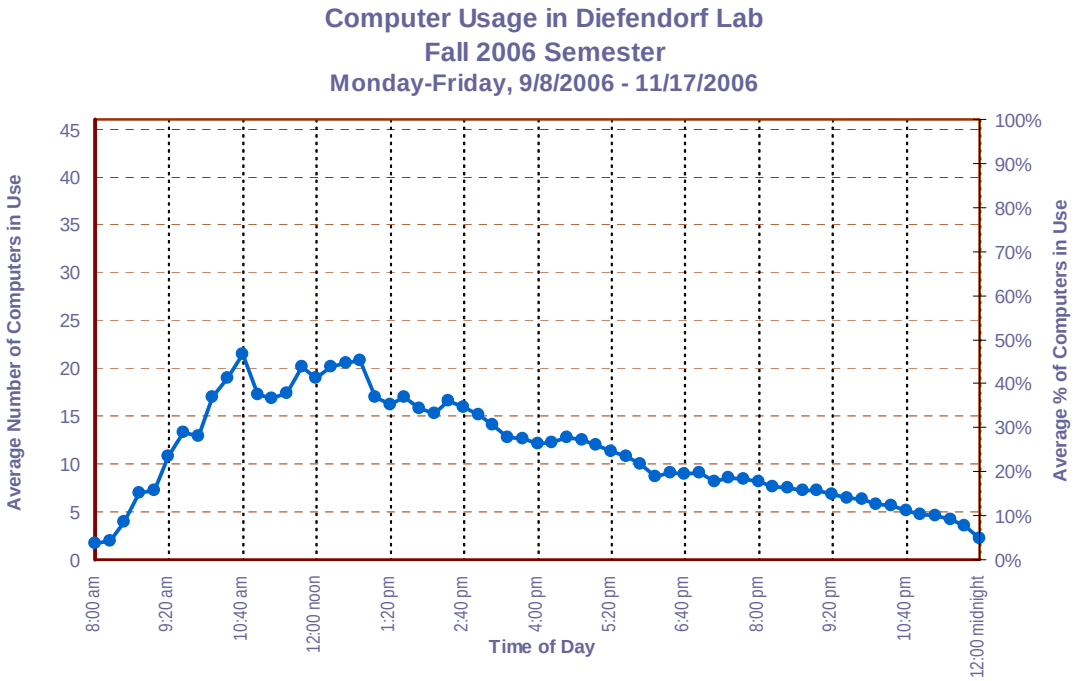

Usage by UB affiliates only. Includes all workstations in Lockwood 2nd floor North. Averages computed for actual usage.



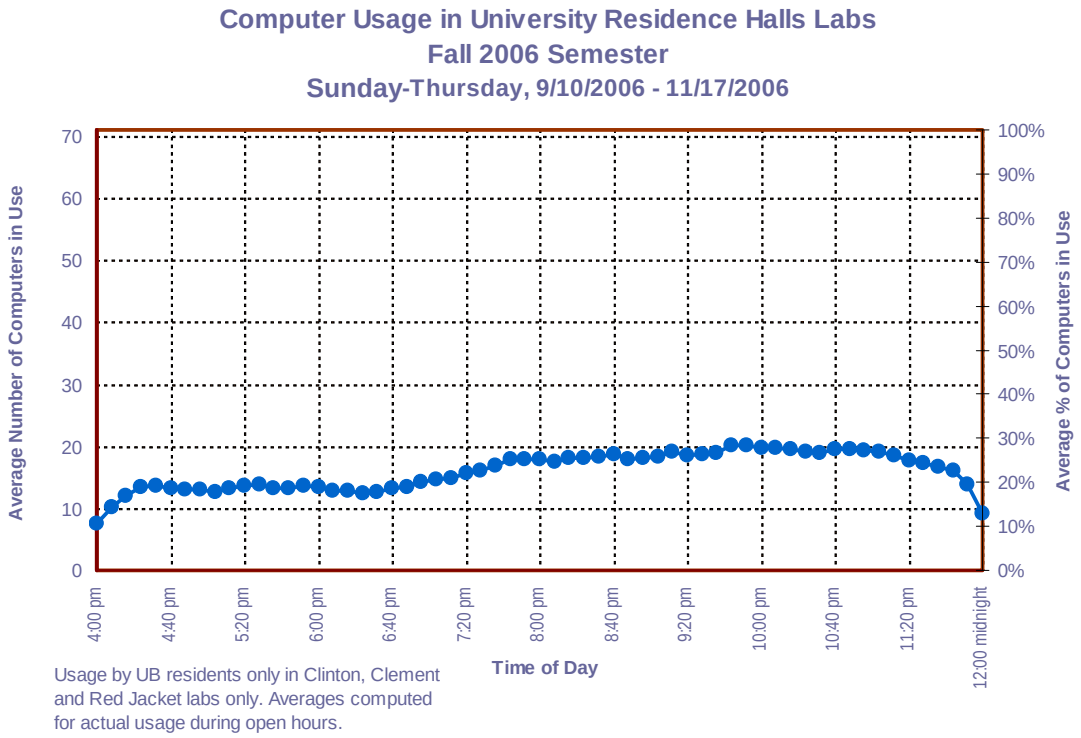

Usage by UB affiliates only. Averages computed for actual usage.



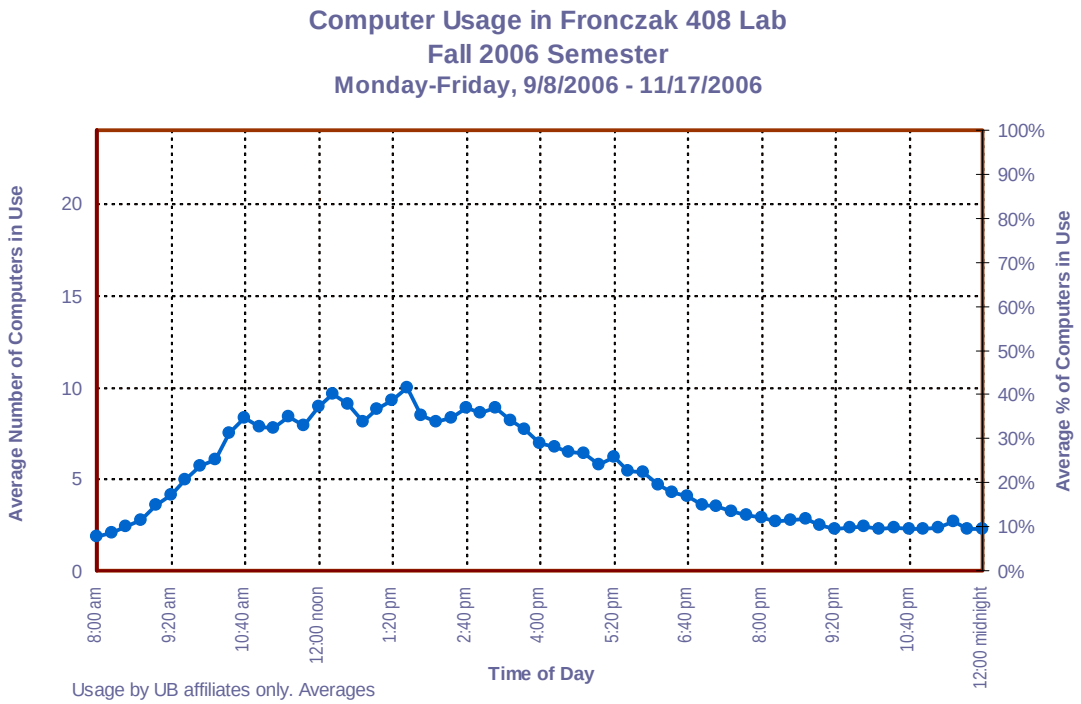

Usage by UB affiliates only. Includes all workstations with cybrary software image. Averages computed for actual usage.



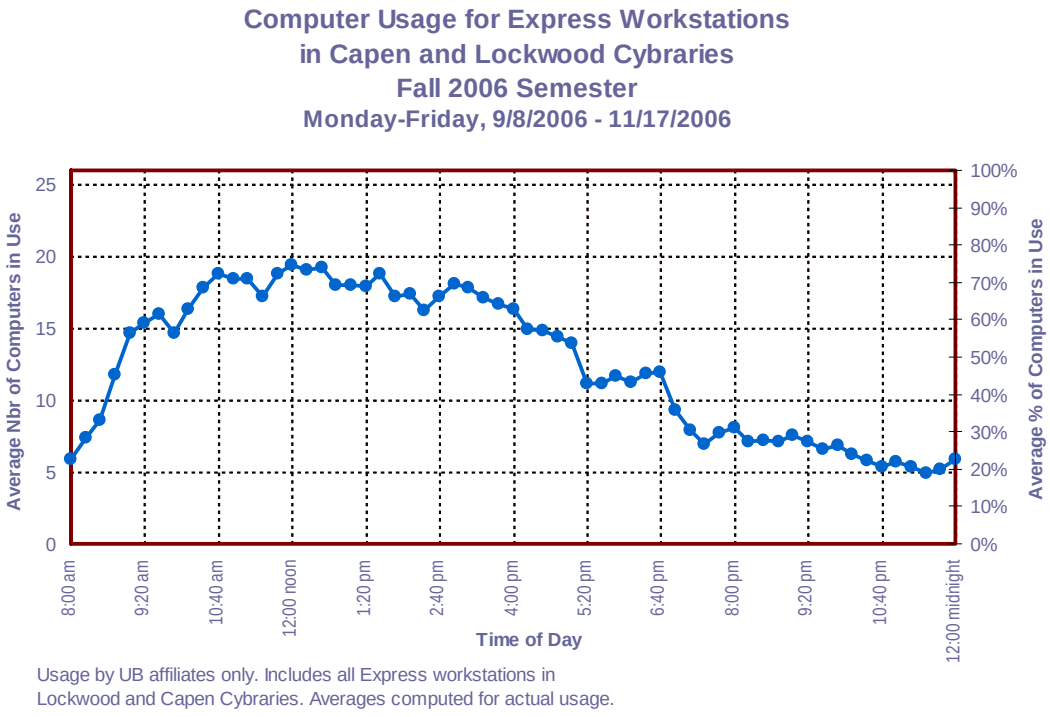

Usage by UB affiliates only. Includes all workstations in Diefendorf rooms 206 and 207. Averages computed for actual usage.




Usage by UB residents only in Clinton, Clement and Red Jacket labs only. Averages computed for actual usage during open hours.




Usage by UB affiliates only. Averages computed for actual usage.




Usage by UB affiliates only. Includes all Express workstations in Lockwood and Capen Cybraries. Averages computed for actual usage.

# Appendix 4: Campus Learning Spaces: Assessing Student Needs with Photo Feedback and Focus Groups

**OFFICE OF INSTITUTIONAL ANALYSIS**
State University of New York at Buffalo

# EXECUTIVE SUMMARY: Campus Learning Spaces: Assessing Student Needs with Photo Feedback and Focus Groups

At the beginning of spring semester 2007, the Informal Learning Spaces Committee, with members from the CIO Office, CIT, and the Libraries and charged with examining student needs for general-use learning spaces on campus, contacted the coordinators of the UB Advocates program for assistance with student focus groups to assess students' needs and desires for these spaces. The UB Advocates program, sponsored by Institutional Analysis and Student Affairs, involves student volunteers who meet twice each semester to participate in focus groups devoted to various campus issues. The first focus group of spring semester, conducted during the last week of February, was devoted to assessing students' needs for on-campus learning spaces.

Twenty-six UB Advocates participated in three different groups. Theme analysis was conducted on the recorded focus group discussion and on participants' written reactions to photographs of examples of different types of learning spaces. The findings are as follow:

1. Students need a variety of spaces for the variety of learning activities in which they engage (e.g., traditional lab spaces for checking e-mail, internet use, and individual work, as well as more fluid, open spaces for group work);

2. Privacy, even in collaborative work settings, is essential;

3. Students have concerns about accessibility, especially for the spaces they consider to be the nicest and most useful – spaces should be conveniently located with sufficient furnishings and equipment for many students, and they should be available on a 24/7 basis;

4. The design of the spaces should be aesthetically pleasing and comfortable, with large desks to allow students to "spread out," lighting that is bright without being glaring, and appropriately comfortable chairs;

5. Proximity to coffee and food increases the comfort-level of a learning space;

6. Technology is important, but students seem quite content with the technology currently available; they simply ask for pc's for those who need them, power outlets and wireless access for lap tops, and print access for all machines; additional forms of helpful technology are projectors, head phones, and dry-erase boards; and

7. Learning spaces should be staffed by helpful and knowledgeable technicians who can assist with hardware *and* software issues.

While approaches to learning (e.g., an increase in collaborative learning activity) and learning technology have changed since computer labs were originally designed on college campuses, such labs are not completely outdated. Their functionality is still important for certain learning activities. However, such traditional spaces should be modernized to allow for a more collaborative approach to academic work and should be supplemented by less formal and more flexible learning spaces.

**OFFICE OF INSTITUTIONAL ANALYSIS**
State University of New York at Buffalo

# BRIEF: Campus Learning Spaces: Assessing Student Needs with Photo Feedback and Focus Groups

During spring semester 2007, student focus groups were conducted to examine students' needs with regard to campus learning spaces. The focus group participants were asked to share their thoughts about what students need in a campus learning space, and they were asked to provide feedback concerning the usefulness of various types of sample learning spaces.

## Participants and Procedures

Thirty-six students from the UB Advocates pool (319 students) agreed to participate in the focus group discussion. Four focus groups were scheduled, two each on consecutive weekday evenings. Twenty students attended the first session, and were divided into two groups of ten. Six students came to the second session and participated in a single discussion. Of the 26 students who participated, 23 are undergraduates: five freshmen, six sophomores, eight juniors, and four seniors. Three graduate students also participated. Nearly two thirds of the participants are female (61.5%), and nearly all (84.6%) are domestic students. Most of the students are Asian or white (87.5%), with only three self-identifying as African American; two students did not report their race. Half of the participants live on campus (53.8%), and a third of them (34.6%) are majors in the College of Arts & Sciences. The areas of Engineering, Health Sciences, and Management are each represented by five students. One student is from Architecture, and one is undeclared. Most of these students report using a campus learning space at least once a day.

Each session began with an activity to get students to "think outside the box" in which they viewed and provided feedback about six types of learning spaces: Traditional Computing Labs; Small Group and Individual Space Adjoining Café; Group Work, Social, and Meeting Spaces; Enclosed Collaborative Learning Spaces; Open Collaborative Learning Spaces; and Create-Your-Own Work Spaces. Two to three examples of each type were presented on a single piece of poster board with a short description of the purposes, location, and amenities. As participants arrived at the session, they were asked to sign in and begin viewing the six posters. As they examined each poster, they completed a feedback form, indicating one thing they liked about the space, one thing they disliked about the space, and their feelings while viewing the space. The feedback form also contained items designed to collect basic demographic information. These forms were collected at the end of the focus group session.

The focus group discussions followed a standardized protocol which included three key questions: what are important characteristics of the spaces you now use to complete academic tasks?; what types of technology do you use in these spaces?; if you could design the ideal campus space, what would it include? During this discussion, students were also asked to share their impressions of the learning spaces shown on the posters. Each discussion lasted approximately one hour. Comments from the focus group discussions and from the feedback sheets were subjected to theme analysis in order to identify the areas of importance to students when they are evaluating the usefulness of a particular learning space.

## Results and Discussion

### Features of Current and Ideal Learning Spaces: Analysis of Focus Group Discussions

An important issue mentioned during all three focus group discussions is the need for different types of spaces for different learning activities. Specifically, students need spaces that allow computer access for checking e-mail and recreational internet use. In addition, they need spaces that allow for quiet study time and individual project completion. Finally, they need spaces where they can use technology to complete group projects and/or practice group presentations. When asked to identify important characteristics of the spaces they use now, they mention good lighting (soft and not too bright), comfortable temperature, comfortable furniture, small group tables, privacy space (i.e., carrels or booths), quiet, secure, and clean with plenty of space for all of their materials around a computer monitor. In terms of the technology they currently need, they list electrical outlets, wireless access, and printers as being very important. Other items include projection screens, ergonomic keyboards, copy machines, scanners, and fax machines. One group suggests that students need the capability of printing to campus printers from "home" and that high-level software should be available at public sites on a 24/7 basis.

The theme areas students feel should be included in an ideal campus learning space are shown in Table 1. Students again emphasize the need for different types of spaces for different types of learning needs. These spaces should be located conveniently near classrooms, residence halls, and transportation and should be available for use on a 24/7 basis. In addition, they need to be large enough and have enough furnishings to accommodate all students desiring to use them. The design of the spaces should be aesthetically pleasing and physically comfortable. These spaces should include private cubicles with sound-proof walls or partitions for individual work, as well as areas for group work. All areas should have sufficient desk space to allow students to spread out the materials they need to complete assignments.

In terms of technology, the needs for an ideal space are quite simple. Students stress the need for fast computers, electrical outlets for lap tops, and printing capability for all machines, including lap tops. Head phones, projectors, and dry erase boards are additional, necessary pieces of equipment. It is important to students that trained support personnel staff these areas, ready to help with both hardware *and* software questions. Finally, staff in these spaces should oversee secure storage areas or deposit boxes for personal belongings.

### Reactions to Examples of Learning Spaces

The six primary themes and nine sub-themes identified in the analysis of the feedback sheets are shown in Table 2 along with student comments that exemplify each theme. Table 3 shows the theme areas receiving primarily positive comments for each learning space (indicated with a star), as well as the percentage of positive comments received out of the total number of comments. Student reactions to the examples within each category of learning space are summarized below. (Appendix A displays frequencies of comments falling into theme areas.)

*Table 1: Characteristics of an Ideal Learning Space*

| Feature | Number of Groups Mentioning |
|---|---|
| ***Access*** | |
| **Availability** | |
| Hours of operation: 24/7 | 2 |
| Ability to reserve space | 1 |
| Need choices depending on assignments/needs | 2 |
| **Location** | |
| Located near classrooms | 1 |
| Convenient to residence/transportation | 1 |
| ***Amenities*** | |
| **Learning Technology** | |
| Technology | 1 |
| Fast Computers – boots up quickly | 1 |
| Electrical Outlets | 1 |
| Headphones | 1 |
| iPrint for Lap Tops | 1 |
| Capability to select release station for printing | 1 |
| All Computers Connected to Printers | 1 |
| Projectors | 1 |
| Dry Erase Boards | 2 |
| **Learning Resources** | |
| Technician knowledgeable with software | 1 |
| **Services** | |
| Storage or deposit box to keep things safe | 1 |
| ***Design*** | |
| **Configuration** | |
| Lots of desk space | 1 |
| Sound-poof | 1 |
| Privacy | 2 |
| Cubicle with space, computer, partitions | 1 |
| Group spaces (round tables) | 1 |
| Aesthetics | 1 |
| Well-Designed | 1 |
| **Furniture** | |
| Food trays that slide | 1 |
| **Lighting** | |
| Lighting | 1 |
| ***Space*** | |
| Space (enough room) | 3 |
| ***Atmosphere*** | |
| Comfortable | 1 |

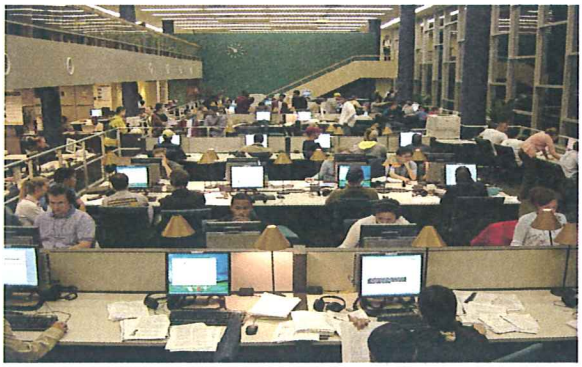
*Table 2: Theme Areas and Exemplary Comments*

| Theme | Positive | Negative |
|---|---|---|
| 1. Access | | |
| Availability | It's reservable, so I know there will be room. | It would probably be kept locked for use by specific majors. |
| "Enough Stuff" | Enough equipment for everyone. | There aren't enough seats or desks. |
| Location | It's in the residence hall -- good place to go if your roommate is being too loud. | I feel as though, because it is located in a residence hall, it would become a place to socialize instead of doing work. |
| 2. Amenities | | |
| Technology | Double screen monitors, useful for working on multiple windows. | Doesn't provide work space for higher level usage. |
| Resources | Computing assistance. | Less access to other resources. |
| Services | Nearby café for coffee. | Food & technology don't mix. |
| 3. Atmosphere | Intimate, comfortable. | It looks bare which doesn't make it an inviting study environment. |
| 4. Cost Efficiency | No positive examples. | There could be better utilization of this area with more tables. |
| 5. Design | | |
| Configuration | There is room to work at the desks, and it is kind of separated. | The workspaces seem somewhat segregated, a bit like office cubicles. |
| Furniture | Seating looks accommodating to groups and comfortable. | The chairs seem hard and primitive. |
| Lighting | The big windows, lots of light. | The lighting seems too dark. |
| 6. Space (Room Size) | Big enough space. | Too close, no space/room. |

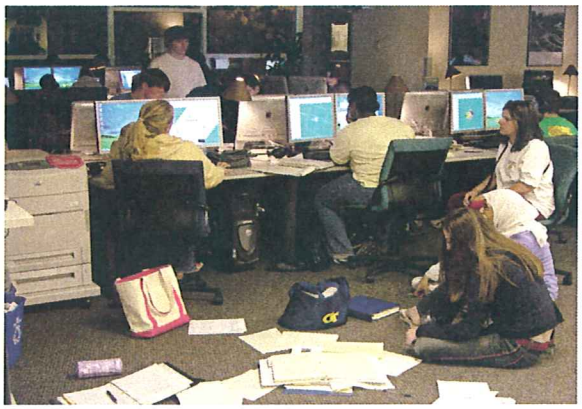
*Table 3: Learning Spaces Receiving Primarily Positive Comments by Theme Area*

| Theme | Learning Space | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Traditional | | Small Group/Ind. | | Group/Social | | Collaborative (Enclosed) | | | Collaborative (Open) | | | Create-Your-Own | | Ideal |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | |
| 1. Access | | | | | | | | | | | | | | | |
| Availability | | | | | ★ | | | | | ★ | | | | | ★ |
| "Enough Stuff" | ★ | | | | | | | | | ★ | | | | | |
| Location | | | | | | | | | | ★ | | | ★ | ★ | ★ |
| 2. Amenities | | | | | | | | | | | | | | | |
| Technology | ★ | ★ | | ★ | | | ★ | ★ | ★ | | ★ | ★ | ★ | ★ | ★ |
| Resources | ★ | | | | | | | ★ | | | | | | | ★ |
| Services | | ★ | ★ | ★ | ★ | | | | | | ★ | | | | ★ |
| 3. Atmosphere | | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ |
| 4. Cost Efficiency | | | | | | | | | | | | | | | |
| 5. Design | | | | | | | | | | | | | | | |
| Configuration | | | ★ | ★ | ★ | | ★ | ★ | ★ | ★ | | ★ | | | ★ |
| Furniture | | ★ | | | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ |
| Lighting | | | ★ | ★ | ★ | | | ★ | | | | | | | ★ |
| 6. Space (Room Size) | | ★ | ★ | ★ | ★ | ★ | | ★ | | | | | | | ★ |
| *Total Themes Covered* | 3 | 4 | 5 | 6 | 6 | 3 | 4 | 7 | 4 | 6 | 4 | 4 | 4 | 4 | 10 |
| *% Positive Comments* | 47.8 | 40.2 | 77.8 | 67.7 | 66.7 | 60.0 | 59.3 | 77.4 | 53.5 | 68.7 | 55.0 | 64.2 | 54.3 | 53.2 | |

*Learning Space #1.*



*Learning Space #2.*



Traditional computing labs The first poster contained two photos, each showing an example of a traditional computing area. These spaces are most similar to the general use spaces that currently exist on campus. Space #1 is the preferred space. Although they perceive it as a large, crowded, and potentially distracting place, they feel it would contain plenty of work stations, and staff would be available to assist with problems. In addition, the partitions between the facing rows of computer desks afford a small degree of privacy. Overall, however, only three of the theme areas received primarily positive ratings (see Table 3).

In contrast, in spite of receiving primarily positive responses in four theme areas, Space #2 is perceived as being crowded, messy, and disorganized. The students sitting on the floor are an indication that not enough work stations are available. One student's comments sum up the sentiment of the group: "It is chaotic, a mess, very unorganized. You leave your room to get away from the atmosphere this room provides."

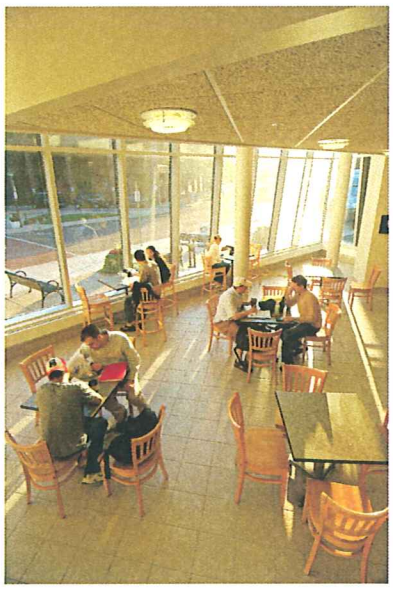
*Learning space #3 is the wide view and learning space #4 is the close-up.*

Small group/individual space adjoining a café. The second poster contained two photos of the same space. The first (#3) was a wide shot of the space, showing several individual/small group work stations adjacent to a café area. The second photo was a close-up of one of the work stations. When the posters were created, these two photos were thought to be showing two different spaces. This inadvertent use of a wide view and a close-up view show how the perspective of a photo can influence students' perceptions of a space.

The wide view received a greater percentage of positive comments than any other space (77.8%), with five theme areas receiving primarily positive comments. Eleven of the 18 students dislike nothing about the space. They like the fact that café services are close at hand, and they like the configuration of the work stations, as well as the lighting. More important to students, however, is the atmosphere of the space: clean, professional, relaxed with "comfyness to study." In addition, the feelings they report when viewing the space are overwhelmingly positive, such as relaxed, motivated, at ease, and ready to work.

The close-up view received 63 positive comments (67.7%). In addition to the five theme areas that receive primarily positive comments for the wide view, technology also receives primarily positive comments. They like the large monitors and individual lamps. In the close-up view, however, students perceive the work stations to be crowded and the chairs to be uncomfortable. It is unclear if respondents would have been more positive about the work stations if they knew these work stations were a part of Space #3. In combination, the two photos receive primarily positive comments in six theme areas, suggesting that the students do like this space and might like it even more with different furniture.

*Learning Space #5.*



Group, social, and meeting spaces. The third poster displayed two examples of group spaces. Learning Space #5 (showing a space in the Alfiero Center on north campus) is viewed more positively than #6, receiving 66.7% positive comments, and primarily positive comments in 6 theme areas. Students especially like the configuration of the space. The windows are a positive aspect for nine of the students. They also like that it is clean and spacious, which contribute to a positive atmosphere. Having a café nearby is an added bonus. On the negative side, however, students do not like the uncomfortable-looking furniture or the floor since it looks like it might be noisy. Also, the limited number of tables decreases the degree of access to the space, and they dislike the lack of privacy between tables.

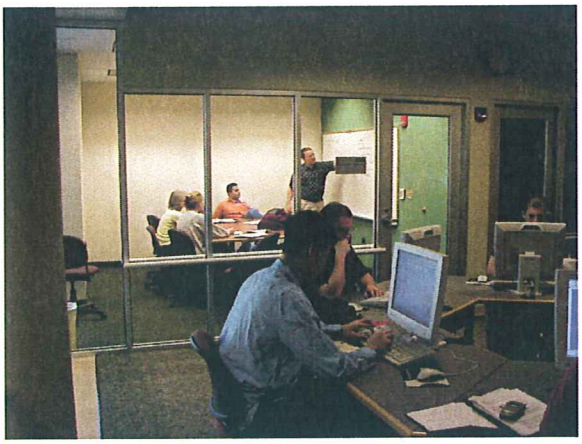
Learning Space #6 received 60.0% positive comments with only three theme areas receiving primarily positive comments. Students are most positive about the configuration and furniture in the space. They like the two-level configuration with the separate area for group work and the comfortable furniture. They view this space as "cozy and comfortable." However, some students are put off by the cafeteria-like atmosphere of the individual work space on the second level, and by the furniture: they fear the comfortable chairs will make students sleepy or

cause people to use the space to sleep rather than to work. Even the people who like the furniture and atmosphere of Learning Space #6 prefer Learning Space #5 for academic work.

*Learning Space #6.*

Enclosed collaborative learning spaces. The fourth poster displayed three examples of enclosed learning spaces designed for collaborative work. Learning Space #7 receives 59.3% positive comments, with 4 theme areas receiving primarily positive comments. Students are most positive about the configuration of the space. They like that the space is enclosed and separate from individual work stations. They feel that it is bright and roomy with sufficient technology for any group project. However, the glass enclosure results in a lack of privacy that would make them uncomfortable when using the room.

Learning Space #8 received the second greatest number of positive comments of any of the learning spaces (77.4%), with seven of the theme areas receiving primarily positive comments. Nine of the 18 students disliked nothing about the space. Students like the technology and resources available, and they like the design of the room, especially the large table. When they view the photo of this space, they report feeling motivated, professional, comfortable, able to speak freely, and involved.



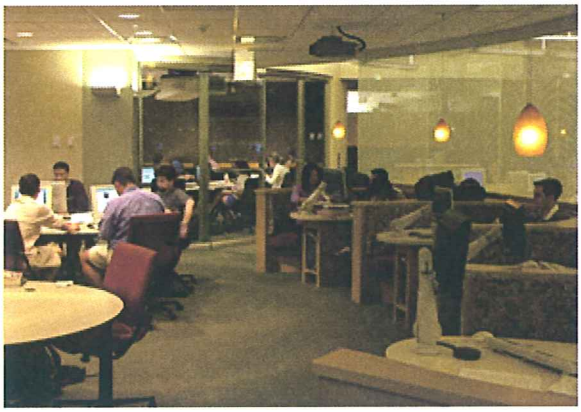
*Learning Space #7.*

*Learning Space #8.*


*Learning Space #9.*

Learning Space #9 received fewer positive comments than #7 (53.5%), with the same number of theme areas (4) receiving primarily positive comments. Students like the technology available in the room along with the configuration and the atmosphere. However, they feel that it is too closed-in and cramped. They also dislike the cinder-block. Of these three spaces, #8 seems to offer the best balance between a private, enclosed space and a closet: students want privacy for group work, but they prefer larger group rooms that do not provide a claustrophobic atmosphere.

Open collaborative learning spaces. Of the three examples of open collaborative spaces presented on the fifth poster, students prefer Learning Space #10. This space received the most positive comments of the three (68.7%), with six theme areas receiving primarily positive comments. Students like the technology and resources available but most important to them is the configuration and the atmosphere. The booths are very appealing, contributing to a comfortable environment. The primary drawback is the lack of privacy between booths.

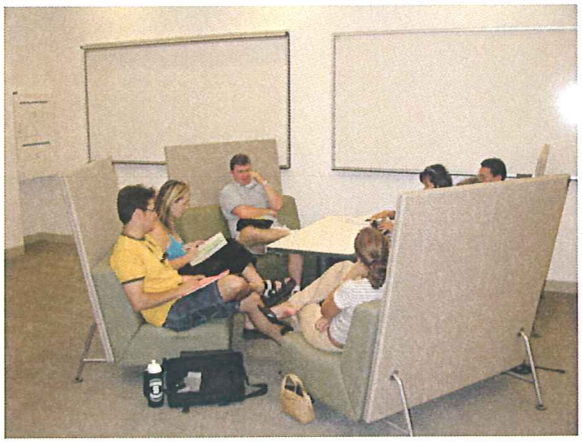


*Learning Space #10.*

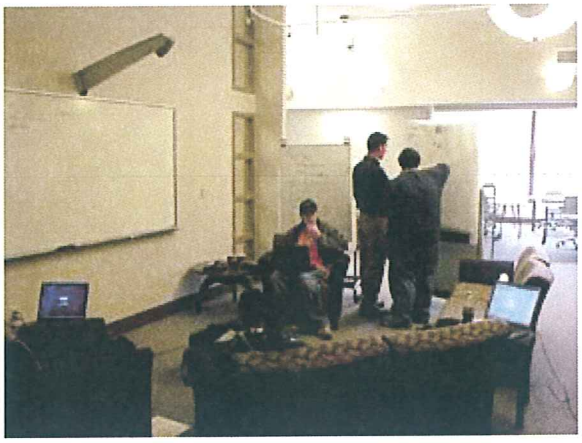
In contrast, students do not like Learning Space #11, which received 55.0% positive comments and only 4 theme areas with primarily positive comments. Students do not like the furniture or the configuration. They dislike the lack of privacy and see this as a social setting rather than a learning setting. In addition, many students view the large screens as a "waste of money." Learning Space #12 was perceived in a slightly more positive light, receiving 64.2% positive comments and 4 theme areas with primarily positive comments. Students perceive this as a "homey" space in which to do collaborative work and like the privacy offered by the walls separating the stations.

*Learning Space #11.*

*Learning Space #12.*



*Learning Space #13.*

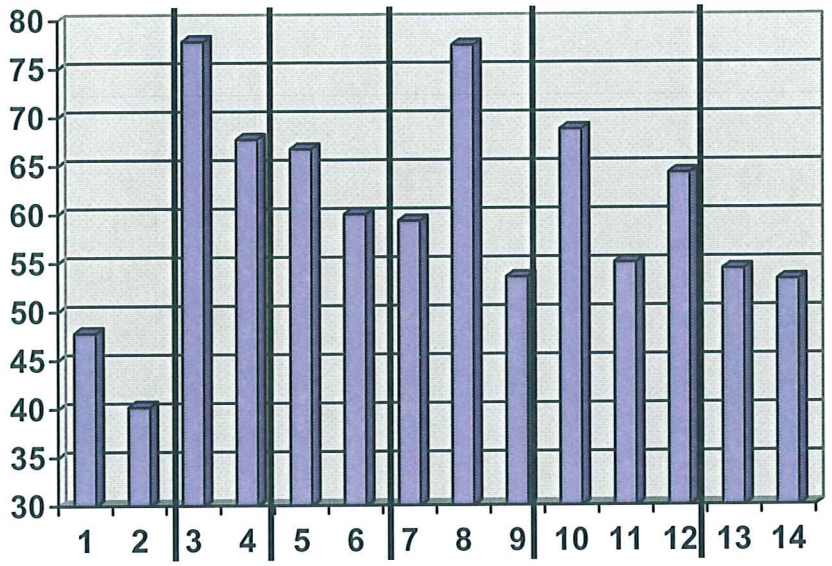


*Learning Space #14.*

Create-your-own learning spaces. The learning spaces shown in the last poster are examples of spaces where students can move furniture and use white boards and wireless technology to configure the space in a variety of ways to meet a variety of learning needs. Learning Space #13 is viewed slightly more positively than #14 (54.3% positive comments as compared to 53.2%), but each received primarily positive comments in the same four theme areas. Students like the technology available and the fact that the spaces are located in convenient areas of the campus (one in the residence halls). They also like the relaxed atmosphere and the furniture. However, students do not like the colors used in #13 since these colors represent a sterile, institutional atmosphere. With #14 comes the fear that other students will use the area to socialize rather than to study.

Summary. Figure 1 illustrates how the learning spaces compare in terms of the percentage of positive comments received. When students are looking for a space to check e-mail, use the internet, and work individually, they may be satisfied with a space like Learning Space #1. However, their comments suggest they would prefer a more informal and spacious area with café services and the potential for small group, as well as individual, work (exemplified in Learning Space #3). They also like the enclosed collaborative space exemplified in learning Space #8, and the open collaborative space exemplified in Learning Space #10. Although the Alfiero Center café (Learning Space #5) is not as popular with these students as 3, 8, or 10, the students may be more likely to use it now that they know it exists. From their comments, it appears that students need a balance between open space with plenty of work stations and privacy. They also need collaborative work stations for group projects. All types of spaces need to be well lit and contain comfortable (but not too comfortable) furniture, as well as large tables and desks. The space also needs to be visually appealing with a cozy, calm, yet professional, atmosphere.

*Figure 1. Percentage of Positive Comments Received*




## Conclusions

The use of focus groups and a photo feedback activity were useful in determining what features are necessary in a learning space, as well as what features students prefer. The data presented here suggest that students need the choice of a variety of spaces designed for a variety of learning needs. These spaces need to be equipped with appropriate technology and designed with enough room to allow for individual and group work. These spaces need furniture that is appropriately comfortable and must provide the appropriate degree of privacy. Students will frequent spaces that have all these features *and* provide a nice atmosphere.

Several unexpected findings shed some additional light on the student perspective. First, students often judge the usefulness of a space based on the presence of other students. They appear to respond more positively to images that show many students versus those that show just a few. Second, the perspective of the photo matters. They like Learning Space #3 when they can see the entire room, but they like the individual work stations less when they see just a close-up. Both of these unexpected findings should be considered if further data are collected using these images.

Three additional unexpected findings shed light on the behavior of UB students. First, they desire privacy, and an important aspect of privacy is the ability to keep their work from being displayed to other students. Most of the students in the focus groups were very uncomfortable with spaces where anyone walking by could see what was on the screen due to the competitive nature of their classmates. The second finding is almost contradictory to the first. While they desire privacy, they want to be able to see other students in the spaces where they are working. They feel more motivated to continue working if they see other students doing the same thing. Finally, access is primarily an important theme for the spaces they like the best. They seem to believe that the nicest and most useful spaces will be very busy or will be reserved for special groups of students.

In spite of the rich data collected in this study, findings may not generalize to the entire student body. Since it is likely that people who self-selected to participate in these focus groups are different than those who did not choose to participate, the present results may potentially be biased. For example, it is possible that those who volunteered for the focus groups are more active in campus life or may have greater concerns about campus space than non-volunteers. Thus, it is important to view the data presented here as offering insight into potential areas for follow-up research with the general UB population rather than as the "final word" on campus learning spaces.

Carol VanZile-Tamsen, Office of Institutional Analysis, 5/16/07

*Appendix A:*

*Frequencies of Comments by Theme Area and Learning Space*

| | | | Learning Space | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Theme*** | ***Sub-Theme*** | ***Direction (+/-)*** | ***1*** | ***2*** | ***3*** | ***4*** | ***5*** | ***6*** | ***7*** | ***8*** | ***9*** | ***10*** | ***11*** | ***12*** | ***13*** | ***14*** |
| **Access** | **Availability** | Positive | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Negative | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 0 | 1 |
| | **Sufficient "stuff"** | Positive | 8 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Negative | 0 | 3 | 4 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 3 | 2 | 4 | 1 |
| | **Location** | Positive | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| | | Negative | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Totals | | Positive | 8 | 2 | 1 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| | | Negative | 0 | 4 | 4 | 0 | 2 | 2 | 3 | 2 | 2 | 2 | 5 | 3 | 4 | 3 |
| **Amenities** | **Learning Technology** | Positive | 3 | 6 | 0 | 5 | 1 | 0 | 5 | 8 | 13 | 3 | 13 | 10 | 7 | 10 |
| | | Negative | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 2 | 0 | 1 | 1 | 2 | 5 | 1 |
| | **Learning Resources** | Positive | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 0 | 1 | 0 | 0 | 0 | 0 |
| | | Negative | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | **Services** | Positive | 0 | 1 | 7 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 |
| | | Negative | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | | Positive | 7 | 7 | 7 | 6 | 3 | 1 | 5 | 13 | 13 | 5 | 16 | 10 | 7 | 10 |
| | | Negative | 2 | 0 | 4 | 2 | 2 | 1 | 0 | 2 | 0 | 1 | 1 | 2 | 6 | 1 |
| **Atmosphere** | | Positive | 4 | 6 | 14 | 5 | 6 | 5 | 2 | 4 | 6 | 8 | 5 | 8 | 7 | 7 |
| | | Negative | 4 | 10 | 2 | 0 | 5 | 4 | 1 | 1 | 2 | 2 | 4 | 2 | 3 | 4 |
| **Cost Efficiency** | | Positive | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Negative | 0 | 0 | 2 | 2 | 2 | 0 | 1 | 2 | 1 | 0 | 3 | 3 | 3 | 1 |
| **Design** | **Configuration** | Positive | 8 | 7 | 16 | 18 | 18 | 8 | 21 | 11 | 10 | 15 | 2 | 11 | 7 | 3 |
| | | Negative | 10 | 14 | 3 | 14 | 9 | 9 | 11 | 6 | 4 | 6 | 10 | 4 | 7 | 6 |
| | **Furniture** | Positive | 0 | 1 | 0 | 3 | 1 | 12 | 2 | 5 | 2 | 4 | 7 | 7 | 6 | 6 |
| | | Negative | 0 | 0 | 0 | 4 | 8 | 3 | 1 | 1 | 1 | 2 | 3 | 4 | 3 | 2 |
| | **Lighting** | Positive | 3 | 0 | 3 | 5 | 9 | 3 | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 1 |
| | | Negative | 4 | 2 | 1 | 1 | 1 | 5 | 9 | 1 | 1 | 8 | 0 | 0 | 0 | 7 |
| Totals | | Positive | 11 | 8 | 19 | 26 | 28 | 23 | 24 | 18 | 13 | 21 | 9 | 18 | 13 | 10 |
| | | Negative | 14 | 16 | 4 | 19 | 18 | 17 | 21 | 8 | 6 | 16 | 13 | 8 | 10 | 15 |
| **Space** | | Positive | 6 | 3 | 3 | 3 | 3 | 2 | 1 | 5 | 0 | 0 | 0 | 1 | 0 | 1 |
| | | Negative | 9 | 1 | 2 | 2 | 1 | 1 | 2 | 4 | 16 | 1 | 2 | 4 | 2 | 2 |
| | | | | | | | | | | | | | | | | |
| **Nothing's** | | Dislike Nothing | 1 | 0 | 11 | 5 | 2 | 4 | 4 | 9 | 2 | 2 | 2 | 2 | 1 | 3 |
| | | Like Nothing | 0 | 1 | 2 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 3 | 0 |
| **Emotions** | | Positive Emotions | 7 | 7 | 22 | 18 | 22 | 14 | 17 | 23 | 12 | 21 | 12 | 13 | 15 | 7 |
| | | Neutral Emotions | 1 | 2 | 1 | 4 | 0 | 4 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 7 |
| | | Negative Emotions | 19 | 17 | 2 | 5 | 3 | 8 | 8 | 2 | 12 | 4 | 7 | 6 | 6 | 10 |
| Total Positive Comments | | | 44 | 33 | 77 | 63 | 66 | 51 | 54 | 72 | 46 | 57 | 44 | 52 | 44 | 41 |
| Total Negative Comments | | | 48 | 49 | 22 | 30 | 33 | 34 | 37 | 21 | 40 | 26 | 36 | 29 | 37 | 36 |