



Conference Paper

Longitudinal Assessment of “User-Driven” Library Commons Spaces

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Abstract

Objective – To conduct a longitudinal assessment of library spaces at the Georgia Tech Library and to determine the satisfaction of students with the most recent commons renovation. The library has completed three commons area renovations. The Library West Commons (LWC) opened in 2002 with an individual productivity lab, multimedia studio, and presentation rehearsal studio, while the Library East Commons (LEC) and the 2nd floor West Commons (2 West) opened in 2006 and 2009, respectively, with flexible, user-centered environments designed to promote collaborative activities. This analysis focuses on the renovated collaborative spaces, while also investigating and commenting on how renovation impacts usage of other spaces in the library.

Methods – Usage of all library spaces was measured during one-week periods in Fall 2008 and Spring 2010. Observations were made of each student floor in the library at four times during the day; measures included space utilization by groups, group sizes, and laptop utilization. In addition, a qualitative instrument was administered during Spring 2010 to 103 students using the 2 West Commons space to confirm whether the renovation met their needs.

Results – Overall, there was a 64.5% increase in group utilization of the library from 2008 to 2010, driven primarily by the 2 West renovation. The greatest concentration of group usage was in the LEC and 2 West, though the number of groups using the LEC declined. Laptop use in the 2 West commons more than doubled (33.6% to 70.5%), and laptop use in the entire library increased from 40.5% to 49.0%. In the qualitative survey, scores ranged between 4.0 and 5.0 on a 5-point scale for items regarding four design themes for the 2 West renovation: power/data, lighting, aesthetics, and the creation of a “defined yet open” space.

Conclusion – Findings suggest that the 2 West Commons is attracting more students and groups following its renovation, that it is attracting students and groups away from the previously renovated LEC, and that overall usage of the library increased subsequent to the 2 West renovation.

Introduction

The Georgia Tech Library serves over 26,000 students, staff, and faculty. The main physical facility consists of two separate libraries (East and West) joined by a bridge. This facility is open 135 hours during the week closing only Friday and Saturday nights. Georgia Tech’s most recent LibQUAL+® survey administration, conducted in 2010, demonstrated heavy use of the facility by both undergraduate and graduate students with 88% of undergraduates and 86% of graduate students indicating at least monthly use (Cook et al., 2010; see Figure 1). Furthermore, over 60% of undergraduates indicated daily or weekly use of

the facility. The fact that over 80% of graduate students indicate regular use of the library facility was particularly surprising, leading us to conclude that “Library as Place” remains a vibrant part of student life across user groups.

The Georgia Tech Library has completed three commons area renovations. The first, the Library West Commons (LWC) opened in 2002 with a large individual productivity lab, a multimedia studio, and a presentation rehearsal studio. Building on the success of the LWC, the library embarked on planning for the Library East Commons (LEC) which opened in 2006. Designed to promote collaborative activities in a flexible,

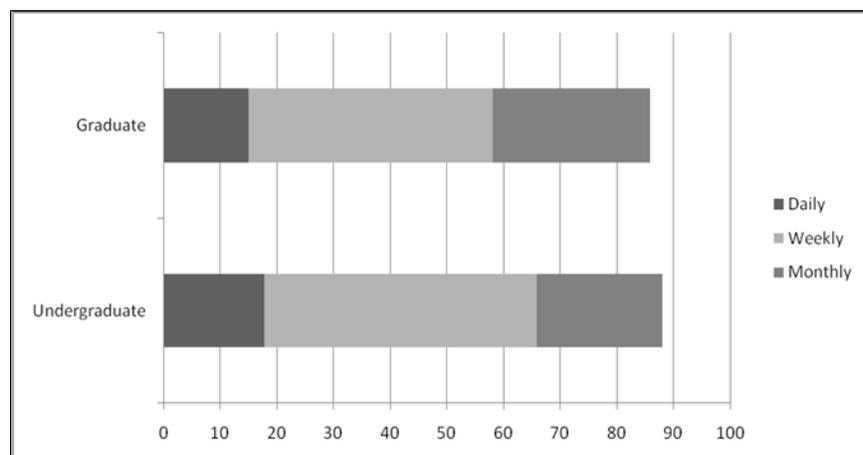


Figure 1
Georgia Tech Library facility use among students (LibQUAL+® 2010)

user-centered environment, this renovation was particularly successful due to the depth of user feedback gathered throughout the design process. The third and most recent renovation, the 2nd floor West Commons (“2 West”), was completed in Fall 2009. The 2 West project continued and increased the level of user design input to the extent that it is often described as a “student designed” library space. Fox and Stuart (2009) provide more comprehensive information on the planning and design of these spaces.

While the 2 West project shares a design component with the LEC, namely that of providing user-informed collaborative spaces, it differs in two significant ways. First, 2 West provides more open spaces for collaborative activities than the LEC, promoting greater adaptability for group size variations and, in general, a sense of more flexibility. Second, other than four quick-use walk-up terminals, 2 West does not provide library-owned desktop computers. In 2007, Georgia Tech updated its student computer ownership policy to require that all incoming first-year students own a personal laptop computer. This requirement is significant because it helped drive the decision not to include desktop computing spaces in 2 West; but instead make the space more amenable to personal laptop use through abundant power outlets and wired data ports, an enhanced wireless network, wireless printing capability, and 42-inch monitors that can attach to multiple laptops simultaneously. Rather than continuing to create expensive, financially unsustainable and less flexible “computer lab” commons with stand-alone computer terminals, the 2 West renovation embraces the laptop and mobile-device oriented culture of the larger institution.

Purpose of the Study

The purpose of this study was to conduct a longitudinal assessment of library spaces at the Georgia Tech Library and to determine the satisfaction of students with the most recent commons renovation. Our analysis focuses on the renovated collaborative spaces, while also

investigating and commenting on how renovation impacts usage of other spaces in the library. By assessing the impact of this most recent renovation over time, we hope to provide justification for future renovations and inform these projects with the most appropriate user-sensitive design.

This longitudinal study seeks to answer the following key questions: To what degree does renovation impact utilization of the renovated space? How does usage of renovated spaces change over time, particularly in light of subsequent renovations to library spaces with similar functions? And, what effect did these renovations have on overall utilization of library spaces? Based on previous observations and gate count data, we anticipated that the creation of the new 2 West commons would substantially increase utilization of that particular space, while also leading to an overall increase in library usage. We also expected to find that the increased utilization of 2 West would come at some expense to usage of the LEC. Both of these commons areas provide collaborative spaces; but the LEC was often very crowded prior to 2 West construction, and we expected that the renovated 2 West would provide a “relief valve” for the student pressure to increase collaborative space within the library. As the final part of our study, we also seek to determine how satisfied students are with the renovation of the 2 West commons based on the original user-centered design criteria for that space.

Although there have been numerous commentaries and research articles written about “library as place” and commons spaces, no published work examines the effect of renovation on library space utilization over time. In a landmark study, Whitmire (2001) examined the library-use patterns of over 1,000 undergraduate students over their first three years in college. Although Whitmire’s research is very useful in providing a holistic understanding of how and why undergraduates use academic library resources, services and facilities, it does not specifically investigate the impact that renovation

has on facilities usage. Scott Bennett, writing in the 2005 Council on Library and Information Resources (CLIR) report, *Library as Place: Rethinking Roles, Rethinking Space*, notes the importance of fostering social components of learning by creating a sense of community among students. We have found at Georgia Tech that creating a sense of community ownership empowers users to modify and govern the space based on their evolving needs. A major consideration for the 2 West renovation was to create a space where students felt comfortable moving furniture around to meet their needs and expectations. The success of this user participation dimension was assessed using a qualitative questionnaire, which supplements the space utilization data. Potthoff, Weis, Montanelli, and Murbach (2000) illustrate a behavioral sciences approach to evaluating library spaces called the Role Repertory Grid Procedure. While there is some overlap between our qualitative instrument and the comprehensive approach adopted by Potthoff et al., our instrument focuses on evaluating four specific themes that emerged from student focus groups involved with the initial co-design phase for 2 West. However, the Role Repertory Grid Procedure may be useful for future iterations of the qualitative part of this study. Somerville and Collins (2008) write about the importance of collaborative, user-centered design principles in the planning process for the renovation of library learning spaces. Though they discuss important components of user-driven library commons renovation, their work does not fill the research gap regarding longitudinal assessment of these spaces. Furthermore, there have not been any formal studies to investigate the internal impact that renovation has on other spaces within the library.

Methodology

The methodology for this longitudinal study involves both quantitative and qualitative components. Initial observations were first performed during Fall 2008 by measuring usage of all library spaces for one week. Observations included counts of patrons using each space or

zone at four times during the day. The number of groups in each space was recorded. Some, but not all, of the 2008 observations also noted group sizes. One of the 2008 observations collected data on laptop utilization.

A second set of comparative observational data was collected during Spring 2010 to more definitively determine the longitudinal impact of opening a new space on overall building usage, group usage versus individual usage by zone, and laptop utilization, after the opening of the 2 West commons. As in 2008, observations were made of each student floor in the library at four times during the day. These times were labeled as morning, afternoon, evening, and night and were taken at approximately the same time each day Monday through Thursday. The observations for Fridays included only three data points as the library closes at 6:00 p.m. on Fridays during most of the semester. For each count, the observer noted the number of individuals and groups in the zone, the sizes of each group, and the number of laptops being used. The 2010 observations were timed to coincide with the same period of the semester as when the 2008 observations were conducted.

Additionally, feedback gathered from students during the initial design phase for 2 West identified specific areas for improvement. These areas included a desire for improved power and data access, improved lighting and aesthetics, and flexible spaces that could be “student-owned.” A qualitative instrument was administered during Spring 2010 to students using the 2 West commons space to confirm if the renovation met their needs. This survey included the following questions:

- *On a scale of 1-5, how well does the power in this space meet your needs? Why?*
- *On a scale of 1-5, how well does the lighting of this space meet your needs? Why?*
- *On a scale of 1-5, how well do the aesthetics, furniture and ambience of this space meet your needs? Why?*

- *During the initial planning for the design of this space, students noted a desire for a “defined yet open” space. They described a space that included well-defined areas for group study, while not limiting the option to move furniture around for their individual needs. On a scale of 1-5, how successful is this space in striking this balance of “defined yet open”? Why?*

In addition to the questions outlined above, the survey also included an open-ended question asking for additional comments or suggestions for the library. These qualitative comments are useful to describe the “lived experience” of the students within the 2 West space. They also provided context for the quantitative statistics and provided a better overall picture of how and why our users interact with the newly renovated areas in the library.

Findings and Observations

Table 1 shows the percentage change in the numbers of individuals using the LEC and 2 West, and the change in the total usage of all zones (floors 1 through 6), from the 2008 and 2010 observational data. The 2 West space saw higher usage for each 2010 data collection when compared with the same period in the 2008 observation. Total usage of 2 West increased 94.0% between the 2008 and 2010 observations.

For the LEC, some 2010 observations revealed higher usage while others declined when compared to 2008. Overall usage of the LEC during the observations increased only 2.7% thus lagging considerably behind the increase of 2 West. The data suggests that on the busiest days (Monday through Thursday), 2 West is attracting students away from the LEC space. Total usage of library spaces on all floors during the observations increased 25.1%, considerably higher than the increase in Georgia Tech student population between 2008 and 2010.

Space Utilization by Groups

Table 2 provides the total number of groups observed in each space and the percentage change for group utilization of each area between 2008 and 2010.

By far, the greatest concentration of group usage is in the LEC and 2 West, as these are the only areas of the library that have been renovated specifically to provide collaborative space. These spaces are also located on the “talking allowed” floors rather than floors dedicated for quiet study. The increase of collaborative use of 2 West both in terms of raw numbers and percentage change is quite high, reflecting the popularity of this freshly renovated space. While still high, the number of groups using the LEC declined. Interestingly, the LEC was the only space to experience a decline in number of groups from 2008 to 2010, though it should be noted that the percentage change in other areas is based on smaller counts as these spaces are primarily dedicated to quiet study. Overall, the data illustrates that the 65.4% increase in group utilization of the library from 2008 to 2010 is driven primarily by the 2 West renovation.

Group Sizes

While the 2008 observations recorded the number of groups using each zone, only eight of the 2008 observations noted the sizes of each group. These eight observations were the evening and night observations, Monday through Thursday. Group sizes were noted during each of the 2010 observations, but we can only make a direct comparison between the 2008 and 2010 data for the evening and weekend observations conducted Monday through Thursday. The number of group members in 2 West increased 67.4%; but as the total number of groups more than doubled, the average group size decreased from 3.4 to 2.8 members. The number of group members in the LEC declined 1.8% with group size declining slightly from 2.7 to 2.5 members. With the

Table 1
LEC, 2 West and Total Attendance % Change 2008-2010

MONDAY	1st Floor East Commons (LEC)	2nd floor West Commons (2 West)	TOTAL All Library Zones % Change (2008-2010)
Morning	-18.1%	+11.5%	-9.8%
Afternoon	+13.2%	+134.5%	+66.1%
Evening	-5.9%	+55.6%	+25.8%
Night	-17.6%	+46.2%	+12.8%
TUESDAY	LEC	2 West	TOTAL LIBRARY
Morning	-16.7%	+29.7%	+10.1%
Afternoon	-24.5%	+87.7%	+18.4%
Evening	+10.6%	+43.6%	+38.2%
Night	+17.5%	+57.3%	+65.0%
WEDNESDAY	LEC	2 West	TOTAL LIBRARY
Morning	+24.4%	+79.3%	+9.3%
Afternoon	-10.6%	+103.7%	+7.9%
Evening	+16.1%	+52.6%	+28.7%
Night	-5.4%	+72.4%	+41.7%
THURSDAY	LEC	2 West	TOTAL LIBRARY
Morning	-20.0%	+260.0%	+31.7%
Afternoon	-4.0%	+130.9%	+45.9%
Evening	-35.1%	+25.3%	-1.4%
Night	-45.7%	+15.7%	-12.1%
FRIDAY	LEC	2 West	TOTAL LIBRARY
Morning	+107.1%	+246.2%	+44.5%
Afternoon	+22.2%	+45.5%	+18.0%
Evening	+42.9%	+286.7%	+35.6%
OVERALL USAGE % CHANGE (2008- 2010)	+2.7%	+94.0%	+25.1%

exception of the LEC and one other zone, all observed spaces recorded increases in the total number of group members between the 2008 and 2010 observations, while average group sizes fluctuated with some zones experiencing increases and some decreases.

When reviewing all 19 observations made during 2010, including the morning and afternoon times excluded from the comparisons in the discussion above, variations in group sizes by zone seem to be minimal. Average group sizes by zone ranged from 2.2 to 2.9 with no apparent pattern by size of

the space, floor level (i.e., floors closer or further away from the main entrance), whether a quiet or talking space, or whether the space had been renovated. One variable that may have provided some impact on group size is the availability in certain zones of tables somewhat larger than in others, or specifically in the renovated 2 West

area, of small tables that can easily be moved together to form larger groups.

Laptop Utilization

Table 3 illustrates how laptop utilization has changed since the 2 West renovation. The number of students utilizing laptop computers was noted during each observation in 2010.

Table 2
Space Utilization by Groups (% Change 2008-2010)

FLOOR	Total # of Groups (2008)	Total # of Groups (2010)	% Change (2008-2010)
1 West (LWC)	49	74	+51.0%
1 East (LEC)	237	218	-8.7%
2 West	207	450	+117.4%
2 East	36	46	+27.8%
3 West	8	23	+187.5%
3 East	36	37	+2.8%
4 West	30	63	+110.0%
4 East	16	22	+37.5%
5	18	31	+72.2%
6	16	25	+56.2%
GROUP UTILIZATION TOTAL % CHANGE, 2008-2010			+65.4%

Table 3
Laptop % Utilization (2008-2010)

FLOOR	2008	2010	% Change (2008-2010)
1 West (LWC)	0.0%	6.9%	+6.9%
1 East (LEC)	27.0%	35.6%	+8.6%
2 West	33.6%	70.5%	+36.9%
2 East	68.2%	52.2%	-16%
3 West	80.0%	62.0%	-18%
3 East	21.4%	68.2%	+46.8%
4 West	100.0%	68.9%	-31.1%
4 East	75.0%	62.4%	-12.6%
5	88.0%	65.7%	-22.3%
6	93.3%	72.6%	-20.7%
TOTAL LAPTOP % UTILIZATION	40.5%	49.0%	+8.5%

In 2010, laptop utilization varied significantly based on zone, but the lowest rates were observed in the LWC and LEC with rates of 6.9% and 35.6% respectively. This result was expected for these areas since most seating areas in the LWC and about half those in the LEC are outfitted with desktop computers. Other spaces in the library saw laptop utilization rates from just over 50% to just over 70% in the 2 West commons, which is specifically designed to support laptops. Total laptop utilization for all library spaces during the study was 49.0%. As there was only one observation in 2008 that noted laptop usage, it is not possible to fully report trends in this area. Still, it can be noted that from the 2008 observation to those in 2010, laptop use in the 2 West commons more than doubled (33.6% to 70.5%) and that laptop use in the entire library increased from 40.5% to 49.0%. Both of these results would be expected given the laptop-friendly renovation to 2 West and the a new freshman class subject to the institutional laptop requirement.

2 West Qualitative Survey

Also significant are the results of the survey regarding the four core design themes for the 2 West renovation: power/data, lighting, aesthetics,

and the creation of a “defined yet open” space. For this survey, the scale was centered so that a response of “3” indicated satisfaction with the renovation efforts for that theme. A “4” indicated that the renovation more than met the desired outcome for that space while a “5” indicated that the student felt the renovation effort had been great. As noted in Table 4 below, over 100 students using the 2 West commons space participated in the survey. With all theme scores ranging between 4.0 and 5.0, it appears that students are quite satisfied with each aspect of the renovation.

Convenient and ample power and data access was a primary concern because the 2 West renovation would not include desktop computers, but rather be marketed as a “laptop friendly” commons space. Specific comments from the qualitative survey reflect student satisfaction with regards to power and data access:

- “It’s real easy to plug in almost anywhere.”
- “Not having to search/fight for outlets makes the library much easier to study in.”
- “Plenty of power outlets scattered throughout.”
- “Points are well placed.”

Table 4
Qualitative Survey Results

<u>THEMES</u>	<u>AVERAGE SCORE (n=103)</u>
Power/Data	4.28
Lighting	4.49
Aesthetics, Furniture, and Ambience	4.44
"Defined Yet Open"	4.43
TOTAL AVERAGE	4.41
SCALE:	5 = Great
	4 = More than adequate
	3 = Meets needs
	2 = Not very well
	1 = Totally inadequate

Prior to the renovation, lighting levels in 2 West were described as unbalanced and generally harsh. The survey results show that students reacted positively to the refreshed lighting for the space:

- "Perfect for computers and work."
- "Outside light and inside light work well together to create an aesthetically pleasing environment."
- "Love the bright lights! Doesn't feel like a prison like before."
- "I feel like the lighting is great for reading, studying, etc. Lighting is subtle as to not distract from work but sufficient enough to function. It almost seems that there is a lot more of natural lighting."

We asked students how well the "aesthetics, furniture, and ambience" of this space met their needs. Their scores and comments reflect an enthusiasm for the comfortable furniture, contemporary look and feel, and practical aesthetics for enhancing collaborative activities:

- "Oh my god, it is the perfect studying chair ever."
- "Effective for both group studying and studying alone."
- "Good comfortable chairs, nice tables, good group work atmosphere."
- "Furniture is nicer; doesn't have the feel of a dungeon."
- "Comfortable yet can focus."
- "Love the new set up, especially white boards. Booths are comfortable."
- "The modern and minimalist style helps me to concentrate on my work in a relaxed environment."
- "Very nice contemporary feel."
- "Simply much more appealing than before."

The final theme we assessed was the flexibility of the space. During the co-design phase, students described a space that included well-defined areas for group study, while not limiting the option to move furniture around for their individual needs.

The comments from the 2010 survey demonstrate that the space allows for such flexibility and openness:

- "Good, can easily move furniture to meet group needs."
- "The present environment is one of the best places to study on campus due to how easily it can adapt to a student's needs."
- "The objective is well met. The central space and other long tables are good for group studies, and the corners are quiet enough for individual studiers."
- "You have your own space, but can still not be isolated from the rest of the library."
- "This really is the perfect place to do group work, because there is so much freedom to move around and use various resources."
- "The white board areas are great for group study, but the option remains open to rearrange furniture to an extent to accommodate larger groups of people."
- "The white boards are a wonderful feature and it helps that most of the furniture is lightweight and moveable. It strikes a great balance."
- "The spaces are less cubicle-like and are open. The rolling chairs make it easy to add more people to a group."

Finally, the survey provided an opportunity to gather feedback about improving services overall, and included an open-ended question about how to improve the library, generally. Many students indicated a shortage of dry erase markers and erasers. This information was communicated to the Commons coordinator who increased supplies during final exams. Other students asked for improved power access in other library spaces. A power audit was conducted by the library facilities manager, and though it is not currently feasible to overhaul the entire electrical grid for the building, broken or non-functioning outlets can be repaired. A very common request was to "keep renovating up to the next floors." Although

the present budget climate will not allow for an immediate comprehensive renovation, the quantitative and qualitative data suggests that adopting a user-driven approach for future facilities refreshments correlates well with student satisfaction.

Conclusions

Analysis of the longitudinal data collected suggests the following:

- The 2 West commons is attracting more students and groups subsequent to its renovation.
- The 2 West commons is attracting students and groups away from the previously renovated LEC.
- Overall usage of the library increased subsequent to the 2 West renovation.
- The need for collaborative spaces in the library continues to grow. Even with the most recent renovation of 2 West, the number of groups and group members continues to increase in other areas of the library including those designated as quiet space.
- Laptop utilization is up somewhat for the whole library and significantly for 2 West.

Data on student usage indicates that the most recently renovated spaces (2 West) are successful. It appears that the most recent renovation increased use of that commons space, as well as overall usage of the library. Results of the qualitative survey regarding the 2 West renovation indicate a very high degree of satisfaction with the project results across each of the core design themes. This level of satisfaction is most likely attributable to the intensive user engagement process undertaken prior to renovation. The high scores on the survey corroborate the large increase observed in usage data for the 2 West commons space. The 2010 data also support the concept that students will embrace a laptop-friendly commons renovation and that all commons renovations do not require library-supplied desktop computers.

Future iterations of this longitudinal study should prove illuminating and practical for space planning and budgeting. In order to conduct a successful inquiry, we have found it useful to adopt the following practices to help ensure smooth data collection and analysis. As with all longitudinal research, using a consistent survey instrument and communicating data gathering guidelines is important to maintain integrity and consistency of results. In addition, it is vital to recognize the need to have knowledge transfer mechanisms in place to deal with changes in personnel. Finally, a method for archiving raw data and results, preferably in an institutional repository or other centralized digital warehouse, can make the data analysis process more efficient and robust.

This study is unique because it assesses how renovating spaces impacts overall usage of the library over time. Based on our literature review, this type of longitudinal study of library space utilization has not yet been published. This research also illustrates how renovating one space has the potential to attract users away from other library spaces. The data suggests that user-centered refreshment or renovation of library commons spaces can have a profound impact on utilization, and that this utilization can increase with the addition of financially sustainable laptop friendly spaces and not just the addition of commons spaces providing desktop computers. Results from this study will be used to guide and inform future renovations at the Georgia Tech Library. Additionally, future observations may be able to more fully assess changes in the utilization of laptop computers. Although this study concerns the Georgia Tech Library, our experience may provide a useful roadmap for other institutions as they seek to transform spaces or assess existing ones.

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