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Research Article

Space Use in the Commons: Evaluating a Flexible Library Environment

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Abstract

Objective – This article evaluates the usage and user experience of the Herman B Wells Library's Learning Commons, a newly renovated technology and learning centre that provides services and spaces tailored to undergraduates' academic needs at Indiana University Bloomington (IUB).

Methods – A mixed-method research protocol combining time-lapse photography, unobtrusive observation, and random-sample surveys was employed to construct and visualize a representative usage and activity profile for the Learning Commons space.

Results – Usage of the Learning Commons by particular student groups varied considerably from expectations based on student enrollments. In particular, business, first and second year students, and international students used the Learning Commons to a higher degree than expected, while humanities students used it to a much lower degree. While users were satisfied with the services provided and the overall atmosphere of the space, they also experienced the negative effects of insufficient space and facilities due to the space often operating at or near its capacity. Demand for collaboration rooms and computer workstations was particularly high, while additional evidence suggests that the Learning Commons furniture mix may not adequately match users' needs.

Conclusions – This study presents a unique approach to space use evaluation that enables researchers to collect and visualize representative observational data. This study demonstrates a

model for quickly and reliably assessing space use for open-plan and learning-centred academic environments and for evaluating how well these learning spaces fulfill their institutional mission.

Introduction

As part of its efforts to transform library spaces and environments to meet students' learning, collaboration, technology, and research needs more effectively, the Herman B Wells Library at Indiana University Bloomington (IUB) opened a newly renovated and redesigned Learning Commons in fall 2014. Occupying the entire first floor (approximately 25,000 square feet) of the west wing of IUB's main research library, the Learning Commons was designed as a technology-focused learning centre that provides services and spaces tailored to undergraduates' academic requirements with the goal of supporting a learning-centred paradigm of library use (see Bennett, 2009).

To enable the diverse range of learning activities encompassed by this usage paradigm, the Learning Commons was designed to maximize flexible study and work spaces and was intended to represent a deliberate break from the previous service model. Prior to the renovation, the Learning Commons' space was configured as an "information commons" with 260 desktop computers in mostly hardwired and immobile computer-lab style rows, and with library and technology support services anchored to large desks (see Forrest & Halbert, 2009, pp. 93-96 for a summary and diagram of this space). In contrast, the redesigned space features a variety of multi-purpose spaces and contains two classrooms (one configured with media tables and one in a traditional teaching lab layout), a writing support and tutoring centre, 18 collaboration rooms with large-screen monitors, work tables, and whiteboards (12 configured with media collaboration tables containing built-in laptop and device display adaptors), 68 individual computer workstations, and multi-purpose seating for about 400 people comprised of a mix of tables, booths, soft benches, chairs, and lounge areas (see Figure 1). All of these spaces are available for student use 24/7, except for the classrooms and writing centre, which may be reserved for workshops and programming. An array of walk-up services is provided in a "Genius Bar" style service hub containing desks for library circulation, course reserves, and equipment check out, directional and basic reference assistance, research consultation, technology and computer support, and peer mentors for help in navigating student services, degree planning, and career development. The configuration of these service hub desks is designed to be flexible, and the composition of the services offered varies based on the time of the semester and demand.

The emphasis on flexibility in the Learning Commons' design assumes that users will engage in a variety of information production and consumption tasks using many types of devices (see Delcore, Teniente-Matson, & Mullooly, 2014). In this way, the Learning Commons can be understood as occupying the centre of a continuum between low-intensity informal spaces and high-intensity formal study spaces (see Delcore et al., 2014; Priestner, Marshall, & Modern Human, 2016), and its mix of spaces and furniture are intended to support people working throughout this spectrum.

Conducted approximately 9 months after its opening, this study sought to evaluate not only these assumptions about the Learning Commons' design, but also its effectiveness as a learning space, by observing students' adoption and usage of its facilities and services in their everyday academic activities.

Literature Review

Beginning around 2000, the creation of "learning commons" was part of a larger trend in

Figure 1
The floor plan of the Learning Commons with workstations, mixed use seating, and the service hub highlighted. (Stock photographs provided by IUB Libraries Communications. Used by permission.)

universities to shift teaching and learning pedagogies from an emphasis on a "culture of teaching," to a "culture of learning" that recognizes the importance of the social dimensions of learning activities (Turner, Welch, & Reynolds, 2013, p. 228; Bennett, 2003, p. 10). In libraries, learning commons spaces tend to be seen as an evolution and extension of the "information commons" model, which reframes spaces originally intended to primarily support students' information-seeking activities as locations for students to participate in information processes and produce knowledge in "a vibrant, collaborative, [and] technology-infused space" (Accardi, Cordova, & Leeder, 2010, p. 312; Turner et al., 2013, p. 230; Somerville & Harlan, 2008, pp. 1-36; Bonnand & Donahue, 2010).

A commitment to an understanding of students as intentional learners is a key aspect of the learning commons concept, and Bennett asserts that these spaces should be "one of the chief places on campus where students take responsibility for and control over their own learning, and [should] employ library staff to enact the learning mission of the university through being educators" (2009, p. 194). A learning commons therefore supports the social dimensions of learning by providing spaces that enable a "variety of teaching and learning relationships" so that students can meet and work with fellow students, faculty, librarians, and other university staff and support units (Head, 2016, p. 8). To fulfill this mission, learning commons require flexible spaces that are both formal and informal and that

"accommodate both solitary and collaborative learning behaviors" (Bennett, 2007, p. 18; see also Head, 2016, pp. 2, 13-14; Turner et al., 2013, p. 231).

Although they represent a significant capital investment for universities and libraries, Head (2016, p. 25) observes that relatively few academic library learning space renovation projects conduct systematic post-occupancy assessments, instead tending to rely on goals developed during the design process. Nevertheless, Bennett points out the importance of both initial post-occupancy performance evaluation for assessing how well a learning space meets the needs of its users in practice, and for continuing this evaluation "persistently" to assure the space's ongoing effectiveness (2007, pp. 15, 23).

Aims

The opening of the Wells Library's Learning Commons presented an opportunity to help address the gap in ongoing assessment of learning spaces by enabling IUB librarians to conduct a post-occupancy evaluation of the Learning Commons' new work environments and to develop methods for periodic long-term assessments of the space. This study was designed to evaluate the Learning Commons by exploring a series of research questions about the ways individuals and groups were using its spaces and services on an everyday basis, including: "What types of students are using (or not using) the Learning Commons, and for what purposes?"; "What tasks and activities are taking place, and what are students trying to accomplish?"; "Are students aware of the technology resources and services available and are these resources meeting students' needs?"; and finally, "Are the underlying assumptions about learning commons design and use requirements supported by students' everyday practices?" Answering these questions allowed librarians and administrators to appraise the efficacy of the Learning Commons' design and assess how well it was fulfilling its intended mission as a learning space.

Methods

Data Collection Design & Instruments

Faced with the challenge of systematically studying a large 24-hour space, this study developed a mixed-method research protocol that combined time-lapse photography, direct unobtrusive observation, and random-sample walk-up surveys to gather a representative and multi-modal activity profile of the Learning Commons. This approach not only enabled the research team to quickly assess the usage of the Learning Commons, but also created tools that can be reused to rapidly and meaningfully evaluate changes in services, policies, or space configurations in the future.

The overall occupancy and use of open study spaces was evaluated using 10 time-lapse cameras placed along the interior perimeter of the Learning Commons so that its full area could be photographed automatically at regular intervals. Usage data for group study rooms were collected using in-person unobtrusive observation and head counts.

Walk-up surveys were conducted with both individuals and groups working in the Learning Commons. These surveys collected demographic, user experience, and satisfaction information using both open and close-ended questions (see Appendices A & B), and were developed with the input of the Learning Commons Operation Team, which included representatives from all service units that cooperate and provide services in the space. The surveys were field tested with a small group of students to verify the clarity of questions, the time required for individual and group participants to complete the survey (about 5-10 minutes), and the time required by a research team member to complete a round of surveying according to the study's sampling design (about 45 minutes-1 hour).

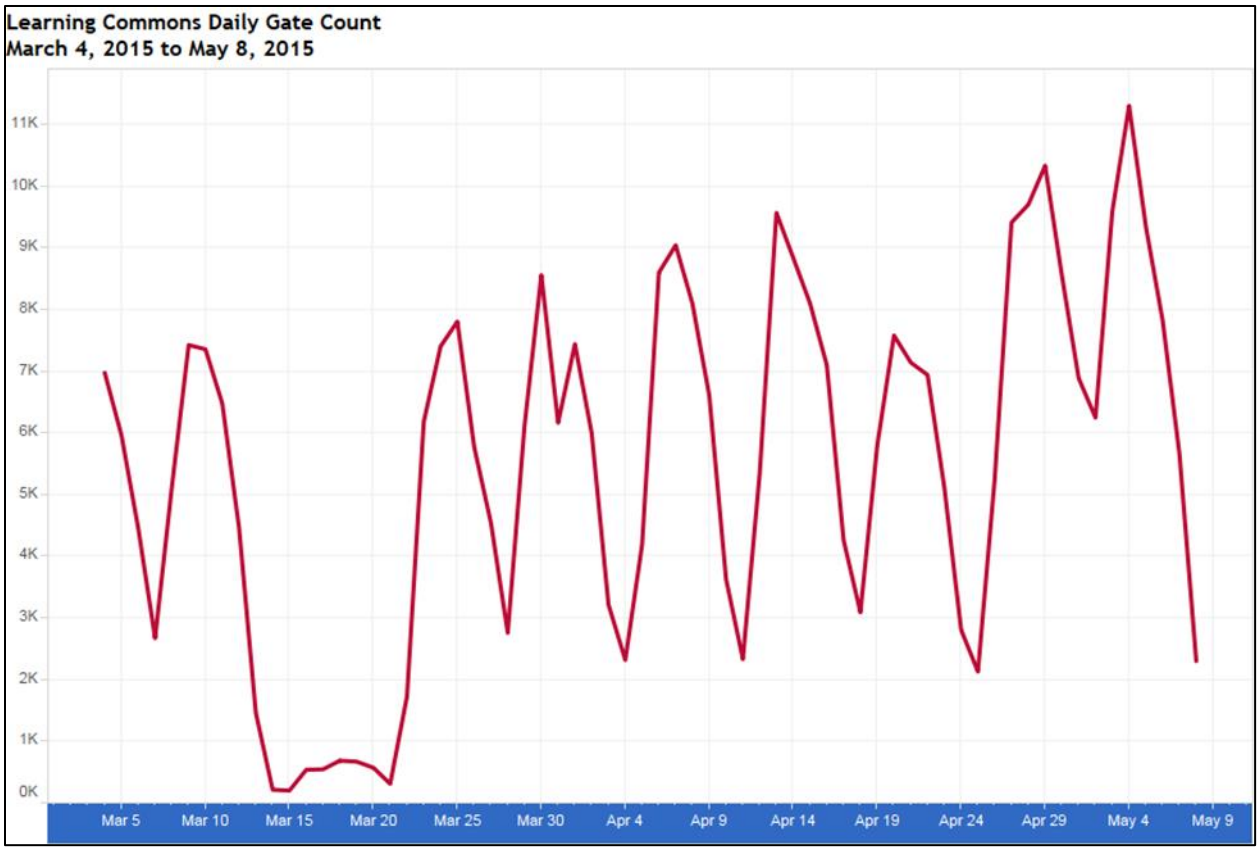

Figure 2
Daily gate counts for the Learning Commons during the study period. Peaks are typically Mondays or Tuesdays, while valleys are typically Saturdays (Low usage on March 14-21 was due to spring break).

All instruments and procedures for this study were reviewed and approved by the IUB Institutional Review Board.[1]

Data Collection Procedures

When utilizing observation and survey-based research methods in spaces like the Learning Commons, ensuring a representative sample of the space's usage over time can be particularly difficult. The occupancy, types of users, and the activities taking place in a library space can vary dramatically over the course of a day, week, or semester (Figure 2), making studies of these spaces potentially vulnerable to underlying structural bias within their sampling design. A formalized sampling technique is therefore useful to construct a study that accurately reflects a space's use characteristics.

To this end, the Learning Commons study randomly selected 175 data collection times from all possible 5-minute increments between March 1 and May 8, 2015, covering the second half of the spring semester. These data collection times were used for both the automated time-lapse photographs and the actively collected observation and survey data.

Observation and survey data collection was completed by a research team consisting of one librarian and seven graduate research assistants. These research team members were trained in the study's sampling methods and data

[1] Classified as exempt. Protocol #36077373.

collection procedures by the study's principal investigator, who also coordinated and oversaw the data collection process.

At each randomly selected data collection time the research team member first collected observation data and head counts for the Learning Commons' group study rooms. Once these observations were complete, the researcher then collected walk-up surveys from a group occupying one randomly selected room, as well as three or four randomly selected individuals from throughout the Learning Commons' space. A tablet computer running Qualtrics web-based survey software was used to generate the random selection and to conduct the surveys, as well as to guide the researcher through data collection procedure from beginning to end to ensure data were collected in a standardized way by all research team members.

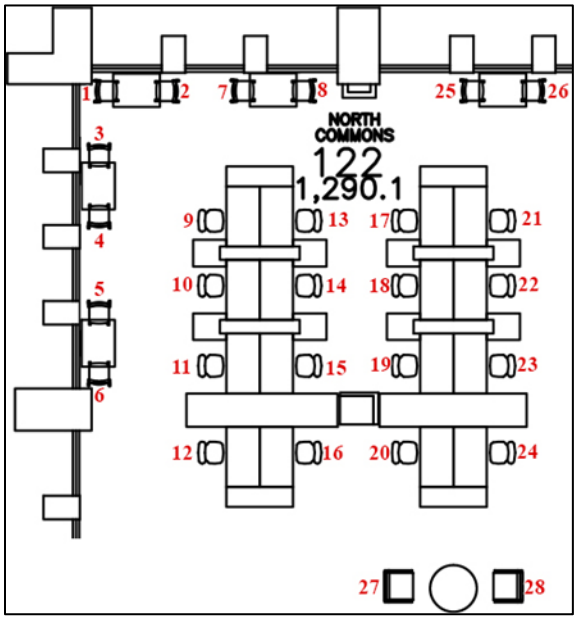

Figure 3
An example zone with numbered seats used for the random selection of individuals for walk-up surveys.

For the group surveys, a group study room was selected randomly until a group agreed to participate or at least four groups had been asked. For the individual surveys, the Learning Commons was divided into zones of roughly equal size. A zone was randomly selected first, and then a seat number was randomly selected from within that zone until an individual agreed to participate (Figure 3) or at least four individuals had been asked. A new Learning Commons zone was then selected and the process was repeated until three or four surveys had been collected. In cases where there were so few people in the Learning Commons that randomly selecting an occupied seat was unlikely (e.g., during early morning hours), the researcher was allowed to override the selection and approach a person in any occupied seat to ask them to complete a survey.

Data Analysis

A combination of quantitative and qualitative approaches was employed to analyze the collected data. The time-lapse photographs were reviewed at the sampled data collection times to ascertain how many people were using the Learning Commons and to construct heat maps of how different areas of the space were utilized (see also Khoo, Rozaklis, Hall, Kusunoki, & Rehrig, 2014 for a similar approach to heat mapping). Observation data of the group study rooms were used to calculate occupancy rates, as well as to evaluate which technologies were utilized in the rooms. The survey results from individuals and groups were analyzed to obtain descriptive statistics about user demographic information, time spent in the Learning Commons' space, and awareness and satisfaction with available services. Finally, answers to the surveys' qualitative questions were coded thematically and categorized for analysis using NVivo qualitative data analysis software to identify and understand patterns in users' experience of and affective attitudes towards the Learning Commons.

Results

In total, all 175 sampled data collection times were completed for the time-lapse photographs, while 95 data collection sessions were completed for the group study room observation and walk-up surveys, resulting in the collection of 304 individual surveys and 96 group surveys. Data collection for the observations and surveys was hindered by the practical difficulties of conducting surveys on a 24-hour schedule (particularly with regard to the ability and willingness of graduate research assistants to conduct lengthy observation and survey procedures in the overnight hours). This number of observations produced a margin of error of 5.62% for individual surveys and 9.98% for group surveys, at a 95% confidence interval, which, although higher than what would be desirable for a statistical study, is adequate for the primarily descriptive goal of outlining the use of the Learning Commons during this time period. While I believe these observations are sufficiently robust to support the validity of the findings and conclusions presented in this article, it is nevertheless possible that not completing all the sampled times may introduce some degree of error into the observations, especially given that overnight times were more likely to be missed than times during the day.

User Demographics

The demographic data collected during the Learning Commons survey revealed patterns in the types of students using the space that differed substantially from expectations based on IUB's enrollment figures.

Kelley School of Business students accounted for 37% of the undergraduate students surveyed in the Learning Commons, while these students comprise 21% of IUB's enrollment (Figure 4). College of Arts and Science (CAS) students comprised the next highest group at 29% of undergraduate users—slightly lower than the 34% expected by its enrollment, and inside the survey's margin of error. However, CAS

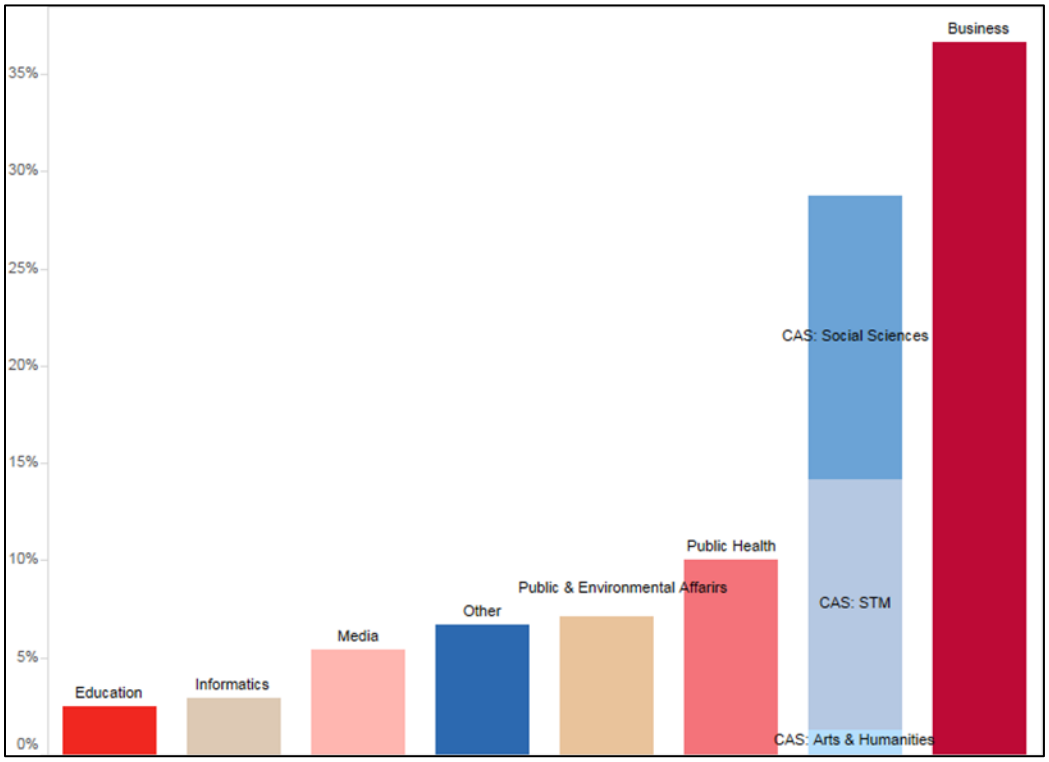

Figure 4
Undergraduate use of the Learning Commons by IUB School of enrollment

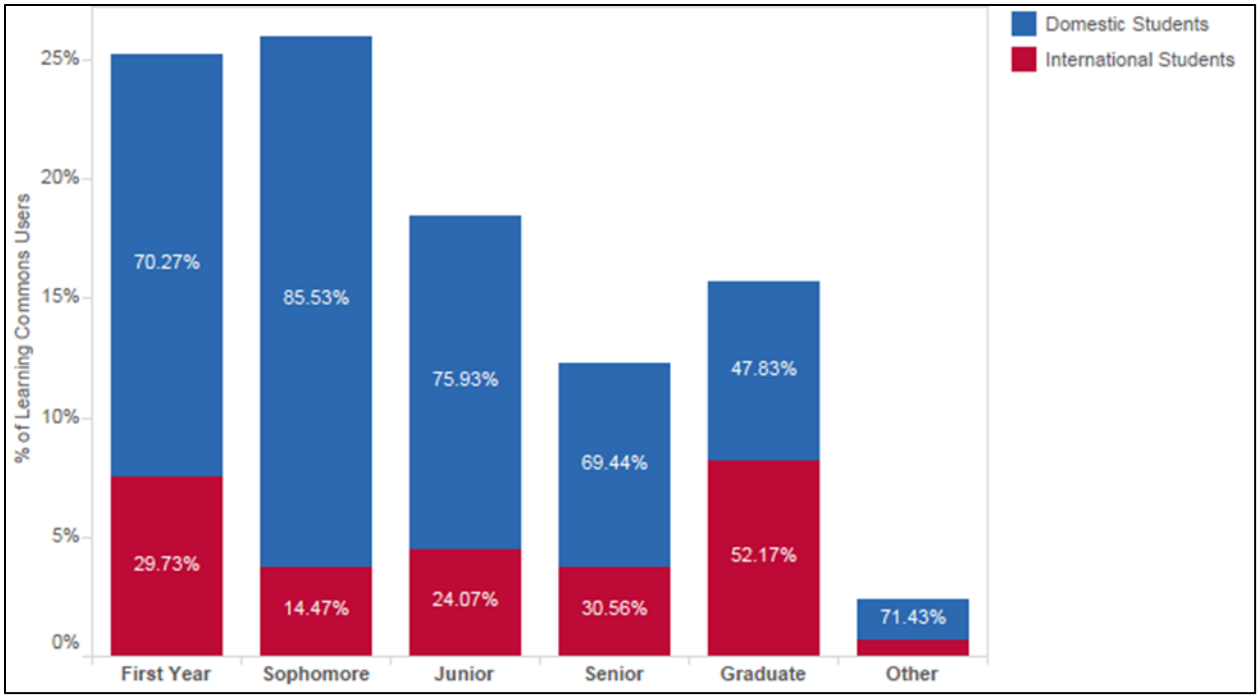

Figure 5
Use of the Learning Commons by year of study and international student status.

students in humanities disciplines accounted for only 1% of the students using the Learning Commons, compared to about 15% of undergraduate enrollment.

Undergraduates early in their educational career used the Learning Commons at the highest level, with first and second year students accounting for 49% of its use (compared to about 18% of enrollment) (Figure 5). Usage appears to decline with the third and fourth years of study, while graduate students accounted for about 16% of users—lower than the 22% expected from their enrollment, but not surprising given that the Learning Commons is targeted primarily for undergraduate use.

At 28% of the surveyed users, international students comprised a much larger proportion of the Learning Commons' users than would be expected based on their university-wide enrollment of 13%. This high proportion of international students also resulted in a higher-than-expected number of self-identified Asian students using the space (27% of users versus 6% of enrollment), while observed usage by other self-identified ethnic and gender groups generally corresponded to expected enrollment patterns.

Space Utilization

Observations obtained from the time-lapse cameras demonstrated strong patterns in the study space utilization of the Learning Commons. While the entire space was in use fairly extensively, there was a clear hierarchy in users' preferences. As shown in Appendix C, computer workstations were the most in-demand areas and were occupied 45-63% of the time. Tables were the next most used category of furniture, typically occupied from 16-36% of the time, while soft seating and lounge areas were the least used, usually at 16% of the time or less. With 175 observations, the sampling design of this aspect of the study enables the calculation of confidence intervals for each of these observed frequencies. For example, for observed values

Table 1
Intended duration of work in the Learning Commons

How long will you stay in the Learning Commons for this visit?	Individuals	Groups
Less than 30 minutes	1.34%	1.12%
30 minutes to 1 hour	4.01%	3.37%
1-2 hours	17.06%	24.72%
2-3 hours	24.08%	22.47%
More than 3 hours	53.51%	48.31%

above 36%, the confidence interval is approximately +/-7% at a 95% confidence level (see Bernard and Killworth (1993) for a detailed explanation of this calculation at varying observed frequencies).

On average, 10.5 of the 18 collaboration rooms in the Learning Commons were occupied during the observation times. Every room exhibited an average occupancy rate of above 50%, while the four most popular rooms exceeded 70% occupancy (Appendix D). The confidence interval for all of these observed frequencies is approximately 7% at a 95% confidence level. Rooms configured in the media-table layout were more popular than those with circular tables and chairs, and at the Learning Commons' busiest times of 4-8 p.m. and 8 p.m.-12 a.m., the group study rooms were almost completely occupied (at 15/18 and 16/18 on average respectively).

However, based on the number of seats occupied, the group study rooms were often not used to capacity. The average group size was 2.27 people per room, while the average capacity is 5.5 (with room capacities ranging from 4 to 7). People using the group study rooms also did not appear to be using the technology provided in the rooms to as high a degree as was anticipated—the average number of large-screen monitors in use in the group study rooms was only 5 of 18, compared to 22 laptops that students had brought with them.

In general, the Learning Commons' users reported planning to stay for relatively long blocks of time. A total of 78% of individuals and 71% of groups said they planned to stay in the Learning Commons for least 2 hours, and only about 5% said they would stay less than 1 hour (Table 1). When asked in the qualitative section of the surveys what they wanted to accomplish while at the Learning Commons, a majority (55.3%) of individuals described a specific academic task such as completing projects or papers. Another 39.1% said "studying," while 17% said "preparing for an exam." Groups followed a similar pattern, with 62% mentioning a specific task, 60% studying, and 18% preparing for an exam.

User Experience and Satisfaction

User satisfaction with the Learning Commons was generally very high, with 87% of users indicating that they were either "satisfied" or "very satisfied" overall.

When asked why they had decided to come to the Learning Commons, individuals emphasized the atmosphere and availability of computer workstations, while groups emphasized the collaborative space and its associated technology (e.g., whiteboards and large computer screens), as well as the availability of private and quiet spaces.

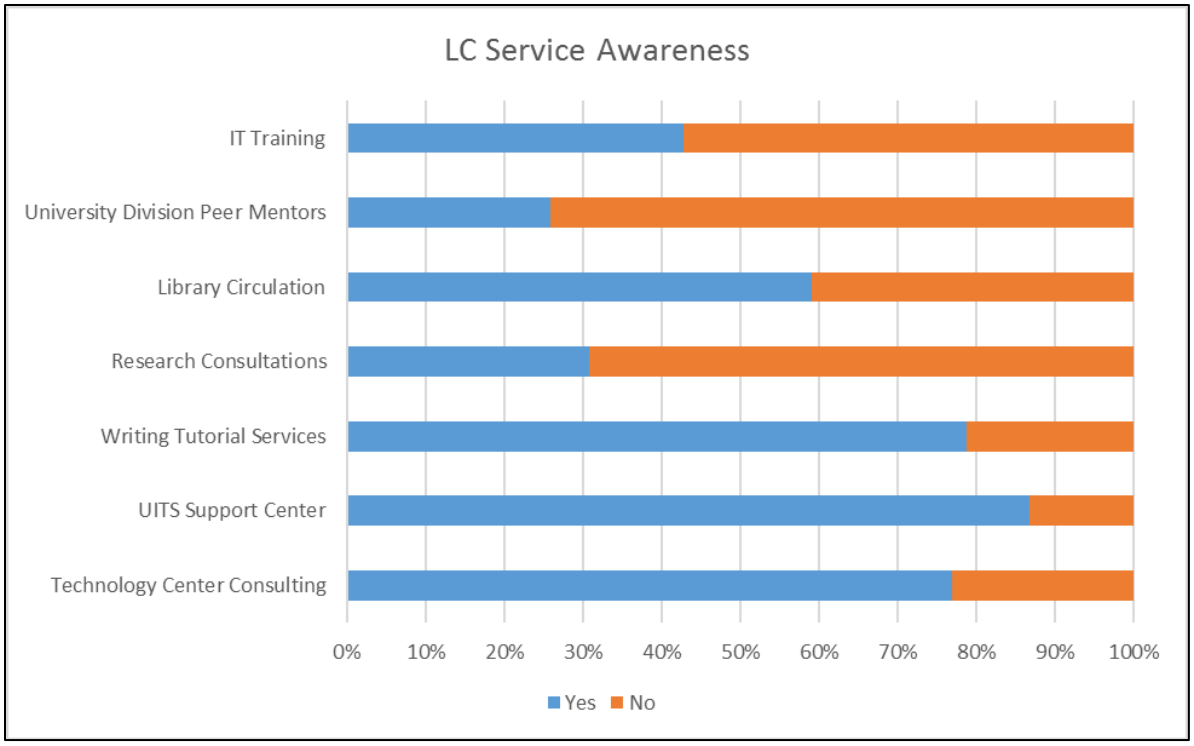

Figure 6
Learning Commons service awareness.

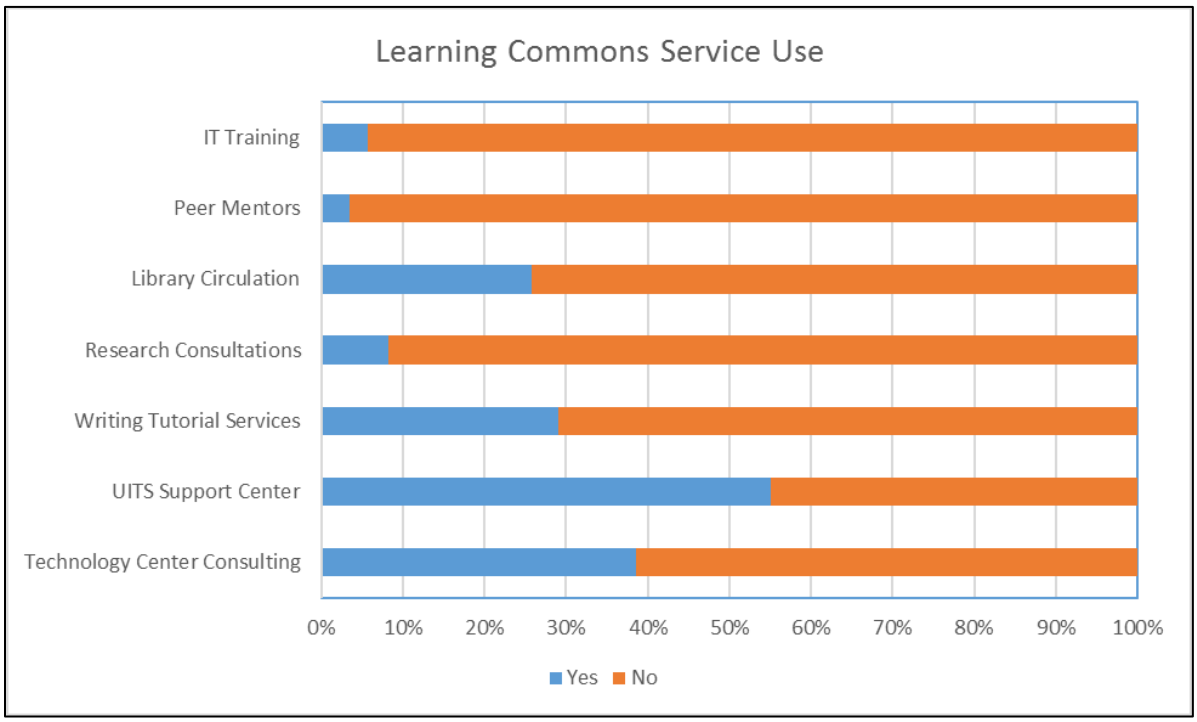

Figure 7
Learning Commons service use.

When asked what was best about the Learning Commons, both individuals and groups again mentioned available technology, the overall environment (especially private and quiet spaces, even though the Learning Commons is not designated as a quiet space), the furniture, and the availability of computers. In general, individuals tended to highlight features that support working alone, while groups noted features that support collaboration. Conversely, many of the same items were also discussed when users were asked what was the worst thing about the Learning Commons. One third of Learning Common users stated that there were not sufficient study spaces, and both groups and individuals complained about insufficient or unavailable technology, furniture, computers, and collaboration rooms. Noise levels and inadequate soundproofing were also regularly mentioned as problems.

Of the services available in the Learning Commons, students were more likely to be aware of technology support services, writing tutorial services, and library circulation than peer mentoring and research consultation support (Figure 6), but they were much more likely to have utilized technology services than library services (Figure 7). Only 8% of respondents reported using research consultations compared to 51% who had used the University Information Technology Services (UITS) support centre. However, 60% of users reported that they had asked for help from the Learning Commons staff at least once. The Learning Commons' users continued to favor obtaining assistance in-person, with 72% saying that if they needed help they would most prefer to get it at a walk-up desk (online chat was the second most preferred method at just 9%).

When students had used the Learning Commons' services, satisfaction was uniformly very high at around 70% for all services. Satisfaction with technology-related services (IT Training, UITS Support, and Technology Center Consulting) was even higher at around 90% (Figure 8). While the most common answer was "nothing" when asked what additional services they would like in the Learning Commons, a

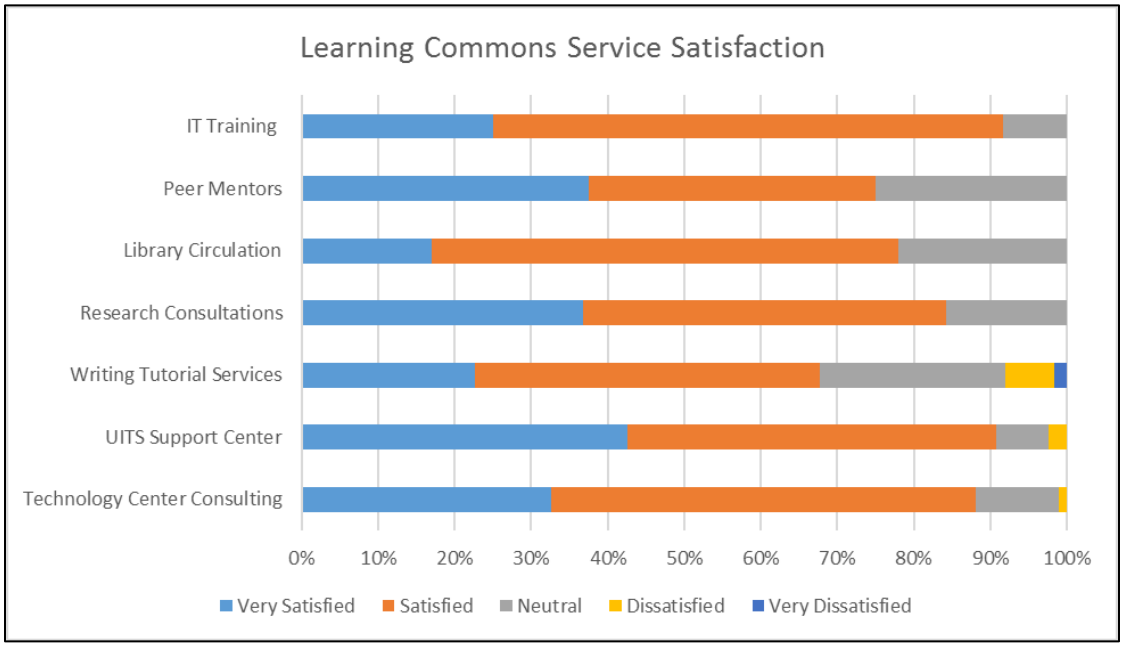

Figure 8
Learning Commons service satisfaction.

handful of users reported a desire for more tutoring in a variety of subject areas (particularly math, foreign languages, and writing).

Discussion

The distinct patterns observed in the demographics of the Learning Commons' users likely result from a combination of space design, location, and pedagogical factors. The Learning Commons appears to serve some types of students very well, such as the business students that comprise the largest user group. The intensive use of the space by these students is likely in part due to the Wells Library's close proximity to the business school, which is located less than one block away (and whose own library is often occupied at full capacity), as well as the collaborative work requirements of many business courses. The importance of the Learning Commons as a group meeting location is further suggested by the prevalence of students majoring in social science and STM disciplines, curricula that also typically include a number of courses that emphasize collaborative and group-based projects. Conversely, the relative absence of humanities students may suggest that the open and group-oriented environment of the Learning Commons does not serve the needs of these students. It is not clear from the survey data whether this is because these students are engaged in more solitary work that is not facilitated by the space or because they need resources that are unavailable, and this finding warrants additional study.

Compared to what would be anticipated by enrollment, students arriving at the Learning Commons' service desks are more likely to be early in their undergraduate careers, more likely to be studying in the business school, and more likely to be international students. Librarians, staff, and graduate assistants working at these service desks should be especially trained and prepared to address the needs of these groups. Follow-up studies or surveys might seek to specifically identify if there are additional needs of both high-use and low-use groups of students that could be met either via current Learning Commons services or by collaboration with other campus units: for example, ESL support or other international student services, curriculum-targeted workshops, tutoring or research consultation, or services and programming designed to reach out to non-using groups of students, such as humanities majors.

The overall success and popularity of the Learning Commons produces many of the problems identified in this study. While users enjoyed the overall environment and atmosphere of the space, they often complained that it was too crowded and had insufficient collaboration rooms, available furniture, and workstations. In a survey of library space choice, Cha & Kim (2015, p. 277) identified the amount of space, noise level, crowdedness, and comfort of furnishings to be the four most important factors students consider in choosing to use a space, so it is perhaps not surprising that this cluster of characteristics appears simultaneously in both positive and negative evaluations of the Learning Commons. The observed problems in all of these areas can also ultimately be linked to the Learning Commons routinely operating at or near its capacity.

The usage patterns of the Learning Commons furniture and group study rooms suggest that many of the spaces' resources are in extremely high demand. Combined with the relatively high observed use of workstations, the desire for additional computers suggests that the nearly 75% reduction of workstations (from 260 to 68) after the Learning Commons' renovation might have been too extreme, and that the capacity of computing resources located in the Learning Commons is not adequate for users' needs. While reducing the number of workstations was a deliberate decision to help make the Learning Commons' space more flexible, and many of the removed workstations were redistributed to other spaces in the building (the net loss was only about 80 computers), users clearly

experience the diminished number of computers as a deficiency of the space. Nevertheless, given the extensive overall use of the Learning Commons, workstations, tabletop work surfaces, and group work spaces might be in such high demand that almost any amount provided would be perceived as insufficient.

Users' preference for tables likely reflects students' need for hard work surfaces for laptops, books, and other materials, a finding similar to Holder and Lange, who also found that students indicated a preference for "traditional furniture such as tables and desk chairs" (2014, p. 15). In terms of space planning, it is probably worth considering allocating a higher proportion of seats to workstations and table seating instead of soft seating and lounge areas. With a current mix of 53% tables, 25% soft seating, and 17% workstations, the Learning Commons' most in-demand seating is also the least available, while a quarter of available seats are under-utilized or used principally during the busiest times when no other places are available.

Shifting some soft seating and lounge areas to workstations or tabletop surfaces might help alleviate demand on these resources and increase the capacity of the space, although the Learning Commons' managers should also carefully observe how the delicate balance between space and furniture types might affect use. As Khoo et al. (2014, pp. 617-618) observe, the perceived occupancy of a space is often as important as its actual occupancy, and depending on the type of furniture and its layout, a space can feel full from the standpoint of the user even if many seats remain open—in some cases even if half of places remain unused (Gibbons & Foster 2007, p. 28). Similarly, Priestner et al. argue that library work spaces need to provide users with enough available "study territory" so that each seat feels inviting, and they demonstrate that in some cases occupancy can counterintuitively be increased by decreasing the number of seats in a space to provide more territory to each seat (2016, pp. 22-24). Khoo et al. conclude that "practical occupancy limits for open plan study spaces could be significantly lower than the theoretical maximum seating" (2014, p. 618).

Within an open environment like the Learning Commons, that is already perceived and experienced as busy and crowded during many of its open hours, simply adding additional seats and furniture might exacerbate the problem even if the absolute capacity is increased. To determine an optimal layout and furniture mix, the Learning Commons' managers and administrators might consider an iterative prototyping approach to adjusting the space (Priestner et al., 2016, pp. 5-7), in which a series of changes are made to the space's configuration and the effects on usage and user behaviour are carefully observed at each step. In this way the flexibility that was designed into the Learning Commons could be effectively leveraged to balance the demand for both solitary and collaborative spaces, to continue to improve the experience of the space for its users, and to more fully respond to students' learning needs.

Despite these capacity issues, the relatively long planned study sessions reported by both individuals and groups suggests that the Learning Commons adequately supports the goal of creating a space that "acknowledge[s] the social dimension of . . . learning behaviors and that enable[s] students to manage socializing in ways that are positive for learning . . ." by "encourage[ing] more time on task and more productive studying" (Bennet, 2007, p. 17). This sustained time in the Learning Commons is important to its effectiveness as a learning space, and confirms the presence of an audience for library and university support services.

While the high levels of satisfaction with the services available in the Learning Commons are encouraging, the relatively weak usage of the services available suggests that the Learning Commons is not yet delivering on its goal of delivering point-of-need learning. Particularly disappointing was the low use and mostly moderate awareness of learner-focused services

such as research consultations, peer mentors, IT training, and writing tutorial services. This low use of library services relative to technology support services further indicates that there may be a disconnect between the types of help and assistance students perceive to be available and the broader range of services that are offered, and that more programming may be necessary to develop students' identification of the Learning Commons as a multifaceted learning space.

Conclusions

The renovated Learning Commons is clearly a popular and well-used collaboration and study space used for a variety of academic tasks and activities. However, it is less certain the degree to which it is fulfilling the "learner-centered" paradigm of design (Bennett, 2009) that asserts the need for providing flexible spaces that support not only the multifaceted, frequently changing, and self-managed learning activities of students, but also the diverse types of teaching and learning relationships encompassed by the social dimensions of learning (Turner et al., 2013, p. 231; Bennett, 2013, p. 38).

The high rates of occupancy observed in the Learning Commons' group study rooms and open study spaces suggest that it is offering attractive locations for many types of student work, while the high overall satisfaction with the redesigned space supports the efficacy of shifting toward a more flexible approach to the provision of space and library and technology services.

This popularity may result in the Learning Commons' falling short in providing adequate spaces for all types of students and student activities. While it contains areas for both solitary and group work, the Learning Commons' design and furniture configuration emphasizes collaborative activities. As is illustrated by the disciplinary distribution of students using the Learning Commons, the space appears to attract students in curricula that tend to have high numbers of group-oriented assignments. The success of the Learning Commons as a collaborative space may be pushing out students in need of a more solitary work environment.

By supporting collaborative relationships among students, the Learning Commons effectively facilitates one aspect of the social dimension of learning. Nevertheless, the low reported identification and usage of available services besides IT and technology support indicates that additional outreach is needed to build relationships between students, librarians, and other service providers such as the writing centre and peer tutors, so that students begin to identify the Learning Commons as a multifaceted learning space.

The results of this study's initial post-occupancy evaluation of students' everyday use of the Learning Commons thus illustrates a space that has been well received by students and meets many of their educational needs, but only partially fulfills its goals as a learning-centred space. While the Learning Commons successfully enables some of the social dimensions of learning by providing a variety of collaborative spaces and supporting technologies for students to engage with one another and information resources, it has not yet fully integrated relationships with other library and campus services. As with any space committed to a learning-centred paradigm, developing these relationships within the Learning Commons is a continuous project, needing ongoing outreach, service development, and evaluation efforts to ensure its success.

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Appendix A
Learning Commons Space Use Assessment
Survey for Individuals

1. Why did you decide to come to the Learning Commons today?

2. What would you like to do or accomplish while you are here?

3. How long will you stay in the Learning Commons for this visit?
    - Less than 30 minutes
    - 30 minutes to 1 hour
    - 1-2 hours
    - 2-3 hours
    - More than 3 hours

4. What is the best thing about the Learning Commons space?

5. What is the worst thing about the Learning Commons space?

6. How many times in the last seven days have you used the Learning Commons space?

7. What would make you want to use the Learning Commons more often?

8. Are there sufficient study spaces in the Learning Commons?
    - Yes
    - No
    - I don't know/ I'm not sure

9. If you need help with something you are working on, how would you most prefer to get assistance?
    - In person at a walk-up help desk
    - Online chat
    - Email
    - Text Message
    - Telephone
    - In person by appointment
    - Other _____

10. How easy is it for you to get help in the Learning Commons?
    - Very Easy
    - Easy
    - Neutral
    - Difficult
    - Very Difficult
    - I don't know

11. Have you ever asked for help from the staff in the Learning Commons?
    - Yes
    - No
    - I don't know/ I'm not sure

12. [If yes selected for #11] Thinking about only the most recent time you asked the staff of the Learning Commons for help, what did you need help with?

13. [If yes selected for #11] How effective were the Learning Commons' staff in answering your question?
    - Very Ineffective
    - Ineffective
    - Neither Effective nor Ineffective
    - Effective
    - Very Effective

14.

	Prior to this survey, I was aware that this service is available in the Learning Commons		I have used this service	
	Yes	**No**	**Yes**	**No**
Technology Center Consulting	❍	❍	❍	❍
UITS Support Center	❍	❍	❍	❍
Writing Tutorial Services	❍	❍	❍	❍
Research Consultations	❍	❍	❍	❍
Library Circulation	❍	❍	❍	❍
University Division Peer Mentors	❍	❍	❍	❍
IT Training	❍	❍	❍	❍

[For the services used] How satisfied were you with the following service:

- Very Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very Dissatisfied

[For the services not used] How likely are you to use the following service:

- Very Likely
- Likely
- Undecided
- Unlikely
- Very Unlikely

15. What additional services would you like to see offered in the Learning Commons?

16. What is your overall satisfaction with the Learning Commons?
    - Very Dissatisfied
    - Dissatisfied
    - Neutral
    - Satisfied
    - Very Satisfied

Demographic Questions

D1. What is your age?

D2. What gender do you identify with?
- Male
- Female
- I don't identify with either of these. I identify as: _____

D3. What is your year of study?
- First Year
- Sophomore
- Junior
- Senior
- Graduate
- Faculty Member
- Other

D4. What is your Major or Department?

D5. What race or ethnicity do you most identify with?
- Black or African American
- Hispanic or Latino
- White or Caucasian
- Asian
- American Indian or Alaska Native
- Native Hawaiian or Other Pacific Islander
- I don't identify as any of these. I identify as: _____

D6. Are you an international student?
- Yes
- No

If yes, what is your country of citizenship:

Appendix B
Learning Commons Space Use Assessment
Survey for Groups

1. How many people are in your group?

2. Why did your group decide to come to the Learning Commons today?

3. What would your group like to do or accomplish while you are here?

4. How long will your group stay in the Learning Commons for this visit?
   - Less than 30 minutes
   - 30 minutes to 1 hour
   - 1-2 hours
   - 2-3 hours
   - More than 3 hours

5. Is your group:
   - Working together on a single assignment or project for a course
   - Working or studying together but on different assignments
   - Working on an extracurricular project
   - Socializing or working on something not related to your studies
   - Working on something else-- What? _____

6. If your group is working together on a course assignment or project, what course is it for?

7. What is the best thing about the Learning Commons space?

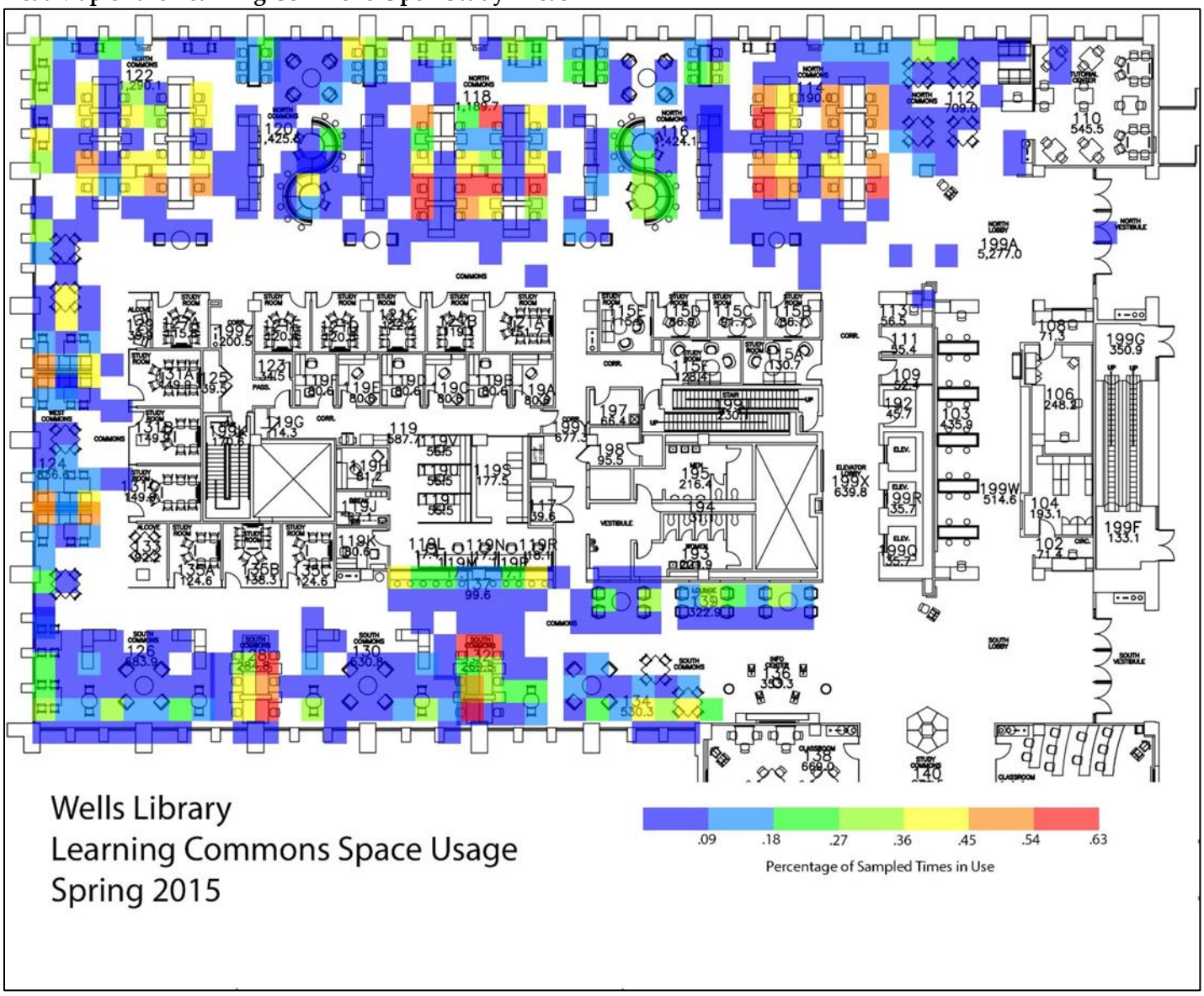
8. What is the worst thing about the Learning Commons space?

9. What would make your group want to use the Learning Commons more often?

10. Are there sufficient group study spaces in the Learning Commons?
    - Yes
    - No
    - I don't know/ I'm not sure

11. What is your group's overall satisfaction with the Learning Commons?
    - Very Dissatisfied
    - Dissatisfied
    - Neutral
    - Satisfied
    - Very Satisfied

Appendix C
Heat Map of the Learning Commons Open Study Areas



Appendix D

Heat map of the Utilization of the Learning Commons' Collaboration Rooms