

Alleviating physical space constraints using virtual space? A study from an urban academic library

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Abstract

Purpose – The purpose of this paper is to investigate if virtual space can be used to alleviate physical space constraints for group collaboration in an urban academic library environment. Specifically, this paper looks to uncover if library users will turn to library-provided virtual space when there is a scarcity of physical space.

Design/methodology/approach – This project discusses the design of the physical and virtual environment, and then measures the use of this environment quantitatively over a 47-month period (2005-2009).

Findings – Results indicate that physical spaces for group collaboration are in very high demand, whereas virtual ones are not. A scarcity of physical collaboration spaces does not lead users to library-provided virtual space, but rather to work around the scarcity in the physical world.

Originality/value – Highlights the value of library as a gathering place and the ways in which virtual collaboration space cannot easily take the place of physical collaboration space.

Keywords Academic libraries, Library facilities, Library users

Paper type Research paper

Introduction

Manhattan is one of the most densely populated islands in the world. According to the 2000 census, there are 66,834.6 persons per square mile, making it the most thickly peopled area in the United States (U.S. Census, 2000). Operating an academic institution within this unique environment can be a challenge, especially considering the popular image of a university: serene, spacious and the perfect environment for contemplation. For example, an entering college freshman recently remarked to the *New York Times* that the college of his imagination should include “Gothic architecture and big grass lawns” (Foderaro, 2010). Creating this kind of environment in Manhattan must confront the excited cacophony of city life and an overall lack of space. Space constraints are reflected in the square footage of space per student metric, which is noticeably lower in Manhattan-based institutions than in comparable university campuses. For example, Columbia University has 326 square feet per student and New York University has 160, where Harvard University has 673 and Yale University has 866 (Pogrebin, 2010).

There is a perception that lack of space can have an overall detrimental effect on institutional quality, making it difficult to connect researchers with laboratory space or students with study space. President of New York University, John Sexton, makes the case for space: “We need the space to run our academic programs: to have the faculty that teach in these programs, to have the students who attend these programs, to create not only carriers of knowledge but ambassadors of New York for the future” (Ibid.). Similarly, Lee Bollinger, President of Columbia University, noted that the “key to preserving and enhancing Columbia’s greatness is space,” and Alan Brinkley, Columbia’s Provost, notes that space “has been a

tremendous inhibition for scientific research particularly, but also for virtually every area” (Arenson, 2007). Columbia has a history of space constraints. As far back as 1960s, the University’s attempt to build a gymnasium in public-owned Morningside Park is often found as a leading cause of the 1968 riots (Kifner, 2008). Protest continues to this day as the university attempts to expand into nearby Manhattanville, a neighborhood in west Harlem (Lee, 2007).

Given the perceived problems lack of space can cause for an academic institution, this project is motivated by a central question: can virtual space be used to compensate for the lack of physical space in very urban environments? To address this question, this project will explore the use of virtual space to augment physical space at one of the libraries at Columbia University, in particular the Teachers College library. The Teachers College library is one of 25 libraries comprising the Columbia University Libraries and is distinguished as one of the nation's largest and most comprehensive research libraries in education [i]. Over the course of 47 months, three types of space were made available to students and faculty for group collaboration: physical space, virtual space, and physical space augmented with virtual space. This project will explore the dynamics of space usage in this very urban environment and attempt to uncover if virtual space can alleviate physical space constraints.

Literature Review

Over the last decade, several concepts have been developed that look to capture how the academic library should orient itself in a fast changing world, specifically with respect to physical and virtual space. The ones relevant to this discussion include the idea of the library as place, Information Commons, Library 2.0 and New Librarianship. Each of these share several similarities, such as a awareness of the role digital technology will play in libraries, yet diverge in emphasis.

The library as place concept draws attention to the physical aspects of the library and the communities of users that form around the use of the space. Library as place also alludes to the human experience dimension of inhabiting a space, including the complicated emotional and physical relationship one can have with a place (Templeton, 2008). With respect to the physical space, Shill and Tonner (2004) find that “a high-quality building does make a difference, and students continue to use an improved facility even after the novelty of a new library has worn off” (p. 149). In terms of the activity that occurs in these spaces, Pomerantz and Marchionini (2007) find that as “the role of the library as a storage space for materials will become decreasingly important; and the role of the library as a space for users, for individual and collaborative work, and as a space for social activity, will become increasingly important” (p. 505). Pomerantz and Marchionini (2007) draw attention to the affordances of the physical and digital spaces, making note that “digital libraries are not physical spaces, and so are unable to fulfill those functions for which the physicality of the library is important,” such as “a place for people to congregate” (p. 528). If library members actively use the concept of library as place in their thinking, it is reasonable to expect they will associate libraries as physical gathering places; it is less likely they would expect libraries to provide virtual gathering places.

Related to the notion of library as place is the concept of Information Commons (IC). The term—as it is used in reference to academic libraries—refers to the convergence of technology, space, and service, specifically to “a new type of physical facility specifically designed to organize workspace and service delivery around [an] integrated digital environment” (Beagle, 1999). These information commons can appear quite different from traditional

academic libraries. For example, the George Mason University IC includes a movie theatre, bank, bookstore, and food court, in addition to an information service desk and group study rooms (MacWhinnie, 2003). These spaces cast as Information Commons have “been a success at many academic institutions” (Ibid., p. 254). For example, Applegate (2009) found that information commons “have shown positive usage and high patron satisfaction” across a variety of academic institutions (p. 342). Similarly, Church (2005) found that information commons could be successful so long as “a flexible model for the integration of technology and library services” is maintained (p. 75). Several researchers have noted that the notion of the “information commons” needs to evolve into a “learning commons,” where the aim of the space is to enhance student learning, not merely add convenience (Bennett, 2008). Roberts (2007) notes that a learning commons is the natural progression of an information commons, where the space and technology form a “laboratory, a space for knowledge creation” (p. 805). In essence, the information commons is where a students and scholars go to retrieve and make use of information from digital and print sources; the learning commons adds the aspiration that students create knowledge within that space (Bennett, 2008).

The notion of Library 2.0 places more emphasis on technology and less so on space, yet does not discount it. Although many definitions persist, Maness (2006) defines it as “the application of interactive, collaborative, and multi-media web-based technologies to web-based library services and collections.” Casey, who is attributed with first crafting the term, describes it less about web-based technologies and more about a “model for library service that encourages constant and purposeful change, inviting user participation in the creation of both the physical and the virtual services they want, supported by consistently evaluating services” (Casey and Stavatinuk, 2006). Although the definitions differ (Casey emphasizes a model and Maness emphasis web-based technologies), each make use of the ideas captured in Web 2.0. The basic design rationale of Web 2.0 is that “web should be used to buttress connections between individuals and provide them unfettered opportunities to express themselves, rather than attempt to curate all possible combinations of knowledge resources or attempt to censor individual contributions” (Cocciolo, 2010, p. 305). Both Library 2.0 and Web 2.0 offer opportunities to re- envision many library-based services, especially the web-based services such as OPACs, digital repositories, and websites.

Whereas the previous concepts draw attention to space, technology and service, New Librarianship focuses on mission. Advanced by Lankes (2009), he concentrates on librarians rather than libraries, and argues that the mission of librarians is to improve society through facilitating knowledge creation in their communities. He believes that knowledge is created through conversation, and librarians can play the role of facilitating conversation with the express purpose of helping library members construct knowledge. Using this framework, libraries should not only provide meeting spaces for face-to-face gathering, but also for virtual gathering, such as through hosting blogs. New Librarianship asks librarians to focus on why they are doing what they are doing and places less emphasis on how it is accomplished (e.g., through Web 2.0 or physical spaces).

These concepts were instrumental in the physical and virtual environmental design of the academic space, which will be discussed next. This project will thus shed light on how these concepts play out in a practical context.

Environmental Design

In the Fall of 2004, the Teachers College library re-opened a renovated facility that included group study spaces that community members could reserve to meet their small team collaboration needs (Sapers, 2007). This included six rooms that would comfortably seat four persons and two rooms that would comfortably seat eight persons (see Figure 1).



Figure 1: Eight-person group meeting space

The following year, community members were able to reserve these spaces online using the library homepage. When reserving space, students were given the option of reserving both physical and virtual collaboration spaces, or a combined option that allowed students to reserve a physical collaboration space accompanied with a virtual collaboration space. The virtual e-collaboration space was actively advertised to students, letting them know they could use the space to edit a wiki, post an agenda, or use discussion tools (see

Figure 2).

The e-collaboration option provided by the library to informal groups is Moodle. Moodle is an open-source learning management system, used in many learning contexts across the globe (Dougiamas and Taylor, 2003). Moodle has the advantage of offering many tools in one package. For example, a student can deploy wikis, threaded-discussion boards, chat rooms,

surveys, make HTML pages, instant message other users and upload files, as well as control access permissions of collaborators. A sample Moodle space is shown in Figure 3. Because of the variety and utility of the tools Moodle provides, it can act more than a course management system and is referred to here as a “virtual space” or “e-collaboration” environment. In many cases, Moodle provides a virtual space for formal courses, where each course offered within an academic unit (school, department, or institution-wide) is made available to faculty and students automatically. In these cases, the faculty member usually has more control over the virtual space than the student and often has the option whether or not to use the course management system. However, this is only one way that Moodle may be used. In this context, the library provides Moodle as a virtual meeting place for informal groups. Any community user can create a Moodle space and invite their group to use it with them. For example, a group could create a Moodle space where they make use of a wiki for authoring a document, a threaded-discussion board for discussing the work on the document asynchronously, and use the chat room to discuss the work in real-time.

Many virtual collaboration options are available to users over the Internet. For example, any Internet user can make use of Adobe Connect for no fee, which allows for audio and screen sharing among users as well as a chat interface [ii]. Similarly, many universities host an installation of Adobe Connect for their users, such as Johns Hopkins University [iii]. Other universities provide virtual meeting options, such as Ohio State University, which provides a virtual meeting system to its constituents [iv]. A host of technologies are also available to Internet users for little or no fee that strive to simulate face-to-face gatherings, such as GoToMeeting, DimDim and WebEx [v]. In this case, Moodle is provided by the library as a service to augment or supplant a face-to-face meeting for informal learning contexts in a much less immersive way than other technologies (e.g., Moodle does not allow voice communication or screen sharing). Library users may choose to use other technologies (such as Adobe Connect) that are available outside of library services. This study will attempt to understand how the utility of this particular arrangement (providing Moodle to augment or supplant face-to-face meetings); future studies can uncover the extent to which other virtual collaboration software or combinations of physical and virtual spaces are used by library users.

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become a moodle guru, get **E-COLLABORATION**

edit a wiki, post an agenda, use discussion tools

OVERHEARD

Figure 2: Library homepage, where students were actively encouraged to make use of e-collaboration spaces.

Home Gottesman Libraries Teachers College Columbia E-Reserves

Moodle@Gottesman > 000_kqa2 Switch role to... Turn editing off

People

Participants

Activities

Forums

Search Forums

Go

Advanced search

Administration

Turn editing off

Settings

Assign roles

An open forum for chatting about anything you want to

[Add a new discussion topic](#)

(There are no discussion topics yet in this forum)

Online Users

(last 5 minutes)

Moodle Administrator

Upcoming Events

There are no upcoming events

[Go to calendar...](#)

[New Event...](#)

Recent Activity

Activity since Tuesday, 8 June 2010, 10:53 AM

[Full report of recent activity...](#)

Figure 3: Students could create blank Moodle spaces for group collaboration.

For booking physical spaces, the students are presented with a screen not unlike that for booking an airline flight (see

Please use the box on the right to secure a room at the Gottesman Libraries (Russell Hall). Once you have made your reservation, we will send you a confirmation to your @columbia.edu email address.

Need to get space for a special event? [Fill-out the special event application](#). Other questions? [Contact Us](#).

 **TIP!** Make sure you don't book a room after the library has closed. Check out the [library hours before booking](#)


Additional Information:

Conference Phones
You will need an authorization code to use a conference phone in the library. Staff and Faculty may contact the Telecommunications Department (212-678-3456) to obtain departmental authorization codes for billing purposes. Students must contact their departments for permission to use the authorization code.

Facilitation Services
Having trouble working with your group? Problem solved! Try the new edLab Facilitation Services, which can help smooth-out the rough edges in your meetings.

Your Room: 304, 3rd Floor Russell Hall
Room 304 offers small groups a private study space for 4-6 people. The room features:

- 4 Aeron Chairs; Room for 4-6 total
- Whiteboard
- 4 Ethernet ports



Title Your Event
Good titles and brief descriptions are helpful to your collaborators and the whole TC community. The title is displayed on the Library Homepage, and on the Large Display screens on-site at the library. Glancing over these events gives everyone an idea of what is taking place in the Library on a given day. Examples of good titles include:

- Cog Psych Final Exam Study Group
- Art Ed Proposal Defence: Dan Serig on Metaphor
- Curr Design for Children with Special Needs

Book a Room

Step 1: Schedule

🕒 Jun 10 1 hour

Starting at 6:00 PM

Step 2: Participants

👤 1-4 Private Meeting Public Event

Step 3: Technology Needs


Equipment (PCs, DVD, VHS, projector, etc.)

E-Collaboration

Your Room: 304, 3rd Floor Russell Hall

Step 4: Details

Meeting Title:

Participants' email addresses (use semi-colons to separate):
 

Additional Services

Facilitation Services (we will email you)

Meeting Supplies

Library Materials

Figure 4). Users specify the day, time, and how many individuals will be attending. Students are also presented with the option of including an e-collaboration space to augment their physical space. If they choose to take an e-collaboration space, the student will be prompted to begin setting up their Moodle space immediately after the room has been booked. If a user request only an e-collaboration space a not a physical space, he is presented with the screen shown in Figure 5. The reservation system is based on the MRBS Open Source room booking system with significant custom enhancements for the user interface and to connect it with Moodle [vii].

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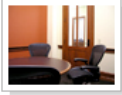
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Participants' email addresses (use semi-colons to separate):
 

Additional Services

Facilitation Services (we will email you)
 Meeting Supplies
 Library Materials

Figure 4: Students can book a physical and virtual space using a single screen.

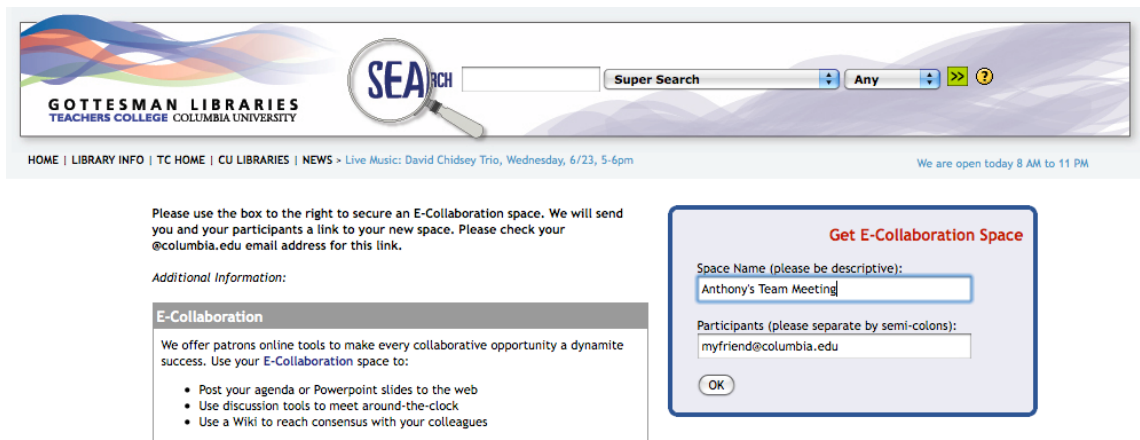


Figure 5: Screen that allows a user to request an e-collaboration space

The environmental design that combines physical and virtual space makes use of several concepts discussed in the literature review. For example, the ability to use technology to reserve space makes use of the information commons concept, which emphasizes the convergence of space, technology, and service. Similarly, the ability to connect buttress connections between users using a virtual collaboration option is reflective of the Library 2.0 and Web 2.0 concept. The primacy of physical interaction captured in the idea of library as place is also actively used in the environmental design. Given these new physical and virtual spaces available to students in Fall 2004, this project will attempt to uncover if the inclusion of a virtual space option can act to alleviate physical space constraints.

Participants

The participants of this study are the students, faculty and staff at Teachers College (TC), Columbia University, a graduate and professional school of education located in New York City. The demographics for TC are the following (from the 2008-2009 school year): 5,117 students (3,234 Masters, 1,584 Doctoral, and 229 Non-degree); 31.8% full-time and 62.8% part-time; 76.6% female and 23% male; Average age of student is 31; 12% are international students; and 260 faculty and approximately 400 professional staff [viii].

Hypotheses

This study will test the following three hypotheses:

H1 – Library users will make use of library-provided virtual space (in this case, Moolde) to augment their face-to-face meetings.

H2 – Library users make use of library-provided virtual space for group collaborations.

H3 – As physical library space becomes scarce, users will make use of library-provided virtual space.

A test of H1 and H2 will uncover if the virtual space option (in this case, Moodle) is being used. H3 will uncover if there is an interaction between physical space and virtual space (e.g., will library users turn to virtual space if a physical space cannot be reserved?).

Method of Analysis

To address the first two research questions, the research method will first establish that there are indeed physical space constraints. This will be accomplished by computing the occupancy rate of the physical collaboration rooms throughout the 47-month period (September 1, 2005 through July 31, 2009) and broken down by time of day. This value will be computed by taking the total room occupancy divided by the total available time for booking. A low percentage value will indicate that the rooms are available for reservation, where a high percentage value will indicate that the rooms are in-use.

After the rate of physical occupancy is uncovered, the rate for space requests by community members will be computed. This will be separated by the type of space being requested: physical space, virtual space, or physical space augmented with virtual space. These will be separated by month and year. This value will uncover the dynamics of space usage: whether library users are making use of virtual space, physical space, both, or neither. This analysis will also be used to test H1 and H2.

The final analysis will test H3 by performing a correlation analysis between physical space and virtual space. If H3 is correct, when the value of the physical space variable increases (leading to a decrease in supply of physical space), the value for e-collaboration should also increase. The correlation values will be computed using Pearson's correlation in SPSS.

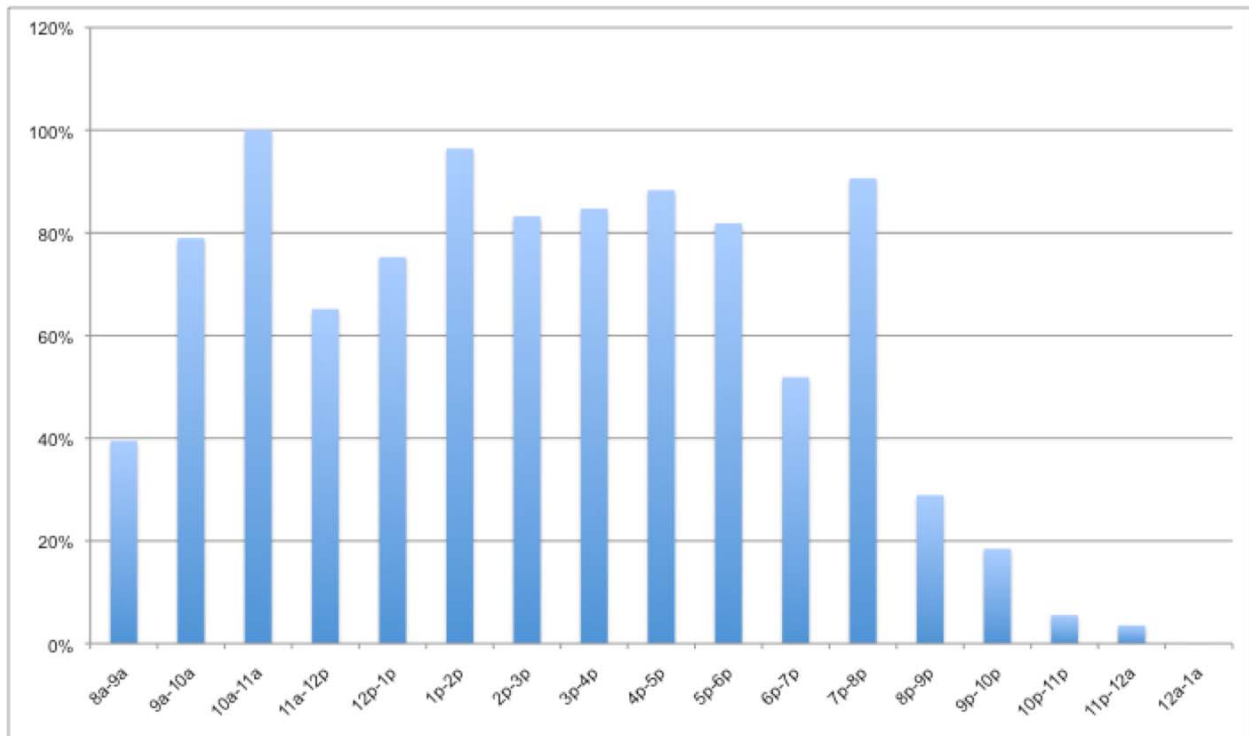


Figure 6: Physical space occupancy by time of day for 47 months during Library open hours

Results

The first set of analysis aims to uncover if there is high occupancy for the collaboration rooms, which would indicate a physical space constraint. The analysis indicates that the eight group collaboration rooms were heavily used during the 47-month period during almost all times that the library was open (see Figure 6). During the times of 10 AM and 11 AM, there is 100% occupancy, indicating that reserving a group collaboration room during these times can be quite competitive. Other times indicate high use, such as 1 PM to 2 PM (96% occupancy) and 7 PM to 8 PM (91% occupancy). Even as early as 8 AM to 9 PM (39%), or as late as 8 PM to 9 PM (29%), there is a good deal of occupancy.

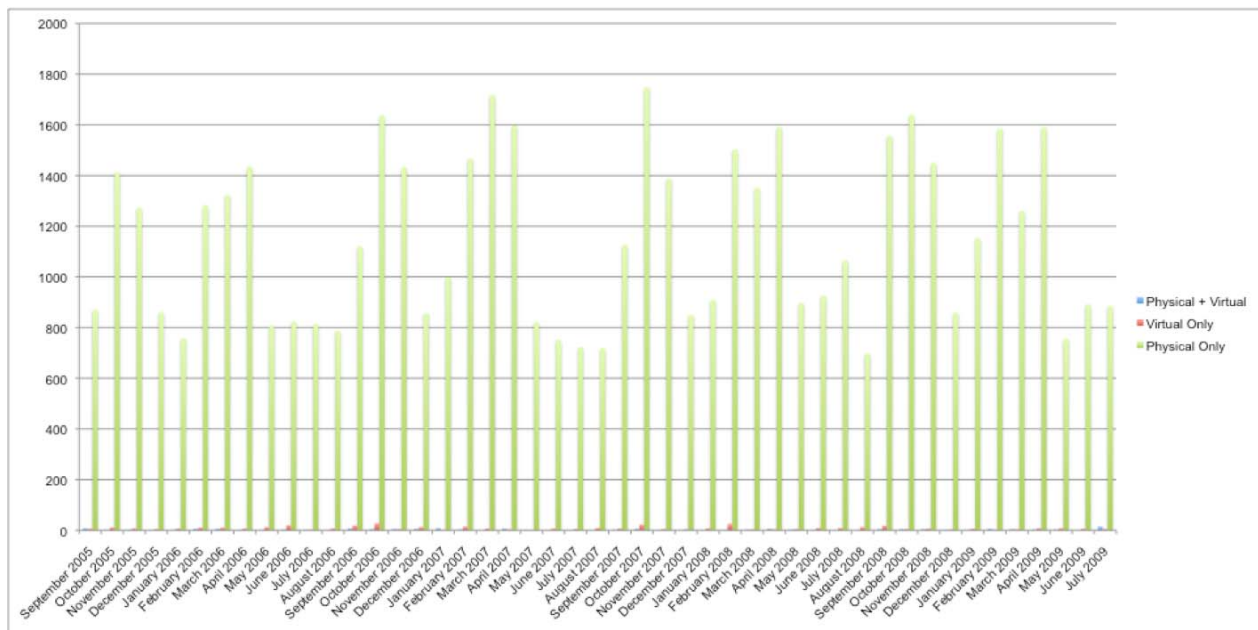


Figure 7: Number of requests for physical, virtual, and physical + virtual space.

The heavy use of physical space is also conveyed in Figure 7, where each month there is on average 1148.3 ($SD = 336.2$) requests for physical space. This quantity far exceeds the number of requests for virtual space ($M = 8.8$, $SD = 6.2$) or physical space augmented with virtual space ($M = 3.6$, $SD = 2.9$). This analysis indicates that despite the active marketing of virtual space, and the clearly competitive environment for physical space, library users continue to desire the use of physical space, even arranging meetings late into the day or early in the morning. Hence H1 and H2 are found false.

The correlation analysis indicates a weak correlation between increases in physical space with increases in virtual space $r(45) = .257$ as well as with physical space augmented with virtual space $r(45) = .262$; however, none of which are at statistically significant levels ($p > .05$). This indicates that there is no significant interaction between use of physical space and virtual space. Hence, H3 is found false.

Discussion

The analysis indicates that physical spaces for group collaboration are in very high demand, whereas virtual ones provided by the library are not. The data indicates that library users would rather book collaboration rooms late in the evening or early in the morning rather than use the virtual collaboration space provided by the library. A scarcity of physical collaboration spaces does not lead users to go virtual, but rather to work around the scarcity in the physical world. In terms of the role of an academic library, this analysis indicates that the concept of library as place is quite relevant, especially in this particular context. Pomerantz and Marchionini's (2007) contention that the library is a "space for users, for individual and collaborative work, and as a space for social activity" is supported by this analysis (p. 505). With respect to the concept of New Librarianship, it appears that there is still a great deal of perception changing needed before individuals will turn to the library as a resource for virtual collaboration. This analysis indicates that individuals easily turn to the library for physical collaboration options, but look elsewhere (or not at all) for virtual options. This may be the result of established notions of the types of services that a library provides, where physical space is expected yet virtual space is not. Rather, library users may turn to other service providers that are more closely associated with virtual space, such as the services available by Google or Adobe.

Limitations

Although this study has several strengths, there are several limitations. One limitation that was not controlled for was the possibility that students and faculty did not like Moodle, and hence choose not to use it. In this case, it was not that users did not want to use virtual collaboration, but rather they did not want to use Moodle. In this case, users may be making use of other virtual collaboration tools, such as the ones available from Google or Adobe. Further studies could survey users to better understand if they do indeed have virtual collaboration interests, and if so, what kind of environment would work best for them. However, because of the very strong difference between use of physical space versus virtual space, it seems probable that even the best virtual environment would have trouble competing with user interest in meeting face-to-face.

Additionally, further research is needed to uncover the motivations for users meeting face-to-face so that tools can be designed or made available that users want to use. For example, it is unclear if users would be more likely to use a tool that attempts to simulate the physical environment (e.g., synchronous audio-visual tools) versus asynchronous formats (e.g., wikis, blogs, etc.). Further research could also indicate if efforts would better be directed towards the supportive role of e-collaboration tools for group meetings rather than the replacement role.

While this study amply represents the user community at this particular institution, it may not be reflective of user communities at other institutions. For example, institutions that make aggressive use of online learning may find that students are more likely to use e-collaboration spaces, as opposed to the institution discussed here which offers a modest amount of online courses.

Conclusion

This study illustrates that the concept of library as place still has a great deal of currency: library users are interested in using physical group meeting space to a high degree and are

willing to work around physical space limitations. This conclusion is consistent with a set of findings from Gerke and Maness (2010), who quantitatively demonstrated the primacy of the physical facility at the University of Colorado at Boulder. They found that “need for facilities that bring people and information together may survive” and “just as physical retailing has not met its demise, it is possible that the physical library will continue to play a vital role on the campuses of colleges and universities throughout the world” (p. 26). Also as concluded by Gerke and Maness, this study does not further support Martell’s (2000) statement that the “construction of new libraries will diminish, and within twenty-five years the physical symbol of the library will no longer be a viable representation of functionality” (p. 110). Existing spaces may be renovated and reconfigured, and the actual functions of the library may change or evolve over time, yet as this study illustrates the need for physical gathering places is resilient.

This study also indicates that virtual collaboration space cannot easily take the place of physical collaboration space, even when there is a scarcity of one and an abundance of the other. For space constrained institutions, such as the ones in Manhattan, the use of virtual space to augment or replace physical space does not appear to be a valid option. Rather, finding new and innovative use of physical space that students and faculty can easily take advantage of is likely to have a better set of results than the alternative. Despite the popularity of the web and the exciting developments in new technologies, users continue to find “Gothic architecture and big grass lawns” as compelling as ever. Applying ingenuity to make possible the best parts of this tradition is an appropriate aspiration for growing universities.

Acknowledgements

I would like to thank Gary Natriello and Brian Hughes for their support on various stages of this project, as well as to the staff of the Gottesman Libraries at Teachers College, Columbia University.

Notes

- i. <http://www.columbia.edu/cu/lweb/indiv/>; http://library.tc.columbia.edu/lib_overview.php
- ii. <http://www.adobe.com/mena/acom/connectnow/>
- iii. <http://ep.jhu.edu/adobe-connect>
- iv. <http://webmeeting.osu.edu/3.2/host.php>
- v. <http://www.gotomeeting.com>; <http://www.dimdim.com>; <http://www.webex.com>
- vii. <http://mrbs.sourceforge.net/>
- viii. <http://www.tc.columbia.edu/admissions/student.htm>; <http://www.tc.columbia.edu/psec/>

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