Reflective Practices: Library Study Spaces in Support of Learning

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In this new age of networked information, social media, and online courses, how can physical campuses best support student learning?[1] How can spaces be designed to support the diversity of students and the diversity of learning activities that are now present on academic campuses? These questions are being asked by campus planners, architects, faculty groups and librarians as all recognize that a significant part of students' learning takes place outside of the classroom. The National Academy of Sciences, recognizing the increasing diversity of learning activities and of students, came to the conclusion that academic institutions must meet the needs of three main learning styles, learning by doing, learning through conversation, and learning by reflection.[2] As librarians work with campus planners and architects to redesign library spaces, how can these spaces be designed to meet the needs of these three learning styles, and thus, support student learning?

Literature Review

In looking at the library literature of the past 10 years, one sees a renewed interest in library space studies including works such as the seminal and more theoretical work by Demas in 2005[3] and the survey of academic library buildings by Stewart in 2010.[4] However as late as 2011 Nitecki noted that "formal inquiry about library spaces has only recently begun to be conducted and reported, suggesting that spaces mostly have been subjected to description assessments, with few sharable evaluations or evolved theories to inform practice."[5] And Montgomery noted in 2014 that "little is known about how academic libraries contribute to student learning on campus."[6]

A survey of the literature on library space planning shows two distinct areas of weakness in research and practice. First is a disconnect between what students are using and asking for and what types of spaces are being designed and studied. In a 2010 post-occupancy survey of libraries with newly completed buildings, Stewart found that study areas (defined as study tables, carrels, study floors, quiet study) were identified as the second busiest areas in the new libraries, second only to group study rooms.[7] And in a study of observed seating patterns in a newly renovated Yale University library by McCarthy & Nitecki, they found that one quarter of the students were observed studying individually in "individual" spaces and that an additional fifty percent of students were working individually alongside others at larger tables or in soft seating areas.[8] Finally, in a study from Rollins College, Montgomery reports that 48% of library users worked alone and that "The desire to work alone and the multiple activities observed in the 'Activity Study,' along with the student discussions of space implied that students needed more individual space to do their work in the library."[9]

However, in Stewart's survey of libraries, he found that 50% (of 55 responding institutions) indicated an increase in the amount of quiet study space but "more than half of the institutions with exclusively undergraduate populations reported less or no areas in the new facility designated for quiet study."[10] In addition, current literature about the design of academic library spaces concentrates on the development of learning commons with atmospheres similar to coffee shops and conversational areas. For example, none of the

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six interior academic library spaces depicted in the 2014 *Academic Libraries* "library design" issue are spaces designed for reflective learning[11] and seven of the eight papers on the assessment of space presented at the 2014 ARL Assessment Conference were on the assessment of learning commons and active learning spaces while the one paper looked at spaces outside of the library.[12]

The second area of weakness in library space research is the reliance on research methods that are insufficient for answering the complex question of how spaces impact student learning. This weakness is not due to a lack of rigor on the part of library researchers but on the difficulty of the research question. In 2012 a report written by distinguished members of the Society for College and University Planning recognized the difficulty in studying learning spaces by stating "we find that it is even more challenging to apply rigorous research designs and data collection methodologies to informal learning spaces [including libraries]."[13] Early studies in library space design concentrated on seating surveys and user satisfaction while more recent research has included a greater variety of research questions and methods including investigating the relationship between spaces which inspire and spaces which are preferred, asking students about their learning behaviors, and using design charettes.[14] While these studies have moved us towards a deeper understanding of our users and how they interact with our spaces and services, they are not sufficient in answering the question of the impact of space on student learning.

Problem Statement

We know that students are coming to higher education with more distractions (i.e. social media) and competing responsibilities (i.e. children, full-time jobs), and that more students have diagnosed learning disabilities.[15] In several recent surveys, students have said that they need quiet study spaces that are designed to encourage them to disconnect, get away from distractions and are distinct from social spaces.[16] These students need study spaces that will assist them in recovering from the mental fatigue that comes with everyday life and that makes it more difficult to direct attention to important tasks, problem-solve, and think reflectively. They need spaces that they perceive of as compatible with successful completion of their study goals. The problem can be stated as:

Academic librarians need better ways to understand how library spaces can support student learning in all three learning styles, especially the styles that call for reflection and individual "doing".

Study Design

Attention Restoration Theory (ART), from environmental psychology, has shown that exposure to natural environments, even through window views and interior plants, can decrease mental fatigue and restore the ability to direct attention.[17] It has also shown how environments that are perceived as compatible with one's goals are more likely to be restorative and to encourage one to remain there longer. This study used two scales developed in environmental psychology, the Revised Perceived Restorativeness Scale (RPRS)[18] and the Perception and Compatibility Scale (PCS),[19] in an experimental setting to determine if exposure to natural environments in library study spaces is perceived as restorative, and thus, likely to have a positive impact on students' abilities to direct their attention and to complete their study goals (i.e. reading a textbook or reviewing notes for an exam). Undergraduate students at two very different academic institutions were asked to complete one of the scales (*N* of 160 for the RPRS and *N* of 90 for the PCS) while viewing slides depicting four different types of library study spaces. These four types were:

1. a window view of natural greenery (Green View),
2. a window view of buildings (Built View),
3. an interior space with green plants (Plant View), and
4. an interior space with no window and no plants (No View).

All students also completed a short demographic survey. Results were analyzed via SPSS to see:

a. which environments, if any, are perceived to be restorative,

b. which environments, if any, are deemed compatible with completing specific study goals, and

c. whether results differ based on a variety of independent variables (i.e. age, gender, preferred study area, institution attended).

Results and Discussion
Restorative Environments

The Green view was perceived to be more restorative than all other views by scoring highest in the overall Restorativeness Scale. Participants found window views of nature to be the most restorative. The plant view, which was expected to score next highest, did not. It was perceived of as the least restorative. Other studies have shown mixed results when looking at the impact of indoor plants on mood, behavior, and work performance. More work needs to be done on the impact of indoor plants. One possibility for the results in this study is that the two Plant view pictures were problematic. The one Plant view contained a rather large blank wall that may have played a role in the responses. This is an area for further research.

The Built view was found to be the next most restorative view after the Green view. This is not surprising since 45% of those responding to the open-ended question in the demographic survey mentioned windows, nature views, or natural lighting as a feature in their favorite place to study. However, the importance of what is outside of the window cannot be ignored. Nineteen percent of respondents on the open-ended question specifically noted a window with a view to nature. In addition, in comparing the medians of the four views in the overall RPRS (Green = 168; Built = 144; No View = 141.5; Plant = 134), there is a very large drop in the perception of restorativeness between the Green view and the Built view. Both sets of photos had windows, comparable furniture, and similar lighting. If the window itself (or natural lighting) were of prime importance, one would expect the scores to be closer. This is another area to explore further.

Compatibility with Study Goals

The Green view was preferred, perceived to be more compatible, and perceived as encouraging participants to come more often and stay longer than all other views by scoring the highest on all four subscales. Participants preferred window views of nature and found them to be more compatible with their study goals. They also were encouraged to come more often and stay longer.

Unlike in the RPRS, the Plant view scored higher than the No View or Built views in the overall comparisons. Although the overall PCS scores may indicate a tendency for students to prefer indoor greenery to no greenery, the detailed results are so mixed that further testing is needed to understand the role of indoor plants.

Another consideration, as mentioned earlier, is the pictures themselves. The PCS had three pictures representing each view, the same two as in the RPRS and one additional image. If the picture containing the large blank wall was problematic in the RPRS, the additional picture in the PCS may have ameliorated the impact of the blank wall in the PCS scores.

Similar to the RPRS findings, the comparison of medians of the four views in the overall PCS show a very large drop in preference and perception of compatibility between the Green View and the Built View, a drop of almost 60 points. In fact, the Plant view is preferred over the Built view. This confirms the findings in the RPRS and is suggestive of both the importance of what is outside of the window and, perhaps of greenery, itself. (Green = 295; Built = 237; NoView = 233; Plant = 243)

Demographic Differences

Using Kruskal-Wallis tests, differences in the overall results of both instruments based on a variety of demographic differences were investigated. Results did not differ significantly on either instrument based on gender, transfer status, campus affiliation, frequency of library use, or preference for study at home/in the dorm versus the library. Differences that did exist were confined to a few very specific instances and only

dealing with how high certain groups rated the Green view. They never altered the order of view preference.

These results lead to the tentative conclusion that maximizing window views of natural spaces may be one of the more universal and successful design principles to use in academic libraries. While students disagree on what type of furniture they find comfortable, whether or not they want books or other people around them, and what types of tables work best for them, they may just agree on the fact that views of nature are restorative, preferred, and compatible with their study goals.

Qualitative Data

The last question on the demographic survey asked the participants to:

> Describe the main features of your favorite space to study, when reading your textbook or reviewing notes for an exam. What would it look like? What features would it have?

Perhaps the most surprising result of this study was that 240 of the 243 participants took the time to respond to this question at the end of the survey. Granted a few were brief in their descriptions, such as the one word, "isolation," or two words, "chair, desk," but most took the time to be very descriptive including the participant who wanted "pretty view, comfy chairs, couches, maroon painted walls, fireplace, pastries, coffee, and a foot massage".

The first steps in the analysis of this data followed procedures for qualitative data analysis. After all responses were read several times, categories were developed that represented main themes derived from the data itself. All responses were read again to insure that the categories were representative of all of the main themes. Responses were then coded based on these categories and analyzed statistically. Seven of the categories were germane to this project. Of these seven categories, the most commonly mentioned by participants in both studies had to do with windows, views, and natural lighting: 45% in the RPRS and 48%

in the PCS mentioned one of these as a desirable feature. The need for quiet when reading or studying was also mentioned by a significant number (43% and 30%) although quiet was sometimes described as quiet with low background noise or music. Other features that relate to quiet were also mentioned: no distractions, seclusion, and calmness.

These results are interesting in light of the literature mentioned earlier in this paper. First they are in alarming contrast to what Stewart found in his survey of recently completed libraries.[20] He found that more than one-half of exclusively undergraduate institutions had either reduced or eliminated their quiet study areas in the new buildings. The results of this study do support his finding that, in post-occupancy studies, quiet study areas were the second busiest areas in the libraries that had them. In addition, the preference for quiet, secluded spaces with few distractions parallels the surveys mentioned by Fister, which note student interest in quiet, solitary study spaces[21] and in the findings by McCarthy & Nitecki on the post-occupancy use of individual study spaces.[22] Finally, the results from the open-ended question support Woodward's guidelines for the "customer-driven" library, where students have areas to "nest" and where they have the sense of "belonging" because the spaces are secluded, individualized, and comfortable.[23]

Conclusion

The challenge for academic librarians, architects, and campus planners is to create library spaces that answer the needs of the greatest number of users while demonstrating the contributions of these spaces to overall institutional goals, particularly learning, while staying within limited budgets. Cognitive, educational and environmental psychology provide a wealth of information about mental fatigue and how the depletion of attentional resources negatively impact the ability to employ successful learning strategies such as reflective thinking, elaboration, effort, and persistence.

Librarians can incorporate this research into and adapt methods from these disciplines for their own studies of library space. This research study is an ex-

ample. It begins the journey of not only examining how library study spaces can be designed to better support student learning but also understanding the complexities of adapting instruments and methods to new uses. Much remains to be done.

While this study points to the possibility that green views are likely to be restorative to a wide range of undergraduate students, more inclusive studies are needed. What about ethnicity, students with learning disabilities, and students at small, private colleges? Finally, how do perceived restorativeness, compatibility with study goals, and preference translate into real learning?

Multiple studies indicate the necessity of attentional resources for the employment of successful learning strategies, the negative impact of mental fatigue on learning, and the restorative power of being in natural spaces. This research, itself, shows that students do perceive study spaces with green views to be more restorative, prefer study spaces with green views and find these spaces to be more compatible with their study goals. What remains is to test the direct impact of being in these more restorative and compatible spaces on deep learning, not just on surface learning or short-term memory. How this can be done is a challenge in research design that I hope I and my colleagues are ready to meet.

Notes

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