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Diana Reid
University of Louisville, diana.reid@louisville.edu

Margo Smith
University of Louisville, margo.smith@louisville.edu

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Measuring (the value of) Space: A Case Study of a Collaborative Assessment of an Academic Library’s Physical Collections

Diana Reid and Margo Smith

Diana Reid is a Serials/Acquisitions Librarian in Ekstrom Library of the University of Louisville and can be reached at diana.reid@louisville.edu. Margo Smith is a Current Periodicals & Microforms Librarian in Ekstrom Library and can be reached at margo.smith@louisville.edu.

Introduction

Managing and maintaining space devoted to housing steadily growing physical collections has long been an issue in academic libraries. Much has been written about methods to predict, and plan for, the growth of collections over time. Yet over the last decade and a half, the focus of acquisitions has shifted from primarily print to primarily digital resources. This shift has been nearly complete for scholarly journals, and now electronic versions of monographs share, if not shelf space, collection space with their print counterparts. Due in part to this shift, we have also seen a re-thinking of the value of library space, from being viewed primarily as vital real estate for storing physical items, to spaces that can engage users and serve their needs in new ways. These changes have brought about a re-evaluation of local print collections and their importance to an individual library’s mission.

All academic libraries are navigating this territory, each with their own history and culture, budgetary concerns, collection priorities, and space limitations. The Ekstrom Library at the University of Louisville decided it would be valuable to obtain a detailed picture of the space usage in the Library’s physical collections, in order to help resolve ongoing space problems, to create a working document for continued maintenance of the Library’s physical collections and to provide data for library administration to use in support of future space planning. To this end, the Physical Collections Task Force (Task Force) was formed. The Task Force’s charge was as follows: “To determine present and future space needs for the Ekstrom Library collections; produce a written statement describing the current collections with recommendations for the future, both short and long-term outlooks.” This case study provides the background and context for our project, describes the methods used for evaluation, and reports the recommendations made based on findings.

Literature Review

Sapp and Suttle (1994, p. 156) noted that at “academic institutions across the country, library buildings constructed during 1950s and 1960s have reached their capacities, or will do so by the turn of the century.” Indeed there were several articles published in the late 1980s and early 1990s addressing space management issues. Some focused on the use of spreadsheet software as a tool (Ellis 1988), while others focused on methods of growth prediction (Wallace 1990). Some were format specific such as for journal collections (Gyekszly and Treadwell 1990), which had yet to undergo the dramatic transition to electronic formats. Sapp and Suttle explicate their methods for measuring collection expansion rates and quantifying growth capacity using a spreadsheet. Similar to the Task Force, their data was intended to be used for stack shift planning and ongoing space monitoring.

In current times, expansion of existing academic library facilities is not likely. Yet continued maintenance of spaces housing existing physical collections is still essential. Several recent case studies describe the consolidation of branch libraries and other losses of collection space that resulted in mass withdrawal projects (Thibodeau, 2010; Fong, 2010). The last several years have also seen a sharp rise in initiatives for shared retention and collection, whose goal is to enable participant libraries to reduce their own collection size, especially for low use materials (Clement, 2012). The notion that every library ought to collect and preserve everything is outdated.

Pritchard (2008) and Nitecki (2011) provide further insight into the changing context of academic library spaces. Pritchard notes in her article that the “digital environment… has transformed the passive sense of a building with books… into an environment where the user has numerous choices” (Pritchard 2008, p. 221). Nitecki expands upon the changing roles of academic libraries by describing them as “accumulator, service provider, and collaborative partner in learning and knowledge creation” (Nitecki 2011, p. 27). As libraries transition from the primary roles of “accumulator” and “service providers” to encompass collaborative roles, an evaluation of space occupied by physical collections can provide useful data to help libraries be proactive about future space planning.

After the completion of its work, the Task Force noted the recent publication of an article by Castro (2011), detailing a similar space assessment project. Castro’s article focused on the creation of two different “tools”, two spreadsheets to separately represent space availability and collection distribution. We also generated representations of space availability and collection distribution, but elected to include all data on one spreadsheet. Both created visual representations of the percent occupied space, Castro via a “heat map,” while the Task Force used a volumetric representation. One key difference was Castro’s planning for space needs for future acquisitions, which is...
tradiitionally a fundamental aspect of stacks management. Our current budget for new materials and acquisitions trends over the last years led us to believe this was not a priority.

**Background**

The University of Louisville consists of three campuses, which house twelve colleges and schools that support 192 degree programs. According to the University’s Fact Book for 2010/2011, the student population is 22,249, which comprise 71% undergraduates, 26% graduate students, and 3% staff attending classes. The University of Louisville was ranked 111 of all universities in expenditures of federal funds for research and development in fiscal year 2012 (Lombardi et al. 2011, 34).

The University Libraries consists of five libraries: the Sidney I. Kornhauser Health Sciences Library, the Dwight Anderson Music Library, the Louis D. Brandeis School of Law Library, the William F. Ekstrom Library, and the Margaret M. Bridwell Art Library. Each library maintains its own catalog, collections and services with the Art Library and the Ekstrom Library sharing technical processing activities.

The Ekstrom Library’s main collection serves the humanities, sciences, social sciences, and business. In addition, the library is a depository for state and federal government publications. The building has a lower level and four stories above ground. The physical collections housed in the lower level of the library are the Photographic Archives and Special Collections. The Reference collection, Media collection, and the Bingham Poetry Room are housed on the first floor. The second floor houses the African-American Collection, Multicultural Children’s Collection, and Current Periodicals. Finally, the main monographic collection and the bound journals are housed on the third and fourth floors. Materials classified in the Library of Congress letters A-N are on the third floor, and the remaining materials classified in P-Z on the fourth floor. On each of the third and fourth floors, the monographs are on the south side of the floor with bound journals on the north side of the floor. When the Ekstrom Library building was completed in 1981, it comfortably held the library’s entire collection of 450,037 volumes.

By 2002, the volume count had reached 947,344, and the Ekstrom Library has since faced space management issues of its physical collections. At that time, planning began for a 50,000 square foot addition, which was completed in 2005. Most of the addition was dedicated to the enhancement of library space and services. A major feature of this space, and one of only seven in the country at the time, is the Robotic Retrieval System (RRS) occupying 8,000 square feet and capable of storing approximately 600,000 volumes. This should have alleviated space concerns for some time to come.

Three major factors, however, during in the intervening years contributed to the Library’s space problems. First, and the most significant factor, was the increase in the number of books that were added to the main monographic collection. The average number of books added per year during the 1990’s was roughly 23,000-25,000. During the decade of 2000-2010, the average number of books added per year was roughly 46,000-48,000 so, that in term of shelf space, usage nearly doubled. Those were the years in which the library system was allocated a large amount of funding so that it could meet the holdings criteria in its bid for membership in the Association of Research Libraries.

Second, in 2005, the Laura Kersey Library of Engineering, Physical Science and Technology (Kersey Library) was repurposed as new classroom space for the Speed School of Engineering. This change happened on short notice with limited time to plan. Kersey Library’s 150,000 volumes, including both monographs and bound journals, were integrated into the Ekstrom Library stacks and the RRS: approximately 40% and 60% respectively. Despite the additional space obtained with the implementation of the RRS in 2006, by the year 2011, the facility housed 500,000 volumes, nearly reaching its capacity of 600,000 volumes.

The third factor that contributed to the space shortage was a long-term project to reclassify the Government Documents collection from the Superintendent of Documents (SuDocs) classification scheme to the LC classification scheme. Originally, the Government Documents collection occupied thirty-six ranges of shelving units housed on the 2nd floor. Many items were offered and de-accessioned via exchange lists. Many volumes were re-located into the RRS, but 76,086 needed to be reclassified into the stacks on the 3rd and 4th floor. Since the majority of Government Documents titles were reclassified into the LC class letters A-N, the third floor is the most crowded. The project began in 1999 and will be completed within the next two years.

The Library’s primary approach to maintaining the ever-shrinking shelf space has been to shift as needed in particularly crowded areas. In some especially compacted sections, when we found students shelving new books horizontally on the tops of other shelved books, subject specialists were asked to weed any duplicate copies of titles in those areas. This method of maintaining the stacks by “putting out fires” has persisted for the past three to four years. For instance, throughout 2011, the monthly average of shifts involved 575 shelves and 22 hours. When there is sufficient shelf space, the majority of shelving time is devoted to re-shelving books. Conversely, when there are numerous areas of compacted shelf space, the primary focus of the work becomes shifting books and relabeling ranges; work that also requires much more oversight and involvement by a supervisor. The labor-intensive efforts of multiple shifts each month provided the impetus for a critical review of the space occupied by the Library’s physical collections. The library administration responded to the situation by creating the Physical Collections Task Force.
Physical Collections Task Force

As stated in the introduction, the Task Force’s charge was as follows: “To determine present and future space needs for the Ekstrom Library collections; produce a written statement describing the current collections with recommendations for the future, both short and long-term outlooks.” In addition to the main monographic collection, this included Reference, bound periodicals, and specialized monographic sub-collections such as African American, Browsing (recently published titles), the Bingham Poetry Room, and Multicultural Children’s Literature. The Media collection, a highly circulated collection of DVDs, Kindle e-readers, iPads and laptops, was also included. Media is located in a prominent area of the library at the corner of the building where it is difficult to provide more storage and shelving; it was important to give voice to their space needs.

Task force members were recruited from the ranks of librarians and support staff from relevant units. The Task Force decided that the best approach to gather data was a comprehensive measuring and mapping of present collection space. The data gathered from the project would provide information to support future decision-making about space issues. To add further value to the report, the group decided to include data on the age of the monographic collections. Data on the average publication date of the collections would enhance the “snapshot” view of the physical collections and also assist with collection development and weeding activities.

Methodology – Available Space

The Task Force reviewed several measuring methodologies. Habich (1998, p. 4) indicates that for preliminary planning for a collection move, or when the consequences of an error are relatively small, estimates are sufficient. Habich (1998) and Self (2001) both suggest a hybrid approach, utilizing measurements and estimation, where total linear feet is extrapolated based on a certain number of sampled shelves.

The Task Force decided that precise measurement of the collection was impractical and unnecessary. However, since shelves were sampled from every column in the main monograph collection and all sub-collections, we are confident that our data would show minimal divergence from a more precise measurement. The group agreed that we would not consider volumes that were circulating or missing, based on an assumption that the number of volumes represented, particularly over the summer months when the majority of measuring took place, would be insignificant for our purposes.

The Stacks Maintenance supervisor organized and led student assistants in measuring the main monographic collection. As a starting point, a digital representation of the stacks was created using existing architectural floor plans. Using Microsoft Publisher, locations of all shelving units and other relevant architectural features, such as sporadic cement pillars were overlaid onto the digital blueprints (see Appendix A).

In conjunction with the floor plans, a log was created for recording measurements, which were done by hand. Each range of shelving was coded, beginning with the first range to be measured labeled A. “A1” indicated row A, side 1. “A1-1” was the first column in row A, side 1; “A1-2” the next adjacent column, etc. For purposes of the study, a column was defined as a single side of a double-sided shelving unit, typically 6-7 shelves. Students were instructed to sample several shelves in each column, and measure in inches the empty space at the end of each of those shelves. Once they obtained an average for the sample shelves, that figure was multiplied by the actual number of shelves in that column and recorded in the corresponding location listed on the log. This method determined the amount of free space in a particular column. Student assistants were instructed to work on the measuring project when the backlog of un-shelved books in their assigned section fell below a certain level. At this rate, it took five months to complete measurements for the 88,053 linear feet (16.67 miles) of shelving in the monographic collections. The monographic sub-collections, such as the African American collection, Bingham Poetry Room, etc. were measured in the same manner.

For the main monograph collection, the data gathered was transferred to a specially prepared spreadsheet that included the mapping of LC classifications across all shelves. This mapping allowed us to calculate the number of shelves per classification, as well as the percent of total shelving that number represented. Together with the data from the space available measurements, this spreadsheet provided an easy way to visualize the size and location of the most compacted areas in the collection, and their relation to the scope of the collection as a whole. See a segment of the data in appendix D. For each sub-collection, such as the African-American and Bingham Poetry Room collection, a separate bar chart was created which summarizes the percentage of space usage but does not include analysis by classification. See the chart in appendix C.

Bound journals, shelved on the third and fourth floors along the same classification division as the main monograph collection, were measured by the Serials Librarian. Using the same digital representation of the stacks, and depending upon the Librarian’s visual assessment of the degree of compaction, either the empty space or the occupied space measured to calculate total available space. For instance, for the bound journals on the third floor, the shelves were quite full so the empty space was measured. Conversely, for the bound journals on the fourth floor, many of the shelves were empty so the occupied space was measured.

Methodology – Age

Part of the Task Force’s charge was to “produce a written statement describing the collections”. Though our primary focus was on space-related issues, we were interested in determining the age of the collection to add another dimension to the collection description and to provide
potentially useful data for Collection Development. Using Microsoft Access, the University Libraries Voyager Integrated Library System was queried to provide a report based on call number and the publication date, the first date in the 008 field in the MARC record. A report was run for the main monograph collection and for each of the selected sub-collections. Data on the age of the bound journals collection was not included as it was deemed irrelevant due to their continuing nature.

The reports showed that publication dates for the main monograph collection spanned from 1560 to 2011. We elected to eliminate the 578 titles with publication dates from 1560 to 1833 in order to make calculations of the mean publication date more meaningful. This span of 273 years accounted for only .08% of the collection overall. The remaining publication dates, from 1834 to 2011, represents 99.92% of the collection and provides a more accurate view of the true age of the collection.

The report data, which included the classification number, publication date, and number of books per classification per year, was exported directly into a spreadsheet. The standard formula for obtaining an average was used to calculate the age of the collection as a whole and by each classification letter. In other words, the number of items for each publication date was multiplied by the date in order to obtain a “total number of years.” The sum of those calculations was divided by the total number of items. A sample chart created from this data shows the number of volumes and average publication date by classification. For this chart, classifications were consolidated by letter into twenty ranges, providing an overview of the age of the collection as a whole. Detailed breakdowns by all individual classifications were retained in spreadsheets for more granular analysis as needed. See the chart in appendix D.

The average publication dates for books in the sub-collections were calculated by the same process used for the main collection. Since the sub-collections are smaller than the general monographic collection, there were fewer publication dates to calculate so all dates were included in the calculation of the mean publication date.

Findings – Space

The Task Force used 75% full as its standard for manageable shelf capacity. Leighton (1999, p. 183) notes that as much as 86% capacity is manageable. He suggests however, that shelves with over 86% full require frequent shifts, which require more resources than simply shelving. The Task Force chose a more conservative standard for shelf capacity so that problem areas could be seen and remedial action taken sooner. Allowing for a margin of error in the measurements was also a consideration.

The data obtained from shelf space measurements in the main monograph collection indicated a “healthier” collection in terms of space than we originally assumed based on observation. See the graph in appendix E. This came as a surprise based on the very real space problems faced on a daily basis by stacks maintenance. A closer look revealed some significant disparities between the third and fourth floor, across which the Library's main monograph collection is distributed. Shelves on the third floor were 79% full, with twenty call number sections filled to 85% capacity or more. On the other hand, the monograph collection on the fourth floor is only 72% full, with ten call number sections filled over 85%. Moreover, the most compacted classifications are often located continguously, which makes shifting extremely difficult. When considered as a whole, the general stacks collection is filled to a generally healthy 76%, however the third floor is precariously compacted and inconsistently distributed, which will need to be addressed before this largest portion of the monograph collection becomes unmanageable.

Among the sub-collections, only the Bingham Poetry Collection, at 82% full, needed immediate attention in order for the collection to remain manageable. All other sub-collections are generally reported to have either low acquisition rates, such as the Multicultural Children's Literature collection, at 78% full, or contain books that are regularly transferred to the stacks, such as the Browsing Collection, which is 68% full. This type of data allows for shifting triage versus all-collection shifting.

Overall, bound journals have plenty of shelf space, although this is primarily due to one very large contiguous section of empty shelving on the 4th floor. The third floor is almost shelved to 90% capacity, and the fourth floor is shelved to only 44% capacity.

Findings – Age

Based on 99.92% of the collection, the data shows the average publication date for the main monograph collection to be 1975. See appendix F for a chart of the number of volumes by publication date. We were able to identify the LC classification, that of A-AZ, General Works, which has oldest average publication date of 1962. In the past, when there was plenty of shelf space, the Reference Department often transferred older volumes to the stacks rather than weeding them. Other subject areas with older than average publication dates are Literature, P-PZ, and World History, D-DU, each with average publication dates of 1969. Although in Literature and World History, an average publication date over forty years old is less of a concern than in subject areas that are best served with more current material. For instance, in Science with the classification letters Q-QZ, the average publication date is 1985. The subject area with the latest average publication date is Military Science, U-UH, which has an average publication date of 1994. Reviewing the number of items in each publication date, we note that collection growth peaked in 2000, and there has been a steady decline in new, current year print acquisitions over the past five years.

The average publication date for our main collection may be in keeping with comparable academic libraries. Anecdotally, however, the collection as a whole appears dated. More monographs are being purchased in electronic format than in print, and many lively discussions have
ensured about whether we are hastening the demise of our print collection, as it is neither extensively weeded nor refreshed with sufficient new materials. The browsing collection, for example, which consists of recently published fiction and non-fiction, circulates (and in hand, goes missing) at a very high rate.

**Recommendations**

A primary goal of the Task Force was to make concrete, prioritized recommendations that could be enacted as soon as possible in order to remedy the most immediate space problems. In the near future, the Task Force recommended an extensive weeding project be conducted in the main monograph collection on the third floor using criteria to be developed in consultation with the Head of Collection Development. A weeding project would create shelf space throughout the collection making room on the shelves for shifting in the compacted areas. A subsequent weeding project using the same criteria in the RRS would be a logical activity to create more room in that facility. All books that are withdrawn from the collection would be sent to a book resale agency.

Recommendations made for the Media Resources collection, such as a need for powered, metal laptop shelves and lockable storage, highlight its uniqueness.

The Task Force determined that a sub-collection that needed immediate attention was the Bingham Poetry Room at 82% capacity. The collection houses poetry titles from North American and Great Britain, and the Task Force recommended that the collection contain only North American titles. The change would decrease the density of the collection from 82% to 73% full. Relocating the British poetry titles to the third floor would increase the “PR’s” in the general stacks from 71.5% filled to 72.4% filled. The Reference Department contacted several faculty members of the English department whose specialty is American and British poetry. When presented with the recommendation, the faculty members were opposed to the idea and offered the compromise of transferring all pre-nineteenth century of both American and British poetry titles to the stacks.

No immediate recommendations were made for the bound journal collection. We continue to shift our journal collection to electronic only versions where possible, and bind less with each passing year.

The Task Force also recommended that the same study be repeated in several years, so that the current “snapshot” of the collections can be compared to the latest data. The comparative data will measure the Library’s success in achieving better distribution of its physical collections, which in turn provides easier maintenance for staff and, most importantly, better access for the Library’s patrons.

**Recommendations Enacted and Conclusion**

The Task Force report provided data which has enabled us to remedy urgent space problems and has become a working document used for continued maintenance for our physical collections. For example, the Reference Department is weeding or relocating items in its collection so that only frequently used material will be housed near the reference desk on the first floor. Currently, there are sixteen shelves of ready-reference volumes behind the reference desk. Nearby, there are eighteen ranges of reference books that are used less often. The final goal is to reduce the reference collection from eighteen ranges of books to nine ranges, so that more study tables can be placed in the reference area. As subject specialists review the collection, data on available space in the general stacks allows them to factor available space as part of their decision-making process, whether to retain, relocate or withdraw a title. Two empty shelves resulting from this project were designated to be installed on the third floor at the end of an existing range (G-HD, which ranged from 80-94% capacity).

The Collection Development Department, in response to both the shelf capacity data and the age of the main monographic collection, accepted the Task Force’s recommendation that a weeding project be undertaken. The subject specialists work from a report produced from the Voyager ILS that identifies duplicate copies that have a publication date of 1999 or earlier. Working in the stacks from this list, subject specialists quickly evaluate the duplicates for content, condition, and any information available on date due slips about the items’ circulation histories. Although this is a fairly conservative weeding project, it has resulted thus far in approximately 15,000 copies withdrawn, and therefore small amounts of shelf space regained throughout the collection. Any greater rate of withdrawal would be difficult for Technical Services to process, and any “deeper,” more thorough weeding project would require much more time on the part of subject specialists. The path chosen is manageable and will result in more “ease” in the collection overall.

With highly compacted problem areas clearly identified in the context of adjacent areas, multiple shifting projects will be planned in advance and prioritized rather than “putting out fires.” As Appendix G shows, there is quite a bit of variation in age between classifications. Data obtained on the age of individual classifications could enable more expedient weeding in certain areas where age and lack of space overlap. Because we had a high degree of duplication of titles, Collection Development Department elected to begin weeding by identifying and withdrawing those.

Finally, the Task Force report provides data for the Library administration to use in support of future space planning. Currently, the Ekstrom Library houses several collaborative partners all of which support the University of Louisville’s educational mission -- the Writing Center, the Delphi Center for Teaching and Learning, the Braden Institute for Social Justice, Muhammad Ali Institute for Peace and Justice, and “REACH,” the University’s tutoring center. As the balance of collections tips more heavily towards the digital and collaborative partnerships with other University organizations continues to expand, the eventual reallocation of some library space may not be a question of “if,” but

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rather “when.” In preparation for such shifts, the Task Force’s report should provide useful baseline information.

Academic libraries are in a time of great transition, encompassing changes in the nature of users’ needs and expectations, in the formats of our collections, in the tools that we use to discover those collections, and finally, in the way we view the Library as space. How can the Library best provide resources and services that balance our users’ multiple needs – for individual and/or collaborative research and for access to all types of information – print, digital and visual? Latimer (2011, p.131) observed that “the move from collections in the traditional sense to connections in our multidisciplinary, collaborative, user-centered library world will continue to provide the challenge for the foreseeable future.” The authors have provided an example of how an analysis of space allocated to physical collections is an integral part of managing this ongoing transition.

References


Appendix A - Ekstrom Library 3rd floor stacks

Legend
♀ ♂ Restrooms
♀ Water Fountain
© Copy Machine
罨 Online Catalog
$ Cardinal Card Machine

3rd Floor Ekstrom Library Stack Area
Shelfwidth 36" End Panel width 16.55 Width Between Ranges ca. 33"
Appendix B  
Segment of 3rd Floor – By Classification

Appendix C  
Ekstrom Subcollections Shelving Summary
Appendix D

Appendix E – Monographic Shelving Summary

<table>
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<th>% Empty</th>
<th># Shelves</th>
<th>% Total Shelving</th>
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<td>17,334</td>
<td>62</td>
</tr>
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<td>4th Floor Monographs</td>
<td>72</td>
<td>28</td>
<td>10,665</td>
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<td>Total: Ekstrom Monographs</td>
<td>76</td>
<td>24</td>
<td>27,989</td>
<td>100</td>
</tr>
</tbody>
</table>
Appendix F

Ekstrom Stacks
Number of Volumes by publication dates and classification groups

![Graph showing number of volumes by publication dates and classification groups.](image-url)