

Bethany A. Koestner. Evaluating a Medical Library's Print and Electronic Book Collection: The Balanced Scorecard Approach. A Master's Paper for the M.S. in L.S. degree. April, 2009. 30 pages. Advisor: Claudia Gollop.

As medical libraries are increasingly providing information in electronic format and simultaneously dealing with budget cuts, there is a need to analyze the usage of print and electronic titles being purchased. This study takes place at an academic medical center library and attempts to gather and analyze data from a variety of sources that may influence future print and electronic monograph purchasing decisions. Purchases were broken down by subject and compared against one another in terms of average numbers of loans. Five subject areas were chosen for further, title by title analysis to determine what types of titles circulated more frequently than others. Ultimately, the library wishes to ensure that the materials it selects are the ones that are needed and used, thereby providing the best return on investment for its book dollars while keeping the patrons satisfied with the quality of the collection. A balanced scorecard approach is employed to set goals for increasing circulation of purchased monographs.

Headings:

Use studies -- Electronic books

College and university libraries -- Book collections

Medical libraries and collections -- Collection development

EVALUATING A MEDICAL LIBRARY'S PRINT AND ELECTRONIC BOOK
COLLECTION: THE BALANCED SCORECARD APPROACH

by
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Introduction

Libraries often struggle to evaluate and promote the effectiveness and usefulness of their services. There is difficulty not only in finding formal data that is useful to evaluate but also in deciding what data will best represent the value of libraries. Evidence-based practice emphasizes the importance of gathering, interpreting, and integrating the best available data (McKibbin, 1998). In recent years there has been an attempt to replicate evidence-based practice from the healthcare field to the field of librarianship (Elderidge, 2000). This effort suggests that rather than blindly providing services without examining the evidence that may or may not support their effectiveness, librarians must take the time to collect data and assess the basis for their use and explore new ways of providing services and information to their patrons.

One example of a newly adopted strategy for evaluating the effectiveness of a library has been borrowed from the business literature. In 1992, Kaplan and Norton introduced the “balanced scorecard,” a tool designed to help corporate executives get a distilled yet comprehensive picture of the health and functioning of their companies. The scorecard is designed to capture key elements of a company’s business strategy and measure these elements over time. It links four major areas of performance measures: the customer perspective, the financial perspective, the innovation and learning perspective, and the internal business perspective. For each of these four areas, the corporation must formulate business goals and measures for evaluating the success of these goals. This

method provides a framework for tying financial measures of performance to evaluative measures of quality. It also forces the corporation to focus not just on short-term objectives but also on long-term strategies for growth and change. Since being introduced, the balanced scorecard has been replicated not just in the private sector but also in non-profit and academic settings. This research involves applying the balanced scorecard approach to the field of librarianship and to collection development, in particular.

Literature Review

One of the earliest papers to propose the use of the balanced scorecard in libraries was contributed by Broady-Preston and Preston (1999) in their review of market-driven mechanisms for measuring quality and effectiveness in academic libraries. Since then there have been a couple of descriptions published on the process of adopting the balanced scorecard for library use (Poll, 2001; Bosch, Lyons, Munroe, Perrault, & Sugnet, 2003; Lloyd, 2006). One of the most comprehensive and detailed published examples of using the balanced scorecard in an academic library is provided by the University of Virginia Library (Self, 2003). Libraries have tended to adjust the four quadrants of examination to correspond with areas of general importance to libraries: the user perspective, the financial perspective, the internal process perspective, and the learning/growth perspective. There are any number of metrics that can be examined in each of the four quadrants of the scorecard depending upon the mission and goals of the library in question.

At the Duke Medical Center library, the quality and usage of the book collection was chosen as an area of particular concern for evaluation. The collection development

study described in this paper has been constructed using the balanced scorecard as a framework for selecting metrics to evaluate. As resources increasingly become available electronically, many libraries are facing budgetary and space constraints that require making difficult decisions about storage, new print book purchases, and whether to purchase items in print or electronically (or both). In terms of journal usage, users have expressed a clear preference for electronic access over print. When both print and electronic formats of a title are offered, electronic journal use exceeds print use by a factor of at least ten (Schottlaender, et al., 2004). However, in the case of books, user preferences are a little less clear. In addition, their preferences may vary depending upon the purpose for which the book will be used. For example, books read for pleasure may be preferred in print format while books used for reference may be preferred in electronic format. In addition, if the book will be read from cover to cover, print may offer better features while if the user needs only a particular section or would like to search the text for a particular term, an electronic book may be the more functional option. Finally, a user may want to first skim the electronic version or look at its table of contents to quickly determine if it will fit her needs before coming to the library to borrow the print version of a book. Therefore, the user will want access to both the electronic and print versions of the book.

There are several methods available for comparing print and electronic book usage. For example, one can compare the usage of titles that are available to users in both print and e-book format (Christianson and Aucoin, 2005; Littman and Connaway, 2004). Here, for example, there can be a direct comparison of usage based on format. On the other hand, one can focus on e-book usage by analyzing e-book usage reports and

conducting user surveys in an attempt to understand what e-books are being accessed and how users perceive their e-book experience (Hernon et al., 2007; Levine-Clark, 2006). Finally, there is a move toward developing standard measures for evaluating the number of electronic materials available, the usage of these materials, and their cost for comparison purposes (Blixrud and Kyrillidou, 2003).

Dillon (2001) showed that it necessary not only to purchase access to e-books in order for them to be accessed by patrons but also to advertise that access appropriately. Prior to information about electronic access being added to catalog records in the University of Texas at Austin, e-book usage was 24% of the available titles; after electronic access information was added to the catalog records, e-book usage went up to 34% of available titles in less than three months. In addition, the average monthly usage doubled after electronic access information was added to the catalog records. Finally, adding electronic access information to the catalog record also changed the type of books being accessed from mainly computer science and business titles to being more evenly spread across the available subject content areas. One wonders how other types of advertising such as RSS feeds, blogs, instruction and signage can impact the usage of electronic titles.

An area of research that has been generally neglected is the comparison of access to reference and core textbooks available both in print and electronically. Since reference materials and core textbooks held by the library generally do not circulate, it is more difficult to evaluate the usage of these materials. One method used is to have sweeps of the reference area several times per day during which time library staff electronically scan books before reshelving them. There is some concern that this method does not

account for items that are reshelved by patrons nor for multiple uses while an item remains off the shelf; however, a similar limitation exists with circulation statistics in that they do not account for items used in the library but not check out. Ugaz and Resnick (2008) employed the sweep method to compare usage of medical reference and core textbooks with their electronic counterparts. They found that all of the 51 titles that they compared were used more in electronic format than in print. Results like this can have important implications for collection development purchasing decisions and use of the library's physical space.

Hernon et al. (2006) also examined the use of electronically available reference materials and textbooks in their larger study of economics, literature, and nursing undergraduate students' usage of e-books in general. Rather than comparing electronic and print usage of the same titles, they focused on user behavior and satisfaction with e-books. Medical reference textbooks were shown to be particularly well suited to electronic format for enhanced search functionality and ease of access. Nursing students showed a preference for purchasing the core textbooks for their classes and supplementing these with e-reference works and other online resources provided through the library. They cited lack of print copy, convenience, cost savings, currency of information, efficiency, and portability as key reasons for using e-books.

Methods

This study was conducted at the Duke University Medical Center Library located on the Duke University campus. The mission of the library is "to provide high quality and customer-oriented information services and resources to support the education, research, and patient care mission of Duke Medicine, including the School of Medicine, School of

Nursing, Duke University Hospital and Health System” (Duke University Medical Center Library, 2006). The Duke University Medical Center and Hospital faculty, residents, staff, and students along with Duke University Affiliated Physicians and preceptors are considered the primary users of the library and their needs drive collection development decisions.

Firstly, this study examined the usage of print books purchased within the last two years to identify trends in books with the highest circulation rates in five particular subject areas: radiology, surgery, nursing, pharmacology, and communicable diseases. These five subject areas were identified based on the percent of the collection that they represent and their centrality to Duke’s research and clinical strength areas. Each book collected within the last two years in these five areas was examined individually to identify particular attributes including the type of book it is and the physical attributes of the book. “Type of book” categories included core textbook, study guide, atlas, and handbook. The examined physical qualities of the book included attributes such as number of pages, number of volumes, presence of illustrations, and size. Data collection was conducted in collaboration with the Duke Medical Center Library with each of the five research team members collecting data on one subject area.

The educational and informational needs of the medical students are likely very different than those of other hospital employees so there is a need to have a diverse collection. For example, medical and nursing students have more of a need for textbooks while the hospital staff is more likely to require summaries of new research provided by tools such as Up-to-Date. However, both students and clinical care givers, and faculty and staff, are in need of current and comprehensive reference materials. When they are

not able to come to the library, electronic versions of reference materials can be particularly useful. Indeed, much of the medical library's e-book collection consists of reference and core medical textbooks.

The medical library purchases access to e-books through a number of different vendors. For the most part, different vendors provide access to different titles but there is some overlap in content. There are also differences in the usage contracts between vendors. For example, some vendors allow for multiple users accessing the same title at the same time while other vendors only allow one user at a time. Finally, there are differences in the type of data that the various vendors provide on usage. This makes it difficult to compare statistics among vendors. For this study, two vendors, Books@Ovid and R2 Digital Library, which provide somewhat comparable data were chosen to evaluate usage of electronic book titles. R2 provided data by year, not just on the number of users who accessed each title but also the number of users who viewed the Table of Contents of a particular title and the number of users who were turned away because someone else was already viewing the desired title. Books@Ovid, on the other hand, only provided the number of users who accessed a particular title by month. Neither vendor provided data on the amount of time the user spent viewing the title or the number of pages that were viewed. Unfortunately, libraries are quite limited by the data provided by the vendors in evaluating the usage of a particular title.

Since many of the titles to which the medical library purchases electronic access are reference and core medical textbooks, their print equivalents are part of the non-circulating collection and reside on the first floor of the library with other reference and reserve materials. This study evaluated how format impacts the frequency with which a

library book is accessed. Specifically, we considered usage of print versus electronic books. Books in electronic format were assessed for use according to access statistics; e-book access was defined as a single episode of a user viewing an e-book as measured by usage statistics collected by the various companies who provide this access and report it to the library. Some of the comparable print books were held in the non-circulating reference collection; therefore, their usage could not be evaluated based on circulation numbers. Instead, this study focused on the books that were part of the circulating collection for which circulation data was available. Print and electronic book usage was compared over a set period of time to determine which is more popular. There was a desire to also evaluate the usage of titles by “status” (e.g., student, faculty, staff, etc.). However, because of the limitations of the data provided by the e-book vendors and difficulty of obtaining this data from the circulation software program, this original aim of the study was not realized.

A second initial intention of the study was to compare the usage of print and electronic reference materials according to format. However, Duke Medical Center Library’s collection of e-book and print reference materials are largely non-overlapping. Given budget cuts, libraries are increasingly moving to purchasing materials in just one format rather than having overlapping print and electronic collections. Therefore this study is only able to compare the 18 titles for which there were both print and electronic versions. The online titles provided by R2 and Books@Ovid were compared with their print equivalents available through the catalog. I expected to find that electronic books are accessed more often than their print equivalents over the same period of time.

E-book usage was also measured against itself over two distinct time periods. The first was the 2006 calendar year and the second was the 2007 calendar year. In 2007, the library began more aggressively advertising its collection of e-books in the hope of increasingly usage. This was done in several ways including RSS feeds, the library blog, and signage. It was anticipated that e-book usage will have gone up from 2006 to 2007 as measured by the number of times that e-books are accessed by users over the course of a year. This comparison will assist the library in evaluating the success of its advertising campaign and suggest either continuing the same advertising methods or examining new ways of introducing users to the digital collection.

This study attempts to provide a broad and comprehensive picture of the health of the Duke Medical Center Library's collection by examining a few carefully chosen metrics. Given ever-present and growing budgetary and space constraints, it is essential that a library's collection development policies and procedures are based on evidence about patron's usage patterns, preferences and needs. The metrics collected focus on how and what patrons are choosing to access books from the library's collection including not just print books but also electronic books.

Results

The subject areas of print books that we chose to evaluate were based upon circulation statistics gathered on the books purchased between 2005 and 2007. Print books purchased within this two year period that were part of the main circulating collection were evaluated. Books that were part of the reference collection or history of medicine collection were omitted. There was a desire to evaluate not just highly circulating subject areas but also those with varying and low circulation rates. The

highest circulating subject area by percent of the number of books in its area was Biology with 71.4% of the collection circulating more than seven times. However, there were only seven books purchased in this area in the last two years (of which five circulated) making this an area that was too small a portion of the total collection to make it worthy of evaluation. However, the next most highly circulating subject area by percentage of the number of books in its area was Radiology with almost half (48.2%) of the collection circulating more than five times (See Table 1). This represented 13 of the 27 books purchased in Radiology over last two years. In addition only two books purchased in this area in the last two years had never circulated. With these high usage statistics, Radiology constituted an obvious area of interest for evaluation.

Another area chosen for evaluation was Communicable Diseases. Of the 13 titles in this subject area, slightly less than half (46.2%) of the books had no record of circulation, while 23.1% circulated fewer than three times, and the remaining four books (30.8%) circulated more than five times. Clearly while a segment of the collection was viewed as very useful to users while the remaining books are much less so. Given the high number of titles that had never circulated, this area was chosen as important for evaluation. In fact, Communicable Diseases had the highest percent of zero loans by the number of titles in its area when compared with the rest of the collection purchased within the two year period of study. An area with a similarly low percentage of books circulating more than seven times was Nursing. In this case, of the 84 titles in this subject area, only 7.1% or five books had more than five loans. Of the remaining titles, 50% circulated between three and seven times, 26.2% circulated fewer than three times and 21.4% had never circulated.

The two remaining subject area categories chosen for evaluation were Pharmacology and Surgery. All of the Pharmacology titles circulated at least once while 22 (66.6%) of the Surgery titles circulated at least once over the same time period. And, seven (41.2%) of the Pharmacology books circulated more than five times, while only seven (21.2%) of the Surgery books circulated more than five times. Finally, eleven of the Surgery titles (33.3%) never circulated at all while none of the Pharmacology titles failed to circulate. Pharmacology was seen as an area that was performing quite well while Surgery seemed to be lagging behind. Both these areas were of interest for evaluation given their percentage of the total books purchased and circulation record.

Table 1. Circulation Statistics by Subject Area of Books Purchased from 2005-2007

Subject Area	No. of Books (% of Total Purchased*)	No. of 0 Loans (Percent)	No. of <3 Loans (Percent)	No. of 3 to 5 Loans (Percent)	No. of >5 Loans (Percent)
Communicable Diseases	13 (1.3)	6 (46.1)	3 (23.1)	0 (0.0)	4 (30.8)
Nursing	70 (7.1)	15 (21.4)	30 (42.9)	20 (28.6)	5 (7.1)
Pharmacology	17 (1.7)	0 (0.0)	5 (29.4)	5 (29.4)	7 (41.2)
Radiology	27 (2.8)	2 (7.4)	6 (22.2)	6 (22.2)	13 (48.2)
Surgery	33 (3.4)	11 (33.3)	11 (33.3)	4 (12.1)	7 (21.2)
Overall	160 (16.3)	34 (21.2)	55 (34.4)	35 (21.9)	36 (22.5)

*Percentage of total books purchased from 2005-2007 in each subject area and overall.

The books in these five subjects were evaluated in a number of different areas identifying content and physical characteristics. The characteristics examined included edition number, clinical or research, theoretical or practical, and type (textbook, study guide, atlas, or handbook). The books were also compared to the *Doody's Core Titles in the Health Sciences, 2008 Edition* list for inclusion and score. *Doody's Core Titles* (DCT) is designed to inform medical, allied health, and nursing librarians in making collection development decisions and covers 121 specialties. Each title ultimately chosen for

inclusion is scored on a scale of 0 to 3 on five different collection development criteria: authoritativeness of author and publisher, scope and coverage of subject matter, quality and timeliness of subject matter, usefulness and purpose, and value for money. A score of one indicates that the title is “good” on a particular criterion, a two means “very good,” and a three means “excellent.” These scores are then averaged to give the final overall score. In cases where the book was assigned more than one score because it fell under more than one section of the list in the subject area of interest, the two or more scores were combined and averaged. On the rare occasion where the book was included on the list but not under the subject area of interest, the score (or average of scores) was still recorded. Physical characteristics such as number of pages, number of volumes, illustrations, and size or weight were also examined. Finally, the condition of the books was measured to assess physical evidence of usage on a one to three scale where one represented “like new,” two represented “some usage,” and three represented “heavy usage.”

Overall, the average number of loans of these 160 books was 3.2 times (range 0 to 19, SD=3.4). The average edition number was 3.5 (range 1 to 21, SD=2.9). The average number of pages was 676.8 (range 59 to 2277, SD=446.9). If a book was currently checked out or missing, information pertaining to that book was gathered from the catalog record and previous editions (if available) but certain attributes, such as condition, were undeterminable. Of the total 160 books, 28 (17.5%) were either checked out (24) or determined to be missing (4). 14 of these were from the Nursing subject area, six were from Pharmacology, five were from Radiology, and three were from Surgery. Of those 132 books that were available to be evaluated for their physical condition, 67

(50.7%) were categorized as “like new,” 55 (41.7%) were categorized as “some usage,” and the remaining 10 (7.6%) were categorized as having “heavy usage.” Unsurprisingly, the condition score was significantly related to whether the book had circulated or not ($\chi^2=34.340$, $p<.001$). Finally, of the 58 books (36.3%) that were included on the DCT list, their average score was 2.6 (range 1.6 to 3.0, $SD=0.3$).

The books were also categorized according to their subject matter, whether it was clinical or research oriented and whether it was theoretical or practical. When applicable, the books were also categorized as textbooks, study guides, handbooks, or atlases. And, finally, those books which were heavily illustrated were noted. Of the 124 books that were rated for their clinical or research content, 105 (84.7%) were categorized as clinical while 19 (15.3%) were categorized as research. Of the 109 books that were categorized according to whether they were more theoretically or practically oriented, 98 (89.9%) were rated as practical while 10 (9.2%) were rated as theoretical (one was categorized as both). With regards to type of book, 50 books were categorized according to this dimension with 31 (62.0%) rated as textbooks, 11 (22.0%) rated as handbooks, and six (12.0%) rated as study guides, and two (4.0%) rated as atlases. Lastly, 47 of the 160 (29.4%) books were categorized as highly illustrated.

In examining each of the subject areas individually, patterns unique to a particular area could be evaluated. In the area of Communicable Diseases, the 13 books circulated an average 2.5 times (range 0 to 9, $SD=3.6$). As Table 2 indicates, the books that had the highest usage statistics, represented by more than five loans, were those with the highest average edition number, highest average DCT score, and highest average condition score. Of interest is that those books with the lowest average number of pages never circulated

while those that had many more pages on average circulated at least once or twice and more than five times. We had informally hypothesized the opposite: that those books with the fewest number of pages would circulate more often than those with the highest number of pages simply because of the hassle of carrying around a heavy book. Instead, apparently patrons found heavier books worthwhile checking out. It is possible that those books that were shorter were simply read at the library rather than being checked out; however, those books that never circulated also received the lowest condition score of “like new.”

None of the books that had zero loans were included in DCT’s list. In total, four of the 13 (30.8%) books in the area of Communicable Diseases were listed on the DCT. Of these, one circulated more than five times and the other three circulated less than three times. Therefore, all of the books included on the DCT list circulated at least once. With regards to the clinical/research and practical/theoretical dimensions, six of the Communicable Diseases books were categorized as clinical while three were categorized as research; two were rated as practical while three were rated as theoretical. Finally, eight (61.5%) of the books were categorized as highly illustrated.

Table 2. Communicable Diseases

No. of Loans (No. of Books)	Average Edition No.	Average DCT Score (if applicable)	Average No. of Pages	Average Condition Score*
0 Loans (6)	1.3	n/a	285	1.0
<3 Loans (3)	3.3	2.5	1011	1.0
3-5 Loans (0)	n/a	n/a	n/a	n/a
>5 Loans (4)	1.8	2.8	786	1.25
Overall (13)	1.9	2.6	607	1.1

*where 1=like new, 2=some use, and 3=high usage

The Nursing books exhibited a similar pattern emerged as shown in Table 3. Overall, the 70 books in the area of Nursing circulated an average 2.2 times (range 0 to 9, SD=2.0). Of the books that circulated at least once, the combined average edition number was higher than for those books which never circulated. In addition, the average number of pages by category increased from zero loans to more than five loans. And, finally, the average condition score likewise increased from “like new” among the never circulated books to “2.25” or slightly better than “some use” for books that circulated more than five times. With regards to the average DCT score, 30 of the 70 (42.9%) books purchased in the area of Nursing were included on the DCT list. Of these, four (26.7% of 15 titles) were among the books that did not circulate, fifteen (50.0% of 30 titles) were among the books that circulated fewer than three times, nine (45.0% of 20 titles) were among the books that circulated between three and five times, and two (40.0% of 5 titles) were among the books that circulated more than five times. In other words, although there was no difference in the average DCT score among books that were included on the list by circulation statistics, fewer titles in the category of books that never circulated were on the Doody’s Core Titles list.

Of the 53 Nursing books that were rated as either clinical or research, 48 were designated as clinical and 5 were designated as research. Of the 52 Nursing books that were categorized as being either practically or theoretically oriented, 49 were rated as practical while 3 were rated as theoretical. In general, books that were categorized as clinical were also rated as practical. Interestingly, although only three books were rated as theoretically-oriented, two of these circulated more than five times and the third circulated three times. Similarly, of the five books designated as research-oriented, all

circulated at least twice. These findings suggest that there might be more demand for theoretical and research titles in the Nursing field than originally supposed.

Table 3. Nursing

No. of Loans (No. of Books)	Average Edition No.	Average DCT Score (if applicable)	Average No. of Pages	Average Condition Score*
0 Loans (15)	2.8	2.8	641	1.0
<3 Loans (30)	4.2	2.6	750	1.5
3-5 Loans (20)	4.0	2.7	783	1.9
>5 Loans (5)	3.8	2.8	832	2.25
Overall (70)	3.8	2.7	742	1.6

*where 1=like new, 2=some use, and 3=high usage

All of the books in the area of Pharmacology circulated at least once with an average circulation of 4.8 times (range 1 to 12, SD=3.4). As the number of circulations increased, the average edition number, DCT score, and condition score also increased. The average number of pages of the books that circulated three to five times and those that circulated more than five times was significantly greater than the average number of pages of the books that circulated less than three times, a trend that has been shown in the other subject areas as well. In terms of the DCT score, none of the books that circulated fewer than three times were included on the Doody's Core Titles list. In total, four books in the area of Pharmacology were included on the Doody's Core Titles list. Of these, two (40.0% of 5 titles) were among the five books that circulated between three and five times and the other two (28.6% of 7 titles) were among the seven books that circulated more than five times. In terms of clinical or research orientation, of the 16 Pharmacology titles that were rated, they were evenly split between the two with eight titles categorized as each. However, when rated as being either practically or theoretically oriented, 15 were rated as practical, just one as theoretical, and one as both.

Table 4. Pharmacology

No. of Loans (No. of Books)	Average Edition No.	Average DCT Score (if applicable)	Average No. of Pages	Average Condition Score*
0 Loans (0)	n/a	n/a	n/a	n/a
<3 Loans (5)	3.4	n/a	597	1.0
3-5 Loans (5)	4.6	2.6	845	1.75
>5 Loans (7)	3.9	2.9	702	2.0
Overall (17)	3.9	2.7	713	1.5

*where 1=like new, 2=some use, and 3=high usage

In the subject area of Radiology, the average number of loans was 6.0 (range 0 to 19, SD=4.9). In this area a different pattern emerged. This was in part due to a book that had zero loans that skewed the results. This book was the twelfth edition while the other book that failed to circulate was the third edition. However, books with fewer editions circulated. It is hypothesized that in the area of Radiology, which is a fast changing field, new information is more highly valued than books that have been released multiple times under different editions. In addition, the DCT score was not telling of how many times the books circulated. Only three of the total 27 books (11.1%) in this area were included in the Doody's Core Titles list. Of these three, none were among the 13 books that circulated more than five times. Instead, one was included in each of the categories of zero loans (50.0% of 2 titles), less than three loans (16.7% of 6 titles), and three to five loans (16.7% of 6 titles).

Of all of the titles that were rated as either research or clinically oriented, all were rated as clinical. Similarly, of all of the titles that were rated as either practical or theoretically oriented, all were rated as practical. In addition, the majority of titles were rated as highly illustrated. These findings are consistent with the Radiology subject area

which tends to be a clinical and practical area. Texts that are illustrated are particularly useful to a subject area like Radiology.

Table 5. Radiology

No. of Loans	Average Edition No.	Average DCT Score (if applicable)	Average No. of Pages	Average Condition Score*
0 Loans (2)	7.5	2.7	871	1.0
<3 Loans (6)	2.3	2.7	459	1.3
3-5 Loans (6)	2.3	2.7	552	1.8
>5 Loans (13)	3.1	n/a	512	2.75
Overall (27)	3.1	2.7	535	2.0

*where 1=like new, 2=some use, and 3=high usage

In the area of Surgery some of the same themes are repeated. The average number of loans for books in this category was 2.6 (range 0 to 12, SD=3.1). The average edition number by category increased from zero loans to more than five loans. The average number of pages were significantly greater for books that circulated more than three times than for books that circulated two, one, or zero times. And, finally, the average condition score increased according to the number of times that the book circulated. In terms of DCT titles, 17 titles of the total 33 (51.5%) in the subject area were included on the Doody's Core Titles list. Of these, four (36.4% of 11 titles) were among the books that did not circulate, eight (72.7% of 11 titles) were among the books that circulated fewer than three times, one (25.0% of 4 titles) was among the books that circulated three to five times, and four (57.1% of 7 titles) were among the books that circulated more than five times.

Again, it was difficult to draw conclusions about how the clinical versus research orientation affected circulation since so many of the title in the area of Surgery were categorized as clinical (19 of 22 rated on this dimension). Similarly, of the 22 titles rated

as practical or theoretical, 19 were rated as practical while just three were rated as theoretical in orientation. Interestingly, of the three titles rated as “heavier,” all circulated at least five times. Our original hypothesis that heaviest titles and those with the highest number of pages would not circulate as often as those that were lighter was clearly disproved by this study.

Table 6. Surgery

No of Loans	Average Edition No.	Average DCT Score (if applicable)	Average No. of Pages	Average Condition Score*
0 Loans (11)	2.3	2.3	552	1.1
<3 Loans (11)	3.0	2.6	557	1.4
3-5 Loans (4)	4.5	2.5	924	1.75
>5 Loans (7)	5.1	2.7	854	2.4
Overall (33)	3.4	2.5	663	1.5

*where 1=like new, 2=some use, and 3=high usage

The second part of this study is a comparison of the usage of the e-book collection by year and as compared to the print collection. It was expected that electronic usage would be more popular than print usage and that its popularity would increase over time as the e-book collection was advertised. Particularly since many of the books that the Duke Medical Center Library has chosen to provide in electronic format are reference materials and textbooks, online access seems well suited to this type of use. This allows the user to navigate to the particular section or term that they are interested in quickly and easily without having to make a special trip to the library. Especially because the library is serving not only medical and nursing students but also hospital staff who need to make quick clinical decisions, providing this type of access seems most appropriate to the population.

Electronic access to R2 titles was not purchased until June 2006 and not integrated into the catalog until July 2006 making a full calendar year comparison of usage difficult. In order to account for this discrepancy in time, the 2006 usage data was doubled to estimate a full calendar year worth of usage. Overall, the 16 titles provided by R2 were successfully accessed 632 times in 2006. If this number is doubled to account for the half year they were not yet purchased, this number becomes 1,264 accesses. In 2007 there were 1,770 successful accesses representing a 40% increase over estimated access in the previous year. Of the 16 titles provided by R2, nine (56.3%) titles had increased usage from 2006 to 2007. Of the nine titles that had increased usage over time, 218 users were able to successfully access the titles in 2006. This number was doubled to 436 to account for the discrepancy in time period and compared to the 1,470 users were able to successfully access the titles in 2007 for an increase of 237%. While this type of increase in usage is clearly not sustainable over time, it provides excellent evidence for the increased usage of titles when they are properly advertised and integrated into the catalog.

One title showed no increased in usage between 2006 and 2007 with 31 users successfully accessing the title each year. However, if one accounts for the time discrepancy, this title was actually used with more frequency in 2006 than 2007. And, of the six titles that were accessed fewer times in 2007 than in 2006, overall 426 users accessed the titles in 2006 while 269 users accessed those titles in 2007. If the 2006 figure is doubled to 852, this represented a decrease in usage of 68%. Overall the concurrency turnaway counts or number of users who were turned away from access because another user was already viewing the title were relatively low; however, one title

had a very high concurrency turnaway count of 248 in 2007. This suggests that it might be worthwhile to purchase additional access to this title so that multiple users can access it at the same time. The number of users accessing the Table of Contents tended to be lower than the number of users accessing the full text of the title. This suggests that users are generally viewing titles that they already know about rather than browsing for titles without knowledge of their contents.

The Books@Ovid titles were available for the full calendar year in both 2006 and 2007 making comparison of usage much simpler. Of the 12 Books@Ovid titles compared, all had increased usage between 2006 and 2007. The number of times that the titles were accessed in 2006 was 2,361. Those same titles were accessed a total of 6,350 times in 2007, representing a 169% increase. Again, this type of increase in usage is unlikely to be sustainable over time but it speaks to the possibility of increased usage of electronic titles given adequate advertisement and clearly linkage from the online catalog to full text content.

Of the 28 of titles available electronically through R2 and Books@Ovid, 18 (64.3%) were identified as also being available in print. Many of these (15) were part of the circulating collection while the remainder (3) were held in the reserves collection and did not normally circulate. In order to better understand the usage of these titles by format, print circulation data was collected to be compared with the electronic access data. The three titles that were held in the reserves collection were omitted from the analysis. Table 7 shows each title and its corresponding number of loans and number of views. For all titles except one, the number of electronic access views was higher than the number of print loans. The one title for which print loans exceeded electronic usage is

likely explained by there being a more recent edition of this title available through a different vendor.

In terms of analyzing these data one must remember that the number of print loans is limited by a Duke affiliated user's ability to check out a book for four weeks and renew it up to two times preventing others from using the same title. Electronic access, on the other hand, in some cases permits multiple users to access the same title simultaneously. In addition, the period of time that an individual user accesses a title electronically is substantially shorter than the amount of time that the print book can be checked out providing more opportunity for other users to gain access to the same title.

Table 7. Comparison of Print Circulation and Electronic Access to Titles

Title of Book	Vendor Providing Access	No. of Print Loans	No. of Electronic Views (2006-2007)
Clinical Neurology (2005)	R2	12	137
Cope's Early Diagnosis of the Acute Abdomen (2005)	R2	13	48
Essential Otolaryngology (2003)	R2	17	153
Hurst's The Heart (2004)	R2	0	113
Joint Structure and Function: A Comprehensive Analysis (2005)	R2	9	88
Sensible ECG Analysis (2000)	R2	20	190
Standards, Recommended Practices and Guidelines: With Official AORN Statements (2005)	R2	4	62
Textbook of Substance Abuse Treatment (2004)	R2	20	7*
Essentials of Complementary and Alternative Medicine (1999)	Books@Ovid	22	43
Fluid and Electrolyte Balance: Nursing Considerations (2000)	Books@Ovid	2	72
Lippincott Manual of Nursing Practice (2006)	Books@Ovid	4	3,589
Lippincott's Manual of Psychiatric Nursing Care Plans (2005)	Books@Ovid	6	220
A Manual of Laboratory and Diagnostic Tests (2004)	Books@Ovid	9	229
Nursing Care Plans & Documentation: Nursing Diagnoses and Collaborative Problems (2004)	Books@Ovid	8	651
Primary Care (1999)	Books@Ovid	11	71

*The 2008 edition of this title is available through PsychOnline which may account for the 2004 edition's low usage through R2.

Limitations

Firstly, at the present time the data on e-book usage being provided by vendors is varied and often quite limited. For example, vendors often do not report how much time was spent looking at the books available in electronic format. In addition, it is impossible to know whether repeated access to particular title represents one user reading an e-book over multiple sessions or multiple users accessing that title for only a single

use. In other words, one can only know whether an item was used, not the ways in which it is being used and by how many unique people. In some cases a view of an electronic title may be the equivalent of a user picking a book off the shelf, flipping through it, and returning it to the shelf. At the same time, print book circulation statistics are themselves limited. Similar to electronic access statistics, one does not know that a book checked out was read cover-to-cover or simply browsed or perhaps only glanced at. We assume that books that are checked out will be used but that is not necessarily the case. In addition, because Duke's Medical Center Library has open access to its stacks, patrons are potentially reading books in the library and not checking them out. Consequently, this usage is completely missed by standard circulation statistics. Since both electronic access and circulation statistics are limited, their usefulness is limited; however, in the absence of more precise measures of usage, they provide some basic data for comparison.

Conclusions

This study is a first step toward choosing and assessing a number of select metrics to be gathered each year going forward to assess the progress and health of the Duke Medical Center Library's book collection using the balanced scorecard approach. There is a particular interest in examining book usage by format given the increasing investment libraries are making in electronic books over and above their print counterparts. There is also interest in evaluating the usage of print titles being purchased to inform collection development decisions in the future. Ultimately, this study provides useful information on both which print books circulate and how book format impacts the frequency with which patrons access books in the library's collection. These baseline

data will be compared to usage statistics going forward to assess the growth and development of the collection's usage.

This study can help libraries, medical libraries in particular, make collection development decisions about which print books and which e-books to purchase access to in order to best serve their patrons and allocate funds most appropriately. If in every case the electronic title has more usage than its print equivalent as this study showed, is that sufficient evidence that electronic access should become the format of choice in making future purchases? Particularly in the medical field where decisions are often being made at the point of care, it seems evident that electronic access is highly valued and utilized. However, there may still be a place for print books. As showed by this study, books that had more pages and higher edition numbers tended to be the books that circulated more often than books with fewer pages and lower edition numbers. There are clearly some established print textbooks that are useful to patrons. For the Duke Medical Center Library, this study provides essential baseline data on which books are being used and in what format. Particularly in the current economic situation, book purchases must be carefully weighed based on the best evidence for their value to users. It is hoped that this study provides some of the evidence necessary to inform future collection development decisions.

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