Ch 4 - Coll Eval -
Use - centered

The
Measurement
and
Evaluation of
Library Services

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CHAPTER

4

COLLECTION EVALUATION: USE-CENTERED APPROACHES

Like all methods of collection evaluation, use studies have been both criticized and praised by librarians. How valuable an analysis of use will be to a library depends on the library's purpose—that is, on the needs of its users. These needs should be reflected in the library's mission statement. Consider the mission of a hypothetical public library:

The Marion Public Library's primary mission is to provide the most wanted materials in sufficient quantities to meet the needs of its patrons in a cost-effective way. Its secondary mission is to provide access, through interlibrary loan, to other materials needed by patrons.

The ultimate test of the quality of this library's collection will be the extent and mode of its use. Most public, school, and special libraries, as well as some college libraries, will be interested in measuring use, because use reflects a primary purpose for their existence.

Librarians in institutions whose major purpose is to promote research are much more ambivalent about use studies. More than 10 years ago, Kent et al. (1979) showed that many books at the University of Pittsburgh library had never been used. Some librarians believed that the implications were simple: in these times of rising costs, even academic librarians need to pay more attention to providing what users want and less attention to purchasing esoteric materials that few patrons are expected to ever use. Other librarians, however, thought the Pittsburgh study was based on an erroneous assumption: that the quantity of use of a research library is important. For instance, Schad (1979) admitted that instructional use of a research collection is characterized by the intensive use of a small body of current materials, often requiring the purchase of multiple copies to meet student demand. But he argued that research use is

characterized by much less intensive use of a vast body of material. . .scholars must sift through extensive numbers of books, journals and other sources. Sometimes hundreds of volumes must be examined to determine whether or not they contain relevant material. A great deal of interlibrary borrowing for this kind of work is not practical, if for no other reason than cost. What this means is that collections that fall below a certain level inhibit research. (p. 62)

In other words, Schad believed that a research library's main goal is to promote high-quality research, rather than to circulate a lot of material. Today, more than a decade after the Pittsburgh study was published, the value of measuring use in research libraries still is debated.

As discussed in Chapter 3, the most valuable collection evaluation efforts use a variety of techniques to measure both the nature of the collection and its use. Combining studies helps overcome the disadvantages of any one method.

For instance, some measures of use, such as circulation, are imperfect. Knowing that a patron checked out a book does not indicate whether he or she actually read or enjoyed it. Use studies tell little about what the patron wanted but could not find. Moreover, they only record the behavior of people who currently use the collection; they give no information about the type of collection that might convert nonusers to users.

Proponents of use studies argue that circulation and other indicators of use are valuable measures. Circulation does not tell whether patrons read or enjoyed their books, but it does indicate that they were interested enough in the subject, author, or title to think they would read or enjoy their selections. Moreover, Baker (1983) found that patrons overwhelmingly report that they find useful and enjoy the materials they check out from the library. Studies of recorded use can be supplemented by studies that focus on nonuser needs or identify materials that the patron wanted but could not find. And use studies are versatile; libraries of all sizes and types can use them to evaluate all kinds of collections or subsets of collections.

The main reason that libraries have relied increasingly on studies of use is that mistakes in collection development are costly. Librarians may spend large sums of money buying, processing, and storing items that will never be used. They might also lose patrons if enough copies of the right items are not available when wanted or if needed titles have been stored, in an attempt to save money, in a building that is not readily accessible to patrons.

Saving funds by improving collection development is of particular concern today because librarians are more aware that recorded use in many libraries is low. Evaluators have documented repeatedly that most library items have not been used during some specified time. This is particularly true in research libraries, which aim for comprehensive, rather than heavily used, collections. For example, Nothiesen (1960) found that 60 percent of the serials held in the John Crerar Library in Chicago did not circulate at all during a one-year period

Number of Circulations	Number of Books	Percent of Total Books
0	702	36.9
1-5	951	49.9
6-10	166	8.7
11+	85	4.5
Total	1,904	100.0

NOTE: The total number of circulations was 4,556. Therefore, the average circulation per book was 4,556/1,904 = 2.4 times in the 5-year period.

EXHIBIT 4-1 Five-year circulation of a select sample of DePauw University books. Reprinted from Hardesty (1981), courtesy of Ablex Publishing Corporation.

and 25 percent of the total journal titles (not individual issues) were borrowed only 1-5 times each. Fussler and Simon (1969) discovered that, of a sample of monographs purchased by the University of Chicago Library from 1944 to 1953, more than half did not circulate during the following five-year period. In the Pittsburgh study, Kent et al. (1979) found that only 52 percent of newly purchased monographs circulated at all during a seven-year period.[1]

There is growing evidence that the pattern of low overall use of individual titles exists in many nonresearch libraries as well. Hardesty (1981) found this to be true in a small liberal arts college with a goal of collecting material to support instruction. He drew a large sample from the list of books acquired at DePauw University during a six-month period from late 1972 to mid-1973. He then examined circulation records for a five-year period. As Exhibit 4-1 shows, more than a third of the books never circulated and another half circulated between one and five times during that entire period. The average circulation for the entire five-year period was only 2.4 times, or 0.5 circulation annually. These findings parallel those of Ettelt (1978) and Hostrop (1966). Each observed circulation in small college libraries for more than one year and discovered that more than 70 percent of the titles owned did not circulate. At the Washington State Library, 50 percent of the collection did not circulate during a 35-month period (Reed, 1979). Almost 40 percent of current periodicals in a law library were not used during a one-year period (Goldblatt, 1986). This pattern of use—

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[1] In a few libraries, the data reveal higher levels of use. For example, Chrzatowski (1989) found that only 24 percent of the journals subscribed to by an academic chemistry library were used two or fewer times in a six-month period; only 9 percent received no use. Presumably, these higher use libraries have carefully analyzed patron demands and determined how best to meet them.

a small part of the collection used intensively and other parts used at a low level—may also be true for other types of libraries, but few data have been collected.

One basic assumption underlies evaluations of collection use: that past use is a good predictor of present or future use. Although Line and Sandison (1974) expressed doubt on the validity of this assumption, much evidence supports it, going back at least to the classic study by Fussler and Simon (1969). There is a considerable built-in inertia associated with large communities. In a university, courses change or disappear and new courses, or even entire programs, emerge. Nevertheless, in terms of the entire university environment, these changes are relatively insignificant. Kent et al. (1979) verified this when they showed that a 3-day use study at the University of Pittsburgh yielded results on the subject distribution of items in circulation equivalent to their 86-month study. Metz and Litchfield (1988) also confirmed, in a study at the Virginia Polytechnic Institute and State University, that the stability of use patterns greatly exceeded the change. This principle also is true in public and school library environments. Interests change but very slowly. Changes likely to significantly affect the use of a collection occur over a long time. Only in the case of special libraries in industrial organizations, especially those heavily involved in short-term contract work, do significant changes of direction occur quickly. And even here, radical changes are likely to be the exception rather than the rule.

In a major study of circulation records, Fussler and Simon (1969) tried to determine whether they could accurately predict how often groups of books with defined characteristics were likely to be used in a research library. If it was possible to determine this, the library could store infrequently used books in a less-accessible, less-costly facility. Fussler and Simon based their study on large systematic samples drawn from the shelf list of the University of Chicago library in two diverse subject areas: economics and Teutonic literature and languages. They also drew smaller samples from many other subject areas. They sampled 9,058 monographs, observing the use of all copies of each title. For serials, they examined the use of all copies of each volume. For each item, they reviewed records of past circulation for the period from 1954 to 1958, as well as the item's language, publication date, and accession date.

Fussler and Simon found that present circulation could be readily predicted on the basis of past use. When circulation records were not available, it was possible to predict use, although less accurately, on the basis of characteristics of the books themselves, the most important predictors being age and language. Use diminished as a title aged, rapidly at first then leveling off (books more than 100 years old circulated about as much per title as those 70–100 years old). The main language of used items was English.

Fussler and Simon attempted to predict accurately the use of items under three different scenarios: (1) when no record of past use was available, (2) when a record of use for 5 years back was available, and (3) when a record of

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2 Fussler and Simon's storage rule is as follows: based on publication date alone, the oldest 25 percent of the collection would be retired; based on publication date and language, more would be retired from the less-used languages.

use for 20 years back was available. They found that language and publication date could identify the 25 percent of the economics collection likely to be used least in the future. If the library applied these criteria, then the 25 percent of the economics collection retired to storage would account for only 3 percent of the collection's total future use. Each title retired to storage would have an average use probability of once every 35 years.[2]

Predictions of use based on age and language were more successful in the scientific disciplines than in the humanities, where use was less dependent on these factors. For example, if the same rule was used at the University of Chicago to retire 25 percent of the books in Teutonic languages and literature, the retired portion of the collection would account for 12 percent of the collection's total future use.

The accuracy with which use can be predicted increases considerably when records of past use are factored in. For example, if, in addition to the rule for language and publication date, no book that has been used in the preceding five years is sent to storage, then the 25 percent of the economics collection with the lowest predicted use would account for only 2 percent of the total use in this subject field. The corresponding figure for the Teutonic collection would be 5 percent. When 20-year use records were available, prediction of future use was even more accurate and language and age characteristics were of little value. If the 25 percent to be retired in either the economics or the Teutonic collection was determined on the basis of the 25 percent least used in the preceding 20 years, then the retired portion of the collection would account for only 1 percent of the total use, and it could be expected that, on the average, each monograph would be requested only once every 100 years.

For serials, Fussler and Simon found it most effective to retire the oldest volume of a particular journal, proceeding consecutively until a volume is reached that shows a specified level of use within a set period of time, such as the last five years. This use-based retirement rule is more effective than one based solely on language and age.

Fussler and Simon's primary finding, that the average item's past circulation could accurately predict its future use, has been verified in all types of library settings. For example, Eggers (1976) examined all books returned at a small library in Iowa and found that 93 percent had circulated in the previous year. Slote (1970) noted a similar pattern after examining the circulation of adult fiction in five public libraries, as did Ettelt (1985) when examining use records in a college library. Brooks (1984a, 1984b) worked with data from academic and public libraries and showed that past circulation can forecast the future overall

circulation for a library—information that can be used by administrators for long-term planning and resource allocation.

The remainder of this chapter focuses on studies that analyze circulation and interlibrary loan records to determine their use. It describes how to use the information for a number of very practical purposes, like deciding which subjects to emphasize in future buying, how many duplicate copies to purchase, and which material should be weeded or stored. Other types of studies also are relevant to use of the collection; the methodologies for these are complex enough and the literature sufficiently extensive that they receive separate treatment. Methods of evaluating in-house or nonrecorded use are discussed in Chapter 5, and ways to assess fill rate or shelf availability are covered in Chapter 6.

ANALYZING RECORDS OF USE

The two types of use data that libraries utilize most often in collection evaluation are records of interlibrary loan borrowing and circulation. The first reflects unmet demands, and the second reflects met demands.

In the simplest type of evaluation, the library examines interlibrary loan records to see if the demand falls within the scope of its collection efforts. For example, a small public library may request, on interlibrary loan, a dissertation on Latvian politics for one of its patrons. Because the library's primary mission is to buy popular materials for community residents, however, it will not add the dissertation to its collection. But some materials borrowed on interlibrary loan should be in the collection. The same library could notice that its patrons are filing interlibrary loan requests for Erma Bombeck's latest book. The library may have neglected to purchase this title or may not have purchased enough copies to meet patron demand. Because current in-print titles make up a substantial percentage of interlibrary loan requests (Stevens, 1974; Trevvett, 1979), some libraries routinely screen requests to identify particular items for purchase and to identify the types of new materials patrons want.

Interlibrary loan records can be broken down in various ways. In one early and fairly typical study, Graziano (1962) examined interlibrary loans over a three-year period at the science library of Southern Illinois University. He tabulated loan requests by department and degree program, comparing the number of interlibrary loans to the number of students and faculty in each area. This type of analysis allows a library to see if some group of users is making more frequent use of interlibrary loan, which might indicate that the collection in this area of specialization needs strengthening. Graziano also analyzed interlibrary loan requests by format (for example, books, theses, and serials) to determine any deficiencies.

Brown, Miller, and Pinchoff (1975) tabulated interlibrary loan requests by mode of request (for instance, telephone versus letter), time taken to fill the loan, and number and type of unfilled loans. The library also collected information on the language of the request, the status of the borrower (for example, student or faculty), and the age and format of the requested item (for example, journal article versus monograph).

A university library in Scotland analyzed almost 2,500 interlibrary loan requests (Roberts and Cameron, 1984). The evaluators marked each request with 1 of 37 subject codes reflecting the teaching and research interests of the university. They recorded the borrower's status and department, the number of days taken to fill the request, and the age of the requested materials. One purpose of this study was to determine the feasibility of purchasing materials requested on interlibrary loan. The evaluators discovered that the materials requested were actually good candidates for purchase. They were frequently low priced, in print, and recently published; in fact, more than half of the requested materials had been published within the previous six years.

Pritchard (1980) tried to determine whether materials requested on interlibrary loan represented a transient user demand. Of 114 books requested on interlibrary loan in this medical school library, only 9 had been purchased. Pritchard compared the 105 monographs that were not purchased against the teaching and research program of the school. Forty-five percent appeared to be at least as relevant to the program as the nine titles that had been purchased. Further analysis showed that the books originally requested on interlibrary loan and eventually purchased had circulation ratios comparable with titles selected by library staff.

Increasingly, computers are handling interlibrary loan activities. The statistics generated from this automation make data tabulation easier. For example, a health sciences library in New York used to compile interlibrary loan statistics manually—a time-consuming process that resulted in numerous inaccurate data reports. The library developed a COBOL-based computer program to generate a variety of statistical reports that break down interlibrary loan information into various categories to improve collection development and overall user service (O'Connell and Miller, 1977).

Although records of interlibrary loan borrowing are valuable, they constitute a small percentage of total library use. As a result, most libraries focus on circulation records, which are easily collected and readily understood by the library's funding authority. The numbers most often reported are total circulation, circulation per volume owned, or circulation per capita. This information shows whether use is increasing or decreasing from year to year and can form a basis for comparing a library's performance with that of similar institutions.

Circulation can be broken down by various user characteristics, such as departmental affiliation, occupation, or grade level, to discover who is borrowing what. This can easily be done in an automated environment if a machine-readable file is maintained that links user identification numbers to various user characteristics. It can also be done manually by surveying or interviewing

users or by analyzing circulation cards that hold the information. The circulation card at the University of Iowa asks users to record the book's call number, author, and title before writing in their name, address, and status (undergraduate, graduate, or faculty). Such information is tallied to "identify use patterns among subpopulations, thus pointing out materials that are underutilized by certain groups. This information allows the librarian to develop and implement plans to enhance awareness of [materials] in different segments of the user population" (Cook, 1985, p. 223).

As Weech (1978) noted, most studies of this type concentrate on a comparatively narrow group of users. For example, Ray (1974, 1978) tried to determine who uses map collections, and several other authors scrutinized patrons of government documents collections (Cook, 1985; Hernon, 1979; McCaghy and Purcell, 1972). Departmental libraries, whether divided by subject (for example, psychology) or format (such as audiovisuals), also could benefit from such an analysis, as could many small libraries. Picture the library at a company that manufactures rolled oats. If the librarian knows the extent to which various departments, such as research and development, purchasing, or distribution, use the collections, he or she can identify areas that need to be augmented for potentially high use or examined for flaws due to low use.

More complicated breakdowns of circulation statistics, generally by the item used, also are valuable. Stieg (1943) conducted one of the earliest such studies at Hamilton College. Basing his analysis on circulation records for three consecutive academic years, he was able to show the effect of subject matter on circulation, the effect of publication date on circulation, the proportion of titles that circulated *n* times in an academic year, and the proportion of titles that circulated in all three academic years. Librarians since Stieg's time have continued to analyze circulation by subject and publication date, although they have also tried to determine the effects of other variables on use. And, like Stieg, evaluators have tried to identify the most-used and least-used titles in an effort to improve current collection development practices.

In an automated environment, librarians can accumulate circulation records over a period of years in a machine-readable archive. A properly designed system will have a built-in management information component capable of gathering and formatting the necessary data continuously as an inexpensive byproduct. Libraries that lack automated circulation systems will need to manually sample circulation data for subsequent analysis. Jain et al. (1967) originally discussed three methods for sampling (circulation, shelf list, and stack samples); Trochim (1980) and Trochim, Miller, and Trochim (1985) tested these to determine whether they would yield comparable data and whether one in particular was easier for libraries to use. In general, evaluators taking a circulation sample examine all books checked out from the library during a specified time. Two forms of collection samples exist: one taken from the shelf list, the other from the books on the shelves at a given time. In each case, the evaluator gathers information on past use from a representative sample of the total collection. These methods all presuppose that the library maintains some record of how often a particular book has been borrowed, generally by recording on book cards or date labels affixed inside the books the date on which the borrowed books are due back in the library.

When Trochim compared the three methods, she found that

- Information for both the circulation sample and the stack sample needs to be collected on representative days over a fairly long time (six months to one year). The circulation sample collects information on the books absent from the collection and the stack sample on books present in a collection at any one time. The long sampling period counteracts the fact that use and nonuse vary, depending on the time of year in which the study is conducted.

- The shelf list sample is the most difficult to implement, since it requires that staff sample the shelf list, then locate the sampled item in the stacks. If the item is not present, staff must also file a reserve or recall request. The stack sample is the easiest to perform because all the books are present on the shelf when the sample is taken.

- The circulation sample can be collected as part of other circulation desk tasks, such as checking out materials or collecting daily circulation statistics. Although additional staff do not have to be hired, the sampling procedure may slow the circulation process.

- The stack sample will be slightly weighted toward books that are used less, and the circulation sample will be slightly weighted toward books that are used more. Libraries should use the sample that best meets their purposes. For example, the circulation sample will help identify the currently used sections for librarians who want to know which items to mark first for theft-detection systems or which to convert first to machine-readable form when automating the circulation system. The shelf sample will help identify little-used sections to aid with weeding or selection of materials for storage.

- Evaluators may consider a combination of the circulation and stack samples if there is adequate staff to carry out both and if the library wants a great deal of information about collection use.

If complete records of past use are not readily available, as when a card with circulation information is replaced and only the last few circulations are shown, knowing the last circulation date of an item will enable fairly accurate predictions of use (Trueswell, 1964, 1965, 1966). But some libraries, because of the circulation system used, have no records of past use in the book. These libraries may use the spine-marking method described by Slote (1982). The procedure is fairly simple. Beginning at a preset date, the circulation staff applies

two self-sticking dot labels to the spine of every volume as it circulates. The first dot shows the book has been used; the second is a check to improve the reliability of the system, by preventing the loss of information in case one of the dots should fall off or be removed. Staff members conduct another reliability check by examining every volume that is checked in or placed on a reshelving cart; if the item is not already marked, two dots are applied to the spine. In the early stage of marking, this procedure will catch volumes that were already in use when the spine-marking method began. Ideally, the dotting procedures are followed for at least one year.

Spine marking can inexpensively identify those items that are used currently and, therefore, most likely to be used in the future. As such, it can be a very effective weeding tool (Shaw, 1978; Williams, 1986); indeed, it was designed for this purpose. It can also be used in studies of in-house use (see Chapter 5). Nevertheless, it does, have one obvious limitation. Although it identifies items that are used, it tells nothing about the amount of use each item receives. The librarian cannot distinguish between an item that circulated once during the last year and one that circulated 20 times; both are marked by two spine dots. This problem can be overcome, although at some cost in time, if circulation staff places a hash mark inside the front cover of the book each time it is used during the study period. If this practice is followed, the spine-marking method can be used for purposes other than weeding.

Evaluators can use data from interlibrary loan and circulation records in a number of practical ways. For example, evaluators can identify types of items and specific items that are likely to be used or not used. Librarians can then change initial and follow-up selection patterns so that more books that are likely to be used are purchased. For example, librarians can buy more duplicate copies of individual books and authors that are likely to be in great demand or can concentrate purchases on subjects that patrons have used heavily in the past. Evaluators can also obtain data that indicate the most effective ways to arrange and promote collections. This information can help libraries meet their goals and improve user satisfaction with the collection. Finally, evaluators can identify a core collection of items likely to satisfy some specified percentage of all circulation demands within the near future. Middle management can use this information to make various decisions, such as which items to weed or store or which items' records to convert first to machine-readable form when the library automates its circulation system.

IDENTIFYING MATERIALS THAT ARE LIKELY TO BE USED

Several studies verify that materials selected by librarians who have studied their clientele and examined past patterns of use in their libraries are used more than those selected some other way. For example, in academic libraries, librarians

select more heavily used titles than do teaching faculty. Both librarians and faculty select items that circulate more than materials given to the library or ordered through a blanket-approval plan (Diodato and Diodato, 1983; Evans, 1969; Evans and Argyres, 1974).

The difference in choice of materials is related to the amount of public service contact the selector has. Turow (1978) asked selectors of children's books in a public library whether "a general impression of what children want" was an important factor in their choice. Ninety-one percent of branch librarians, all of whom had daily contact with their patrons, thought this criterion was "very important." None of the system coordinators, who had no public service duties but were responsible for purchasing books for branches without children's librarians, rated this criterion as more than "somewhat important." In an academic library, Evans (1969) found that public service librarians routinely selected a higher percentage of titles in demand than their nonpublic service counterparts. Both studies imply that public service librarians, through observation of use patterns, have gained knowledge of what patrons are likely and not likely to use.

This knowledge may be related to specific characteristics of the items that have been shown to affect use. These include the age of the item, the language in which it is written, the current or expected popularity of its author or title, its general subject, and its degree of subject specificity.

Age

Researchers have repeatedly shown that the age of an item affects its use, regardless of category, although the rate of aging may vary from area to area. The overall rate of obsolescence in the social sciences is similar to that of the sciences as a whole (Van Styvendaele, 1981) and much higher than in the humanities (Griscom, 1983; Longyear, 1977; Soper, 1972). On the average, however, a book's circulation declines very quickly within three to five years after its addition to the library (Ettelt, 1978; Hardesty, 1981; Middleswort, 1951; Raisig et al., 1966). Brown, Miller, and Pinchoff (1975) found that materials less than five years old accounted for the bulk of interlibrary loan borrowing in a health sciences library. This is not surprising since most patrons want current books, especially in the case of nonfiction. Also, a major factor in book choice is simply knowing that the work exists; new books tend to receive more publicity than old ones. There are obvious implications for libraries interested in maximizing use of items. Works should be purchased when they are fairly new and processed quickly for the collection. Librarians considering replacing a worn and dated book with a newer copy of the same book should determine whether past use records justify the purchase, because an older book is likely to be used less than a new and different book. There are obvious exceptions to the age rule, such as the classics and books that regain popularity after the release

of movies that are based on them, but these situations are easily handled on an individual basis.

Age also affects the use of serials. As Griffith et al. (1979) noted, the aging rate varies among journals, based on the subject area, what the journal is used for, and the user community. For example, science journals that support a research front age quickly; journals that receive intense use by a diversified audience age faster than those that receive diffuse use by a specialized audience. Selectors can use information on aging patterns to help make decisions such as those relating to the purchase of back runs of a journal.

Language

Even in academic settings, patrons check out or borrow on interlibrary loan many more items written in their native tongue than they do materials written in other languages. For example, Heussman (1970) found that 95.5 percent of the circulation in two seminary libraries in the United States was of English-language materials. The percentage of such materials borrowed on interlibrary loan in academic libraries in the United States ranges from 67 percent to 99 percent (Stevens, 1974). Ninety-eight percent of the social sciences materials requested from the (British) National Lending Library were written in English (Wood and Bower, 1969). More than 80 percent of the loan requests submitted to the Information Dissemination Service, serving the needs of health professionals in nine New York counties, were for English-language materials (Brown, Miller, and Pinchoff, 1975). Libraries interested in maximizing use will not want to allocate a large part of the budget to the purchase of foreign-language materials.[3]

Current or Expected Popularity of a Title or Author

Librarians have always purchased items appearing on best-seller lists or works by authors with a popular following because patrons have repeatedly requested these materials. During the last two decades, some librarians have begun to purchase more multiple copies of these works to improve the likelihood of meeting patron demands. Exactly how much need is there for duplication in most libraries? Evaluators have not explored this subject extensively; however, a few preliminary studies show that duplication is desirable.

Moreland (1968) found that 25 percent of a particular library's patrons were dissatisfied with the services they received. Of these, 65 percent were unhappy because they could not get the books they wanted when they wanted them. The library decided to increase the rate of duplication for popular titles. Eleven

[3]Because of the present dominance of English in scholarly materials, particularly in the sciences, this overwhelming concentration of use on materials in the vernacular may be much less true for non-English-speaking countries.

participating branches identified 122 titles that were thought to be in continuous demand. Most of the titles were modern classics. Staff in each branch regularly checked the shelves to verify that at least one copy of each title was always available for patron checkout. The branch added more copies each time patrons had checked out all copies of the item. Over the 11 months of the study, librarians at the 11 branches purchased a total of 21,821 copies. They bought an average of 16 copies of each title at each branch, a much higher rate of duplication than normal. Today, heeding the lessons of this experiment, many public libraries are purchasing many more multiple copies initially to ensure that patrons have an excellent chance of finding what they want on library shelves. One demand-oriented library, the Baltimore County Public Library in Maryland, has purchased more than 700 copies of a single best seller to be used at 22 branch libraries (Rawlinson, 1986).

Other types of libraries also need to duplicate materials. In academic libraries, Simmons (1970) examined the circulation of books in a single semester at the University of British Columbia. He identified more than 2,000 books for which the level of demand seemed to justify the purchase of additional copies. Metz (1980) found that a substantial number of items owned by university libraries and sought by patrons were checked out to other users, suggesting that some duplication is needed. A five-week study at the University of Tennessee at Knoxville pinpointed reasons why the items patrons wanted were unavailable: 71 percent were checked out to other users (Smith and Granade, 1978).

Evaluators can study duplication needs for items other than books. Goldblatt (1986) measured the use of 770 journals in a law library. She determined that patrons used certain types of journals frequently, such as law school reviews from U.S. schools, and infrequently used others, such as law school reviews from foreign schools. She compared the costs per use of buying each type of journal and revised purchasing patterns as a result; she also identified specific journal titles that patrons used heavily. After reviewing cost figures, Goldblatt determined the level of use that justified a second subscription. She used this information to order duplicates of some titles and to cancel the second subscription of others.

Some evaluators consider information on unmet demands when determining how much duplication is needed. Many librarians automatically order duplicate copies any time the number of reserves reaches an unacceptable level—say, three or more. Evaluators also can use interlibrary loan figures to identify journals from which patrons request more than some given number of articles per year. Data on in-house use can aid in determining how much duplication is necessary, as is discussed in Chapter 5.

Automated circulation systems enable evaluators to quickly collect information about which items should be duplicated. Because each item in the system must carry a unique identifying number, librarians can readily identify the items that are most and least used. This information can form the basis for duplication

and future purchase decisions or, for that matter, for decisions to retire materials altogether.

Some libraries with manual circulation systems identify heavily used titles that should be duplicated by taking a sample of the circulating titles. Because the issue of interest is items that are used, it is better to take a circulation sample than a collection sample. Unfortunately, any sample will fail to identify all titles that need duplication. A better solution is to have circulation staff quickly examine each item being returned to the library during some specified time period, say six weeks, and count the number of times it has been checked out during the last year.

All these methods can be used to relate the number of days a book is out on loan to the total number of days the library is open. If the library is open 280 days a year, then circulation for a particular item can be expressed in terms of the number of days the item is absent from the shelves, say, 190/280. This represents the probability that this item will be off the shelves when looked for by any user. Circulation data for two copies of a particular title are combined and related to a potential availability of 560 days. Data for items available in three or more copies are handled similarly.

In cases where the library does not have an automated circulation system, it is necessary to estimate the number of days a particular item is out. Because at least one study (Buckland, 1975) showed that patrons tend to return books when they are due, evaluators can use the length of the circulation period to estimate the length of an item's absence from the shelves. Therefore, if a library is open 360 days a year and a book with a 4-week (28-day) loan period is checked out twice during that year, the book can be expected to be off the shelves for about 56 days (2×28).

The library then has to decide subjectively at what level titles will be duplicated. In the last example, the book was unavailable 15 percent of the time (56/360 days). Perhaps this is acceptable. But is 30 percent acceptable? What about 50 percent? Various factors affect a library's decision about when to duplicate and when not to. For example, a cheap book may be duplicated more readily than an expensive one. The cost of processing may also be factored in, as may the ability of a library to take some alternative action, such as reducing the length of the loan period, to increase a particular title's availability.

It is also a good idea, although it appears to rarely be done, to identify authors likely to be heavily or poorly used. Librarians working with automated systems could link the records of each title by the same author and determine an average-use rate for all the author's books. In a manual system, a clerk could average the number of circulations per item for authors thought to be popular or for which the library owned more than some given number of titles. If this average is high, the library could purchase more multiple copies initially, a practice increasingly followed at demand-oriented public libraries. Selectors should also identify, whenever possible, authors whose works have

been purchased repeatedly in the past but that have received little use. Predicting future use of individual items is not easy, except for titles that are very esoteric or of blockbuster potential. Libraries that have used these techniques, however, to identify currently owned titles that are heavily used and to base initial purchasing decisions on factors relating to whether a book is likely to be used, have been very successful with their patrons. For example, the Baltimore County Public Library successfully met user demands for 86–97 percent of specific known-title requests (Engel, 1982). This is significantly higher than the 50 percent availability rates obtained by most libraries (Kuraim, 1983). The library's centralized selection staff, assisted by a team of public service librarians, did this by consistently and systematically identifying and purchasing authors and titles likely to be in demand and correcting inadequate purchasing by adding duplicate copies where needed.

Subject

The subject of the item also affects its use. McGrath (1972) used the classified profile approach, described in Chapter 3, to relate books used to the subjects taught at two very different academic libraries, the University of Southwestern Louisiana and the South Dakota School of Mines and Technology. He matched book classification numbers to catalog offerings to create a classified profile of courses taught. Patrons were more likely to check out or use in-house books with classification numbers that matched the course profiles. In a later study, McGrath, Simon, and Bullard (1979) used this approach to determine to what extent graduate and undergraduate students borrow books outside their own disciplines. Jenks (1976) improved the approach by supplementing circulation information for each class with information on the number of students in each department so that he could factor in the effects of large and small enrollments before making collection development decisions. This type of subject analysis is appropriate for community college and school libraries as well as for universities. The reader is referred to Chapter 3 for a complete discussion of the advantages and disadvantages of the classified profile approach to collection evaluation.

Libraries of all types can use simple subject analysis to determine whether the use of or demand for each subject class is rising or declining month by month and year by year. Evaluators can express the rise or decline of a class in terms of a percentage of the total circulation or in terms of the proportion of books existing in the class that are on loan at any time. McClellan (1956) used the latter method in a completely manual environment. On a specified day of each month, he counted more than 150 subject categories to determine how many books were on the shelf and how many were in circulation. Over time, evaluators can observe trends in collection use by this simple method and can identify rising and declining classes. Automated circulation systems allow evaluators to continuously gather data of this type.

Knowing the absolute use of portions of the collection is important, but Jain et al. (1967) correctly noted that relative use is more important—that is, the amount of use actually received compared with the amount of use expected. Suppose that mathematics occupies 12 percent of the total collection of a science library and that geology occupies 9 percent. One would expect that mathematics would receive 12 percent of the use and geology 9 percent of the use. Geology, however, might account for 15 percent of the current circulation and mathematics for only 6 percent. Mathematics would be an underused class and geology an overused class in this library.[4]

An underused class is one whose contents seem to exceed present user needs. A heavily underused class may contain items that are no longer current. Librarians should weed this class to eliminate out-of-date materials and should strengthen it by purchasing newer titles and editions. Underuse also occurs when a library buys the wrong books, especially ones that are too technical or too theoretical for its clientele. Selecting materials more attuned to the user population should correct this. Underuse may also indicate a subject for which interest is declining in the user community. If this is the case, librarians should greatly restrict purchases in this area. When Mills (1982) evaluated the use of the film center at the University of Illinois, he found a fourth type of underused class, containing items "which are categorically different in some way from the bulk of the collection. Seasonal films, films about holidays, and feature films are all examples of films which may appear to be underused when a collection is analyzed in this fashion" (p. 7). As Mills noted, it is inappropriate to compare the use of these kinds of films to the standards of use set by the rest of the films in the collection.

An overused class is one that seems to need strengthening. Because the present use exceeds expectations, the danger exists that the class is not strong enough to support existing and future demands of users. The more overused a class, the lower the probability that any particular book will be on the shelf when sought by a user. When books are absent from the shelves, most of the users looking for specific titles leave dissatisfied (Hitchingham, 1976), although a small number will file interlibrary loan requests for the materials (Aguilar, 1984). Librarians can strengthen overused classes by purchasing new titles or purchasing duplicate copies of titles known or expected to be in great demand.

Evaluators can easily exploit an automated circulation system to obtain data comparing actual use versus expected use. Exhibit 4-2 presents an example of this type of data from the library at the Goddard Space Flight Center. For each Library of Congress class number, the exhibit shows the total number of

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[4] Interpretation of relative-use data of this kind requires caution. The data simply indicate a deviation from expected behavior; they do not explain why the deviation exists. The librarian must carefully scrutinize heavily overused and heavily underused classes to determine what corrective action to take.

	Total Holdings		Circulation Year			
			1976		1977	
HF1001	1	0.00%	0	0.00%	0	0.00%
HF1002	1	0.00%	0	0.00%	0	0.00%
HF1007	2	0.00%	0	0.00%	0	0.00%
HF1017	1	0.00%	0	0.00%	0	0.00%
HF1042	2	0.00%	0	0.00%	0	0.00%
HF1231	1	0.00%	0	0.00%	0	0.00%
HF1253	4	0.00%	0	0.00%	0	0.00%
HF1455	4	0.00%	0	0.00%	0	0.00%
HF3002	1	0.00%	0	0.00%	0	0.00%
HF3007	6	0.00%	0	0.00%	0	0.00%
HF3010	4	0.01%	0	0.00%	0	0.00%
HF3031	1	0.00%	0	0.00%	0	0.00%
HF5351	2	0.00%	2	0.02%	2	0.02%
HF5353	2	0.00%	0	0.00%	0	0.00%
HF5371	3	0.00%	0	0.00%	5	0.04%
HF5381	3	0.00%	1	0.01%	0	0.00%
HF5381.7	1	0.00%	0	0.00%	1	0.01%
HF5382	4	0.00%	0	0.00%	0	0.00%
HF5382.5	1	0.00%	0	0.00%	0	0.00%
HF5383	3	0.00%	3	0.02%	4	0.04%
HF5386	5	0.00%	4	0.03%	12	0.11%
HF5415	4	0.00%	2	0.02%	0	0.00%
HF5415.1	1	0.00%	0	0.00%	0	0.00%
HF5415.13	2	0.00%	0	0.00%	0	0.00%
HF5437	4	0.00%	0	0.00%	0	0.00%
HF5500	25	0.04%	16	0.13%	7	0.06%
HF5500.2	9	0.01%	7	0.06%	9	0.08%
HF5547	43	0.07%	1	0.01%	8	0.07%
HF5547.5	6	0.01%	1	0.01%	1	0.01%
HF5548	10	0.01%	0	0.00%	1	0.01%
HF5548.2	76	0.13%	35	0.28%	43	0.38%
HF5548.3	5	0.00%	0	0.00%	0	0.00%
HF5548.5	8	0.01%	4	0.03%	2	0.02%
HF5548.6	2	0.00%	0	0.00%	0	0.00%
HF5548.8	13	0.02%	10	0.08%	16	0.14%
HF5549	58	0.10%	31	0.25%	37	0.33%
HF5549.5	53	0.09%	29	0.23%	20	0.18%
HF5550	12	0.02%	5	0.04%	25	0.22%
HF5621	2	0.00%	6	0.05%	0	0.00%
HF5625	2	0.00%	0	0.00%	1	0.01%
HF5629	1	0.00%	0	0.00%	0	0.00%
HF5630	2	0.00%	2	0.02%	2	0.02%
HF5635	8	0.01%	5	0.04%	2	0.02%
HF5657	3	0.00%	4	0.03%	2	0.02%
HF5657.9	1	0.00%	0	0.00%	0	0.00%
HF5667	4	0.00%	0	0.00%	7	0.06%
HF5679	2	0.00%	1	0.01%	1	0.01%
HF5686	2	0.00%	0	0.00%	0	0.00%
HF5688	3	0.00%	1	0.01%	4	0.04%
HF5695	2	0.00%	2	0.02%	0	0.00%
HF5714	1	0.00%	0	0.00%	0	0.00%
HF5726	1	0.00%	0	0.00%	0	0.00%
HF5736	6	0.01%	1	0.00%	2	0.00%

EXHIBIT 4-2   Sample of circulation data from the Goddard Space Flight Center library. Reprinted from Lancaster (1982), courtesy of Haworth Press.

volumes held by the library, the percentage of the total collection occupied by that class, the number of items from that class circulating in 1976 and 1977, and the percentage of the 1976 and 1977 circulation accounted for by that class. Class HF5549, for example, contains 58 items that constitute 0.10 percent of the total collection. But this class accounted for 0.25 percent of total circulation in 1976 and 0.33 percent of total circulation in 1977. It is an overused class.

Exhibit 4-3 presents summary circulation and holdings data from Goddard's library for each main class and discloses both overused and underused classes. The two major classes in the collection, Q (Science) and T (Applied Science and Technology), are overused and underused, respectively. Evaluators find these kinds of data extremely valuable when establishing collection development policies.

Library of Congress Class	Percent of Collection	Percent of 1976–1977 Circulation	1977 Use Compared with 1976 Use*
A	0.38	0	=
B	0.19	0.16	=
C	0.17	0.30	+
D	0.15	0.06	+
E/F	0.13	0.06	−
G	1.78	1.75	+
H	3.26	4.71	−
J	0.72	0.31	−
K	0.13	0.07	+
L	2.22	0.77	−
N	0.04	0.02	=
P	0.91	0.41	=
Q	54.90	65.24	−
R	0.54	0.24	−
S	0.41	0.32	+
T	31.04	24.39	−
U	0.16	0.09	−
V	0.23	0.15	−
Z	2.64	0.33	+

*+ indicates a rising class, − represents a declining class, and = indicates no change. Many of the + and − indicators are not statistically significant.

EXHIBIT 4-3 Macrolevel analysis of circulation/holdings data from the Goddard Space Flight Center library. Reprinted from Lancaster (1982), courtesy of Haworth Press.

Class	Percent of Holdings	Percent of Circulation	Underuse or Overuse*
Q (Science)	2.63	1.68	−
QA	15.13	28.07	+
QB	9.03	9.45	=
QC	20.54	21.15	=
QD	3.50	1.23	−
QE	2.18	2.40	=
QH	1.12	0.81	−
QK	0.24	0.16	−
QL	0.11	0.04	−
QM	0.01	0.01	=
QP	0.32	0.20	−
QR	0.09	0.05	−

*+ indicates overuse, − signifies underuse, and = indicates that the level of use is as expected.

EXHIBIT 4-4 Circulation versus holdings from class Q (Science). Note that the overuse of class Q is due solely to the overuse of subclass QA (Mathematics). Reprinted from Lancaster (1982), courtesy of Haworth Press.

Whenever possible, librarians should break down the data into their smallest components to avoid jumping to the wrong conclusions. For example, Exhibit 4-4 shows that whereas class Q (Science) as a whole is overused, all of this overuse is accounted for by subclass QA (Mathematics). The other subclasses are either underused or used at the level expected.

Several authors discuss how to distinguish among overused, underused, and average-use classes. Trochim (1980) and Trochim, Miller, and Trochim (1980) suggested that the evaluator should simply examine the raw differences between the percentage of holdings and the percentage of circulation of each class. Mills (1982) was very critical of this. A difference of 0.2 percent would apply equally to a subject occupying 0.5 percent of the collection and getting 0.7 percent of the use and to a subject occupying 2.5 percent of the collection and receiving 2.7 percent of the use. But the discrepancy between holdings and use is much greater for the smaller class than for the larger—40 percent as opposed to 8 percent.

Mills suggested a better method for determining underused and overused classes: multiply the relative-use factor (which is expressed as a percentage) by 100 to create a related variable, percentage of expected use (PEU). The PEU concept is easy to understand, suggesting as it does that the expected use of a subject will be 100 percent. Subjects that are above 100 percent are tentatively designated as overused; those below 100 percent are considered underused.

It is necessary, however, to distinguish those categories that vary significantly from the PEU from those that vary only slightly. Mostyn (1974) developed a formula to test, for each subject area, the following null hypothesis: the proportion of circulation observed in a subject area is equal to the proportion of circulation expected in that area. Subject areas for which the null hypothesis is rejected are those that are either overused or underused.

Dowlin and Magrath (1983) ranked the PEUs of various subjects in a continuum from high to low. They labeled those subjects with PEUs one standard deviation below the mean as underused and those with PEUs one standard deviation above the mean as overused.

Librarians can, of course, subjectively define a threshold that represents overused or underused classes. For example, a library could decide that any class whose PEU is less than 80 percent is an underused class, and, similarly, that any class whose PEU exceeds 120 percent is an overused class. This method seems the easiest for most libraries to apply.

Several other points need to be made about relative use. First, librarians may calculate use for only one or two areas of the collection. Say, for example, that a school library has 10,000 titles and a circulation of 30,000 annually. The new librarian does not have time to determine use for all subject areas but does suspect that mathematics is an underused class. Circulation and holdings in this one area are measured. Assume that the 100 mathematics books in the collection circulated 25 times during the last academic year. Logically, mathematics should account for 1 percent of total circulation (100/10,000), but it accounts for only 0.25 percent (25/10,000), making it a grossly underused class. Corrective action can now be taken.

Second, librarians should note the close relationship between the concepts of relative use and stock turnover rate. Relative use compares the proportion of circulation expected in one area to the proportion of holdings in that area. Stock turnover rate is the ratio of total holdings to total circulation within some specified time period (that is, the average circulation per item). Like relative use, turnover rate allows identification of patterns of strengths and weaknesses for any collection or its subsets. For example, a public librarian who knows that the library's average fiction turnover rate is 1.5 can quickly tell that mystery fiction, with a turnover rate of 4.0, is an overused class and that classic fiction, with a turnover rate of 0.5, is an underused class. The National Oceanic and Atmospheric Administration library has regularly used computerized circulation and acquisition data to calculate stock turnover rates (Wenger, Sweet, and Stiles, 1979). The rates are then used to improve collection development efforts.

Third, the concept of relative use does not limit itself to subject analysis; librarians can calculate relative use for materials of a particular format, those located in a particular department or branch, or those of a particular age or language. Again, evaluators compare the expected use of each category, based on size alone, to the actual recorded use and note any patterns of overuse or underuse. Many evaluators find it especially beneficial to analyze the relative use of particular formats. Several studies have shown that the ratio of journal use to book use varies considerably from discipline to discipline (for example, Hodowanec, 1980; Stangl and Kilgour, 1967). Knowing this ratio will help a library determine whether books or journals should receive the most emphasis.

The public library in Oklahoma City found that the average circulation of its 76,862 uncataloged paperbacks was 4.75, compared with an average circulation among the 465,326 cataloged hardbacks of 2.31 (Little, 1979). If this information is converted to relative-use form, it can be shown that although 14 percent of the book collection is composed of uncataloged paperbacks, these account for 25 percent of the circulation. This entire category of materials is overused. The automated circulation system described by Nimmer (1980) allows relative use to be simultaneously cross-analyzed by subject and departmental library location. This type of breakdown would be particularly helpful in academic and public libraries, because departmental or branch libraries within the system might receive different amounts of use depending on who their primary patrons are. A library could discover, for instance, that microbiology books located in a chemistry library receive substantially less use than the microbiology books in a biology library. The evaluator could then determine how much overlap there needs to be in these collections. Indeed, Bulick (1982) found so much overlap between the social sciences in a university library that he recommended not having separate departmental libraries for social science disciplines.

Fourth, librarians can calculate relative use manually with data from collection or circulation samples. Jain (1965, 1966, 1969) and Jain et al. (1967) suggested combining data from three samples: one drawn from the total collection, one drawn from monographs borrowed for home use, and one drawn from monographs used within the library. He suggested that this combination is more reliable than any one type of data alone.

Finally, evaluators can calculate a type of relative-use data from interlibrary loan records by determining the ratio of borrowings to holdings. Aguilar (1986) arranged the ratios in a continuum from low to high, designating classes one standard deviation above the mean as overused and those one standard deviation below the mean as underused. He then determined the percentage of expected use from circulation records in these areas, again designating overused and underused classes as those more than one standard deviation from the mean. If overuse or underuse was significant in some subject area, Aguilar determined the library's next action from a preset decision table. The table illustrated four separate actions:

1. A specific subject is being used heavily at the local level, and the number of interlibrary loans needed to supplement the local collection is high. This is definitely an overused class; therefore, the library should purchase additional or duplicate titles.

2. A subject is being used heavily at the local level, but patrons do not think it is necessary to go outside for additional materials. This is the ideal situation. The library should continue its current purchasing patterns.

3. Even though local materials are underused, users frequently find it necessary to go outside the institution for materials they want on the subject. Something appears to be wrong with the local collection. This category should be examined closely to determine exactly what is causing the problem (an outdated collection, emphasis on the wrong titles, or the like).

4. Local materials are not being used, nor are users requesting materials from other institutions. This is a "dead" subject; materials in this subject area should be deemphasized.

Byrd, Thomas, and Hughes (1982) also calculated relative-use data from interlibrary loan records. They constructed a graph with the x-axis representing different subjects and then plotted two lines: the percentage of total acquisitions for each new field and the percentage of borrowing each field represents. Exhibit 4-5 illustrates this for the National Library of Medicine (NLM) classification areas in clinical medicine at the University of Missouri–Kansas City Health Sciences Library. Such a graph readily shows the relationship between the subject distribution of new books added to these collections and the same distribution of books borrowed on interlibrary loan. Evaluators can identify areas where the percentages are not close. These classes are broken down into even narrower classes and regraphed to see exactly where the problem lies. When Byrd and his coauthors did this for NLM's WM class (psychiatry), they found that users were requesting more titles on psychotherapy, schizophrenia, neuroses, organic psychoses, and social behavior disorders than the library was processing.

Generally, the theory expressed here is that the classes needing the most attention are those in which the volume of materials borrowed most exceeds the volume of materials purchased. This discrepancy is expressed as a collection balance indicator (CBI)—a relative percentage—as follows:

$$100 \times \frac{\text{new acquisitions in this class}}{\text{total acquisitions}} - 100 \times \frac{\text{titles borrowed in this class}}{\text{total titles borrowed}}$$

A positive CBI indicates a relatively strong subject area in terms of current acquisitions, whereas a negative CBI indicates a relatively weak area. This can be illustrated through two simple examples:

$$100 \times \frac{100}{400} - 100 \times \frac{12}{120} = +15$$

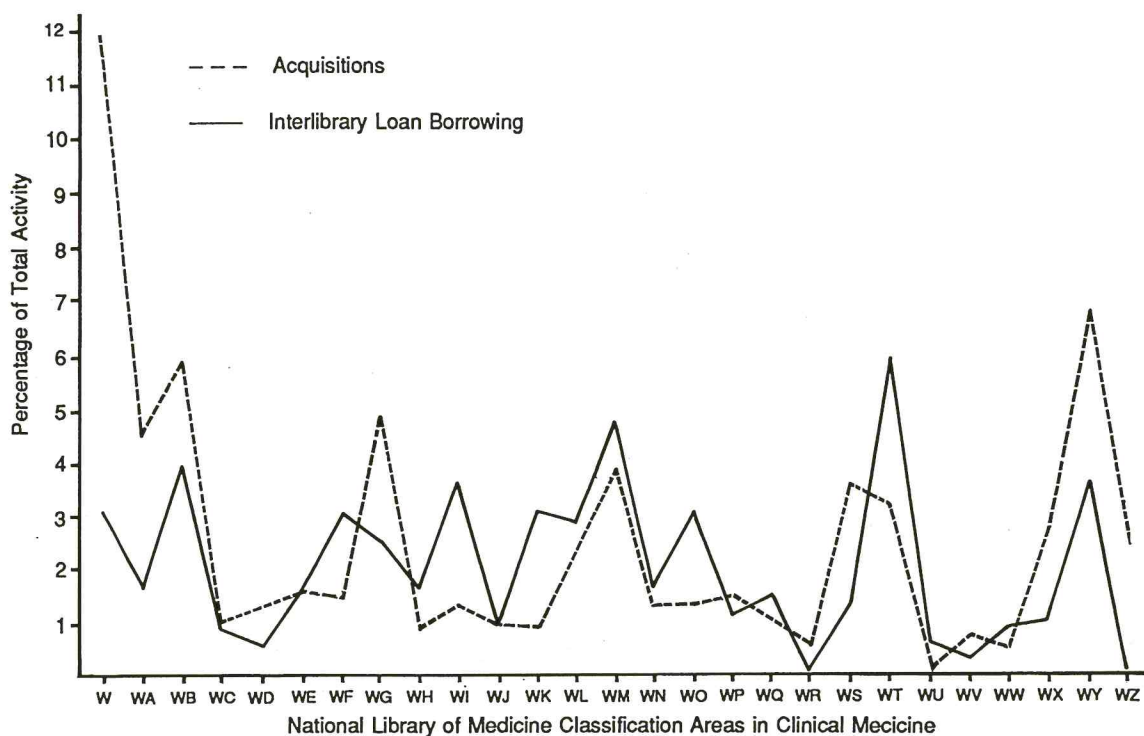$$100 \times \frac{40}{400} - 100 \times \frac{30}{120} = -15$$

EXHIBIT 4-5 Subject distribution of new acquisitions and books borrowed on interlibrary loan for fiscal year 1980 at the University of Missouri–Kansas City Health Sciences Library. Reprinted from Byrd, Thomas, and Hughes (1982), courtesy of the Medical Library Association.

In the first case, 25 percent of the acquisitions are made in a subject field, but only 10 percent of the titles borrowed fall in this area. The second case puts the proportions exactly in reverse—10 percent of acquisitions and 25 percent of titles borrowed—and the value is a low −15. The librarian will need to examine the second subject area to determine why the local collection is not being used even though the interlibrary loan borrowing indicates patron interest in this subject.

The more useful data that the librarian has available, the more likely it is that collection development decisions will be made wisely. Krueger (1983) described a coordinated collection evaluation program in which Illinois librarians collected the following data for each subject area: percentage of collection occupied, percentage of use accounted for, percentage of interlibrary loan requests accounted for, percentage of current acquisitions, percentage of American publishing output (from *Publishers Weekly* and the *Bowker Annual of Library and Book Trade Information*), median age of materials used, median age of materials owned, and percentage of books available on the shelf during a specific time. These data were used to improve cooperative collection development efforts.

Specialized Nature of the Item

The degree of subject specificity of a title affects its use. Sargent (1979) analyzed 129 books that had not circulated at the University of Wisconsin–Oshkosh since their purchase more than seven years before and discovered that half were specialized and generally of a technical or scholarly nature. Schmitt and Saunders (1983) found that 77 percent of the titles recommended in *Choice* as being suitable for a "broad audience" and 74 percent of those "generally recommended for most undergraduate levels" had been used since their acquisition, in comparison with only 59 percent of the more specialized titles. Lee (1986) read the preface and introductory materials for all items contained in the anthropology collection at a small college library. He discovered that books labeled by their authors as "introductory" or "for a general audience" circulated significantly more than those written for a specialized or advanced audience. In fact, titles of a general nature on any subject are likely to appeal to a larger audience than titles on specific aspects of the same subject. Some demand-oriented libraries, such as the Baltimore County Public Library, have used this information to emphasize items of a more generalized nature.

Quality

Many librarians think that the quality of a book should influence its use, although no evidence exists that this is true. Indeed, studies conducted 20 years apart in locales as diverse as Indiana and Jamaica suggest it is not true. Using the inductive method of evaluation described in Chapter 3 of this book, Goldhor (1959, 1981b, 1981c) found no correlation between book quality and use in public libraries. Rather, he suggested that "if libraries buy good books and poor books in equal quantities, they will be read in approximately equal numbers" (1959, p. 255). Goldhor believed that public library patrons do not differentiate better books from the poorer books or read better books more often. Further research is needed on this issue.

IDENTIFYING PATTERNS OF ARRANGEMENT AND PROMOTION OF MATERIALS

Use studies enable librarians to see which patterns of arrangement and promotion work best. More than 50 years ago, Shaw (1938) studied circulation patterns of books on each shelf of a regular stacks section. Books on shelves at eye level circulated more than books on the bottom shelves. When Shaw tilted the bottom four shelves so that patrons could more easily read the titles on the books' spines, circulation of these books increased.

Promoting titles by increasing their visibility and accessibility affects their use. For example, books located near the library's door circulate more than those housed further away (Carnovsky, 1935). University faculty use books housed in their offices more than those located in departmental libraries. In turn, they use books in nearby departmental libraries more than books in main libraries and books in main libraries more than those in libraries farther away (Soper, 1972, 1976).

In a series of studies, Aguilar (1982), Goldhor (1972, 1981a), Mueller (1965), and Taylor (1982) showed that displayed books circulate more than nondisplayed books. Building on this research, Baker (1986a, 1986b) found that displays can increase the use of any type of book they contain, but only if they are located in easily accessible, highly visible areas. Books displayed face front so that their covers are more visible circulate more than books displayed spine out (Long, 1986).

Book lists also can increase usage, but only when librarians distribute the lists widely and in a way that requires little patron effort to obtain them (Baker, 1986b). Taylor (1982) failed to increase the use of book list titles when, following the test library's usual practice, she left them out for voluntary patron pickup. Many patrons did not visit those sections of the library where the book lists were placed. Those who did still had to notice the book list, among all the other stimuli competing for their attention, had to comprehend what the list was, and had to consciously pick up the list before they could consider using it as a selection aid. Any breakdown in this process resulted in the book list not being used. Golden (1983), Goldhor (1972, 1981a), and Parrish (1986) were more effective in distributing book lists. Parrish set up a large poster and display at the library's entrance to promote use of the lists. Each of these three

researchers also placed one book list in each set of books borrowed by an adult patron. Circulation of book list titles increased significantly in each of these studies.

Another series of studies focused on the use of books arranged in genre fiction categories. Ninth graders found a classified fiction scheme easier to use than an alphabetically arranged fiction section (Briggs, 1973). Most patrons browsing for fiction generally said they wanted a book in a particular genre (Spiller, 1980). And fiction categorized into genre areas was used more than fiction categorized other ways (Baker, 1988). Patrons in Baker's study felt the genre markings saved time, were easy to use, and allowed them to identify authors, previously unknown to them, who wrote the type of book they liked.

The research reviewed in this section consists primarily of experimental studies. The researchers developed a hypothesis and tested it, measuring changes in use before and after a new promotion or arrangement feature was tried. Librarians can use results of studies like these in many practical ways. For example, in a library with a goal of promoting "quality" works, Hermenze (1981) increased the use of classics by displaying them prominently near the circulation desk. After receiving patron complaints about the difficulty of browsing for fiction classified under the Library of Congress scheme, Wood (1985) distributed genre fiction book lists. Circulation of these titles subsequently increased.

IDENTIFYING CORE COLLECTIONS OF MATERIALS

Evaluators have successfully identified core collections in libraries. Generally, some optimal number of volumes constitutes a core collection that is capable of satisfying a specified percentage of all demands (Trueswell, 1966). Librarians generally determine the core by examining the circulation records for each item borrowed during a specified time, although they also could factor in recall or reserve requests for an item, records of interlibrary loan borrowing of owned items, or measures of in-house use. They can then make a graph similar to the one in Exhibit 4-6. The graph shows the percentage of books borrowed now (that is, during some current circulation period) that were last borrowed within some specified period. For example, approximately 25 percent of the items borrowed currently had not been borrowed within the preceding 6 months, approximately 10 percent within the preceding 18 months, and approximately 3 percent in the preceding 36 months. In other words, approximately 97 percent of the items being borrowed now were borrowed at least once in the preceding 36 months. The core collection could be defined as all books circulating at least once in the past 36 months. This collection, which is expected to account for approximately 97 percent of the total circulation, could be a small subset of the entire collection.
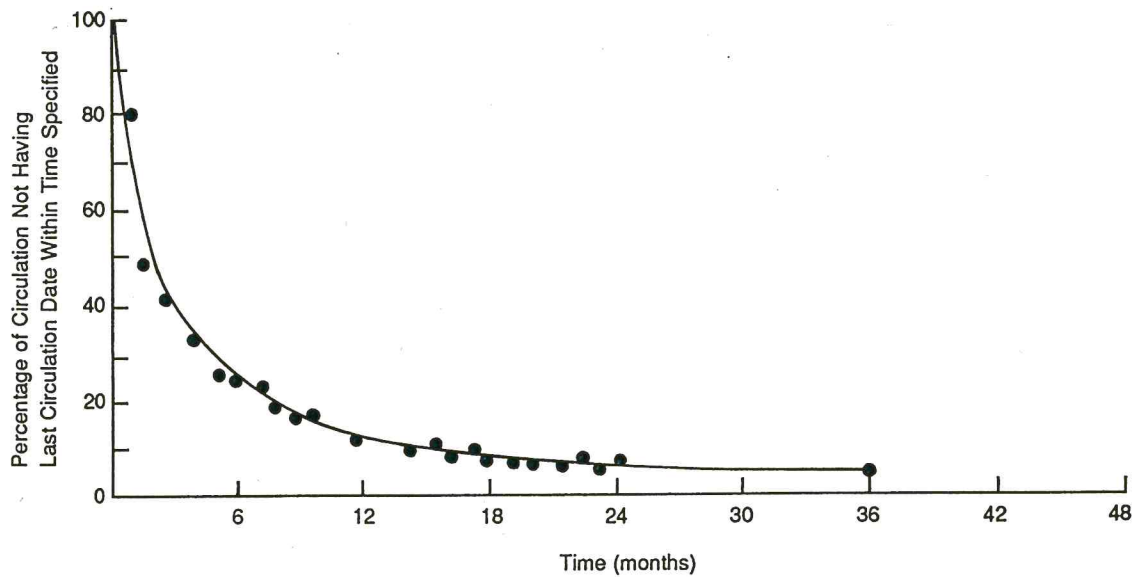

EXHIBIT 4-6   Distribution of book use on the basis of last circulation date. Reprinted from Trueswell (1966), courtesy of *Libri.*

Truesswell (1966) identified core collections in libraries at Northwestern University, the University of Massachusetts, and Holyoke College. In each case, he found that 80 percent of the use was accounted for by approximately 20 percent of the collection; enough evaluators have observed this same pattern over the years (for example, Goldblatt, 1986; Hardesty, 1981) that it has been termed "the 80/20 rule." The actual figures observed in such a study, however, may not be 80/20 (Hayes, 1981; Kaske, 1979; Lancaster, 1982; Urquhart and Urquhart, 1976). Although the use of any book collection will follow a hyperbolic distribution, the steepness of the curve may vary from one institution to the next. Reed (1979), for example, found that during a 35-month period, 90 percent of monograph use came from 50 percent of the collection. The information obtained from this type of study is useful in guiding further action when the two numbers are far apart:

If, for example, the parameters were 50/50, 60/60, and so on, it would indicate that all the parts of the collection are, on the average, equally in demand. In such a case, there would be no point in trying to decide which parts are not heavily in demand . . . On the other hand, with a parameter set such as (90/10) one would be encouraged to look for the 90 percent of the collection that is in very low demand. (Kantor, 1980, p. 514)

In applying the 80/20 rule to improve collection development efforts, it is assumed that the specific rule derived for a given library is stable over time. Kantor (1980) suggested this could be tested. A library could compare the results obtained from a sample of current circulating titles with the results obtained from a sample of the entire collection. If the rule is the same for the two samples, the distribution is stable. When Kent et al. (1979) tested the subject distribution of circulation at the University of Pittsburgh, they found it was very stable: a 3-day circulation study yielded results equivalent to those of a 36-month study. Subject distribution should be stable for most libraries because user interests and circulation patterns change slowly.

Many evaluators have concentrated on identifying core collections of serials (for example, Advani and Gupta, 1984; Goldblatt, 1986; Sridhar, 1986). This is because the high rate of inflation in the price of journals has forced libraries to drop the least-used titles. Because a small percentage of titles accounts for a high percentage of use, libraries have dropped many subscriptions to expensive, low-use periodicals.

Two early studies are worth describing in detail. Kilgour (1962) analyzed three months' worth of canceled charge slips at Yale's medical library. The slips were for journals published between 1956 and 1960. Thirty-seven journals accounted for 49 percent of the use, and 86 journals for 73 percent of the use. Fleming and Kilgour (1964) conducted a follow-up study at the medical libraries of Yale and Columbia to identify a core of biomedical journals capable of satisfying 75 percent of current demand. They examined canceled charge slips for journal issues published during a designated 42-month period. These were collected for one year at Yale and six months at Columbia. Although Columbia subscribed to more than 2,000 journals and Yale to more than 1,500, a core of 262 journals supplied 80 percent of the total journal use. As few as 69 journals satisfied more than half the demand in both libraries.

It seemed odd that the number of journals supplying half the use at Yale was 37 in 1962 and 69 in 1964. Fleming and Kilgour attributed this difference to the saturation effect of heavily used titles. The rate of use of the most popular titles, virtually to maximum capacity, remains relatively constant over a given period (unless duplicate copies are added to satisfy higher demand). The less-used materials, however, accumulate additional loans over time. This means that the shorter the period for which circulation records are analyzed, the fewer the number of different titles that will contribute to a fixed percentage of the total usage. Conversely, the longer the circulation period studied, the greater the number of journals that will contribute to a fixed usage percentage:

Sixty-nine Yale titles supplied 50 percent of use in one year as opposed to thirty-seven in three months, not so much because the heavily used titles were more heavily used during a year, but rather because the little-used titles accumulated more loans over a year and thereby depressed the 50 percent level. (p. 240)

Academic and research-oriented libraries interested primarily in the extent of scholarly use (as opposed to the absolute quantities of use) should study serials use for a longer, rather than a shorter, time. A study of journal use at the Air Force Cambridge Research Laboratories (Groos, 1966) showed that many patrons felt low-use journals were an important part of the collection. Thirty-eight percent of the patrons requested a low-use title (one with only one use during a six-month period); these titles accounted for 51 percent of total use. Librarians can use core collection information in a number of ways. Miller (1981) described three small midwestern college libraries that worked together to identify their core distributions. In each case, approximately 40 percent of the collection met 80 percent of the demand. Lake Forest used the results to determine which items in the collection should be the first to receive security tape when a new theft-detection system was installed. Knox determined which parts of the collection to convert first from Dewey to Library of Congress classification. And St. Olaf's decided which means of storage was best for items in its collection.

This last use—resolving the ongoing problem of inadequate space to house collections—is the primary reason many libraries identify core collections. Librarians consider various options when they run out of space, such as purchasing microforms initially, whenever available, converting bound volumes to a less-bulky format, using compact shelving, or building a new, larger facility to house materials. Researchers have dismissed some of these options

as unrealistic. The amount of material available on microform is small when compared to that available in paper form (Lawrence, 1981); it may cost more to microfilm bound volumes than to provide more space to house the paper copies (University of California, 1977); and the initial capital outlay for new full-service buildings is difficult to raise in tight budget times (Stayner, 1983). Researchers are still exploring other options. For example, the Library of Congress is assessing the costs, benefits, and problems of storing the content of materials on optical disks (Price, 1985). Kountz (1987) has described automated storage and retrieval approaches, and Creaghe and Davis (1986) have discussed such a system adopted by one university that can house 950,000 volumes.

The two most common solutions to space problems are those that librarians have used for decades: weeding the collection and storing some materials remotely. Weeding not only saves space, it saves the time of patrons and staff, makes the library more appealing, enhances the collection's reputation for reliability and currency, provides a check for needed mending and binding, identifies lost or stolen books, and provides feedback on the collection's strengths and weaknesses (Segal, 1980). Remote storage has these same benefits but allows a library to keep titles that a researcher or scholar may someday use.

Librarians weigh space options after considering constraints set by the parent institution and the library's purpose. School libraries, for example, are unlikely to store materials remotely because their primary mission is to house items that will meet current curricular needs and because they often have limited space and no storage options. On the other hand, corporate libraries can be expected to maintain a company archive, and academic libraries a collection that will support faculty research; in these cases remote storage is an option.

Librarians should take three kinds of costs into account when deciding whether to weed or store: (1) the cost of circulations "lost" because discarded or stored books were unavailable to the user at the time requested, (2) the costs of various retirement methods, and (3) the costs of various types of storage. The cost of lost circulation is an interesting concept, first explored by Raffel and Shishko (1969). They assumed there would be some loss of circulation if items were weeded or stored in less-expensive, but less-convenient, locations. Some librarians have argued that this assumption is simplistic and does not take into account the fact that a book badly needed will be requested from storage or that a substitute may be found for a book not available in the library. Overall, however, the assumption is valid, because physical accessibility is a primary factor influencing most patrons' use. For example, one library found that moving items to a storage facility reduced loans by 30 percent, even though patrons could have requested the stored materials and obtained them that same day (Douglas, 1986). Few patrons use interlibrary loans or recall services, which take several days or weeks to deliver requested items, even when they believe the items in question are relevant to their needs (Hitchingham, 1976). Readers are referred to Chapter 2 in this book for a full discussion of accessibility.

Evaluators can estimate the maximum number of books that would be lost using certain weeding or storage criteria. Suppose that an evaluator selects a sample of all books in some subject area that are at least 10 years old and then establishes different sets of weeding guidelines. Let us assume that two sets of guidelines, each with two weeding criteria, are established. The first set says that a book should be weeded if its physical condition is poor and if it has not circulated during the past five years. The second set says that a book should be weeded if its physical condition is poor and if it has not circulated during the past three years. For each of these two sets of criteria, the evaluator plots the number of circulations that would have been lost during the past several years (using actual circulation data from the sample works) if these criteria had been used to weed or store each item in the collection. This practice will slightly overestimate lost circulations, because it assumes that no patron will seek an item not currently on the shelf. It can, however, determine which set of weeding or storage criteria will result in the fewest lost circulations for a particular library.

Existing evidence (for example, Ash, 1974; Basart, 1980) shows that retirement decisions based on usage are more sound, in terms of identifying books likely to be requested in the future, than those of any other single criterion. Evaluators, however, may supplement use information by a number of other factors when making weeding and storage decisions, as librarians at a California public library did. These librarians began their weeding program by obtaining a computer-generated list of all materials that had not circulated in three years. They examined individual titles on the list, factoring in a number of other weeding criteria, before making their discard decisions (Hayden, 1987). The most-used weeding criteria are listed in "Guidelines for the Review of Library Collections" (American Library Association, 1979). These criteria include, among others, the age, subject, language, physical condition, obsolescence of content, or "quality" of the title (this last generally is determined through the list-checking approach described in Chapter 3). Librarians do not have to apply any set of retirement rules on a librarywide basis, but rather may modify them depending on the format or subject area involved. Thus, the Massachusetts Institute of Technology and an IBM library developed different sets of criteria for weeding monographs, periodicals, internal company reports, and materials of other formats (Hulser, 1986; Lucker, Herzog, and Owens, 1986).

Making storage decisions based on use requires examining each title and modifying each catalog card to show which items are stored off-site. This is expensive when a large number of books are involved. If saving money is very important, evaluators may substitute the publication date for the use criterion when making storage decisions (Ford, 1980; Moss, Brophy, and Hargreaves, 1982). Publication-date storage decisions are easy for junior staff to carry out and could be implemented with the minimum of documentation, if users could be successfully instructed (perhaps with a notice prominently

posted in the catalog areas) that any book published before a certain date is on closed access. However, it would mean that catalogue entries would be inaccurate and might lead to user frustration at the shelves. (Best, 1980, p. 232)

The publication-date approach to storage often is more cost-effective for materials that age rapidly, such as medical research reports, or for large libraries. Gradmann and Pinkwart (1987) illustrated this graphically. Staff at the university library in Bonn, West Germany wanted to weed the collection by checking each individual title and examining its use, age, and various other aspects. The library rejected this method after determining that it would take existing professional staff members 39 years to weed the 550,000-item collection using a volume-by-volume approach, because there was no money for additional help and the staff was already overburdened with work.

Even those libraries that retire complete groups of material to storage on the basis of publication date (or for that matter, some other criterion) often make exceptions when necessary; that is, a particular book will not be discarded or retired to storage if it has been used above some threshold level, even though it falls within a general category of materials identified as prime candidates for storage.

Librarians must consider still another cost in the storage of less-used materials. In stacks that are open to the public, library staff must arrange the volumes systematically, using the library's classification scheme, to allow for browsing and to permit the user to find a particular item easily once its call number is known. But materials in book stacks that are accessible only to members of the library staff, particularly items in remote storage areas, do not have to be stored by a classified subject arrangement. These materials can be stored compactly and economically in other ways. More than 25 years ago, Metcalf (1965) suggested compactly shelving stored materials by size or date of acquisition. He also described ways of implementing compact storage. More recently, the Brookhaven National Laboratory Research Library doubled the linear footage of its remote storage facility by shelving items one behind the other on two-foot-deep shelves (Ryan and Galli, 1983).

Boll (1982) and Gilder et al. (1980) gave good overviews of the types of compact shelving units that a number of large libraries are using for storage. If these are properly designed to be mobile and easy to use, they will not even interfere with patron access to materials. Although space is conserved by all compact-storage techniques, there may be an added cost if mechanical and mobile shelving units are used. These costs may offset much, if not all, of the gain derived from saving space.

Some libraries use several space-saving options concurrently. When the American Jewish Archives became full, librarians devised a three-part plan to handle the problem: they weeded extraneous materials, microfilmed others, and placed a third group of little-used items in off-site storage (Proffit, 1986).

Evaluators can decide which of these options are more cost-effective, substituting local cost figures into various formulas that researchers have proposed. Most of these formulas originally were written for large university libraries that have severe storage needs (for example, Ford, 1979; Lawrence and Oja, 1979)), but the models apply to other library settings as well. Lister (1967) demonstrated that the storage cost per volume decreases for books stored in a compact form in less-accessible storage areas, but that the cost per circulation increases, especially if evaluators factor in some form of cost penalty for the delay and inconvenience caused to users. Stayner and Richardson (1983) compared costs associated with four storage solutions: (1) a conventional, low-density storage building or extension, (2) a remote, high-density storage facility, (3) a shared storage facility, and (4) no new building of any type. They figured in the costs for building the necessary storage facility, as well as the recurring costs of weeding and altering catalog records. Brown (1980) and Thompson (1980) also compared weeding and storage costs.

Using a fairly sophisticated relegation model, Lawrence (1981) compared the costs of (1) retaining materials on the shelves in a new larger library, (2) relegating material to compact shelving at a remote storage facility, and (3) weeding the material from the collection. For the first option, Lawrence determined the annual capital cost of constructing and equipping a new full-service library expected to last 40 years, the annual recurring cost of building maintenance, and the average circulation cost. For the storage option, he figured in the annual capital cost of constructing and equipping a storage facility (approximately 23 percent of the cost of a new full-service library), the annual building maintenance cost, the cost of selecting storage candidates from the collection, the cost of changing the location on the catalog record, and the unit cost of circulation. The selection cost included a small fee that users would be willing to pay to avoid a two-day delay in the delivery of materials housed in the storage facility and the cost of round-trip transportation for each item a user requested. For the weeding option, Lawrence added the cost of selecting books to be discarded and the cost of borrowing these items on interlibrary loan. The latter cost included a fee that users would be willing to pay to avoid a two-week delay in obtaining materials.

Lawrence then used a formula to determine which space-saving option was best, given the average number of years expected between circulations of each item. Exhibits 4-7 and 4-8 show the results of his analysis. These data—and, incidentally, data in studies by Brown (1980) and Stayner and Richardson (1983)—showed that no one treatment is cost-effective for every item. Rather, librarians should choose different space-saving treatments, depending on the number of times an item has circulated. In the Lawrence study, if a storage facility was already built, the most cost-effective solution would be for the librarian to retain, in the campus library, items that had circulated at least once in the past 10 years, to discard items that had circulated less than once in 35
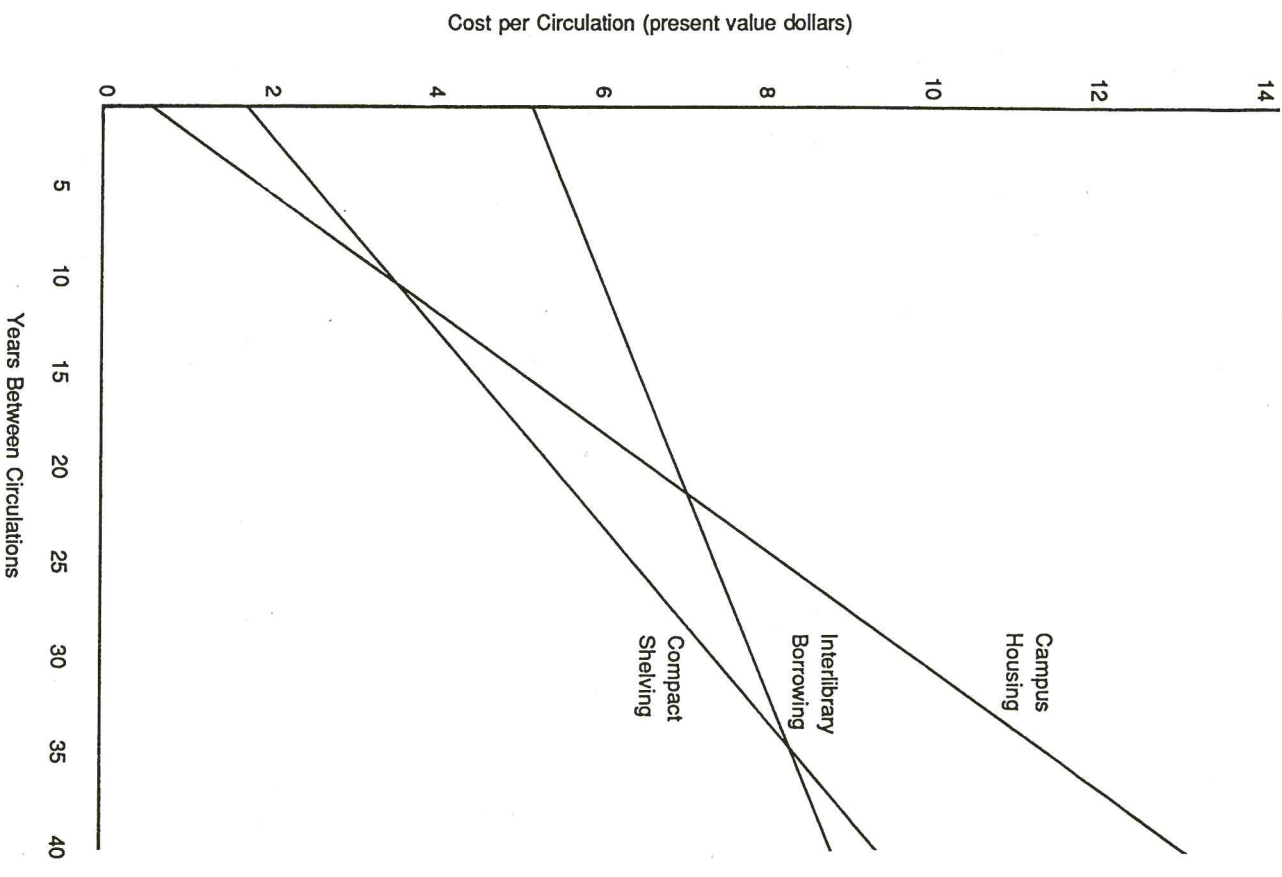
EXHIBIT 4-7 Estimated cost of circulation for three housing alternatives. Reprinted from Lawrence (1981), courtesy of the American Library Association.

Disposition		Years Between
From	To	Uses
Campus	Disposal	20.93
Campus	Storage	10.17
Storage	Disposal	34.22

EXHIBIT 4-8 Crossover points for storage and disposal, and disposal. Reprinted from Lawrence (1981), courtesy of the American Library Association.

years, and to store the rest. If no storage facility was available, the librarian would retain on campus those items that had circulated once in the past 21 years and would discard the remainder.

Two final points must be made about these least-cost decision rules. First, they do not generally consider in-house use. This is less important than one might think, however, because materials that circulate tend to be those that are used in-house and vice versa (this is explained in detail in Chapter 5). Second, the rules affecting relegation decisions are very sensitive to changes in unit costs; even small differences in costs can result in a major shift in the decision rules.

CONCLUSION

There are a variety of approaches to evaluating the use of library collections. At this point, it must be reemphasized that a library should choose the evaluation method or methods best suited to its purpose. Often this involves conducting a multitiered evaluation using a combination of collection-oriented and use-oriented methods. Many authors report using evaluations of this type. For example, when Bolgiano and King (1978) evaluated a periodicals collection, they compared their holdings to those on recommended lists, analyzed current titles in relation to the academic programs they might be expected to support, reviewed interlibrary loan requests for periodicals, and conducted a citation analysis of graduate theses finished at the university during the previous five years. Researchers in a Virginia health sciences library evaluated periodical holdings by measuring the availability of titles in other area libraries, recording in-house use, surveying users, and examining lists of titles held by other selected libraries (Alligood, Russo-Martin, and Peterson, 1983). Although using a variety of methods will increase the cost of the evaluation, the results often provide a more balanced and comprehensive review than those obtained by using just one method.

Ultimately evaluators will scrutinize most collections in terms of the proportion of the demands they are able to satisfy. If a collection is sufficiently large, is well chosen in relation to the needs of the community served, is accessible, and

is updated and weeded, it should satisfy the bulk of demands—both known-item and subject-related requests—placed on it.

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