

## Subscriptions vs. Books in a Constant Dollar Budget

*Citation analysis was used as an aid in collection development in the field of engineering. It was found that for graduate students books are of greater importance than journals. Substantial reductions in the number of subscriptions released funds for the purchase of books within the limitations of a constant dollar budget. Library usefulness appears to have been increased.*

**I**NFLATION HAS LED MANY LIBRARIANS to examine critically their collection building practices. Particular attention has been given to rapidly rising subscription prices, in part because subscriptions consume the major portion of the acquisitions budget in many university libraries. Another factor contributing to the emphasis on subscriptions has been the availability of rank-order listings of useful and/or important periodicals as derived from citation analysis.<sup>1</sup>

While attention has been focused on the usefulness of some periodicals relative to other periodicals, much less attention has been given to the usefulness of periodicals relative to other forms of library materials. For example, one might ask whether it is better to continue a subscription to a seldom used translation journal or to purchase duplicate copies of a few heavily used monographs.

Traditionally, academic librarians have responded to funding shortages by maintaining periodical subscriptions in preference to buying new books. Thus one reads from time to time of libraries that have suspended book buying.<sup>2</sup> Less anecdotal evidence of the tendency to stop buying books in order to continue subscriptions is provided by a recent report, which states that academic libraries increased expenditures

for periodicals by 36 percent in the two-year period ending in 1975, though prices increased by only 34 percent. In contrast, book expenditures increased only 2.8 percent during these two years, although book prices increased by 8 percent.<sup>3</sup> These figures should not be surprising in light of White's discussion of the dramatic changes in library materials budgets that occurred in 1969-73. The transfer of funds from the book to the serials budget resulted in a "drastic" reduction in the acquisition of books during that period.<sup>4</sup>

The tendency to buy subscriptions rather than books probably is based on the belief of librarians and faculty that periodicals are the fundamental tools of research. It is reasoned that one of the characteristics of a good research library is a large number of currently received periodicals. The extraordinary increases in the prices of periodicals during the past several years make it necessary to examine in more detail the assumption that periodicals deserve precedence when a choice must be made between books and subscriptions.

A study of the library materials used by students writing master's theses in the West Virginia University (WVU) College of Engineering suggests that, at least in engineering, a large number of subscriptions is less important than an adequate book collection. This conclusion is based on the measurement of the use of library materials in terms of citation frequency. As with any quantita-

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tive measure of library use, there are limitations inherent in the use of citation data. However, the results have provided useful guidance in budget decisions at West Virginia University, and similar considerations may prove useful to librarians in other subject areas at other academic institutions.

#### BACKGROUND

Incentive for a study of the use of periodicals relative to books was provided by several published reports showing that there are profound differences in the citation patterns in different fields. Jones and his associates compared results of several studies and found that the percentage of references that cited periodicals ranged from a low of 21.5 percent in English history to a high of 92.7 percent in chemistry. In general science, 82 percent of the references cited periodicals.<sup>5</sup>

Fussler's study of the literature of chemistry and physics showed the remarkable stability of citation patterns in these two fields. The percentage of references that cited journals had remained virtually unchanged for nearly fifty years.<sup>6</sup>

Garfield has commented frequently on the subject-dependent nature of citation patterns. For example, only 20 percent of references processed for the *Science Citation Index* in 1975 cited nonjournal items, but 62 percent of the references in the *Social Sciences Citation Index* cited such items.<sup>7</sup> The relatively low incidence of journal citation in the social sciences is shared by some fields of applied science. In 1972 it was found that 45 percent of references in applied chemistry journals cited nonjournal items, but only 9.6 percent of references in chemistry journals cited such items.<sup>8</sup>

One might expect a similar emphasis on nonjournal citations in the field of engineering. Indeed, highly cited works in engineering tend to be books rather than journal articles, a characteristic of the literature which distinguishes engineering from other scientific and technical fields.<sup>9,10</sup>

These studies suggest that decisions to continue or cancel subscriptions in an academic library must be made on a subject-by-subject basis. When budget limitations require a choice to be made between the purchase of books and subscriptions, it

seems that subscriptions would be the better investment in the field of chemistry. In applied chemistry, however, lesser used subscriptions might have to be canceled in order to maintain an adequate book collection.

Although studies of citation patterns in the literature of a given subject field can be useful, they do not provide an adequate base upon which to make decisions in a given library. A study of the citation patterns of the individual library's particular group of users should be made before making a decision concerning the purchase of library materials to support that user group. There are several reasons for making a study of the local users:

1. A library must serve the local group of authors, not a subject field. Thus a librarian needs to know what is being used and cited by those who use the library, not what is being cited by those who publish in a particular set of journals. In this regard it should be noted that the literature of a specialty must be distinguished from the literature of interest to workers in that specialty. Garfield pointed out that the literature used by agricultural scientists is not the same as the literature produced by agricultural scientists.<sup>11</sup> Further, a listing of the most cited physics journals is quite different from a listing of the journals most cited by physicists.<sup>12</sup> Finally, a study by Scales<sup>13</sup> indicates that rank-order lists of journals for a field as a whole do not necessarily correspond to the particular journal needs even in large libraries with a large and diverse group of users.

2. Studies of the literature as a whole provide only an average measure of the use of library materials. Local conditions may lead to wide departures from this average, but there are no data available to indicate the extent of variation among different user groups in the same general subject field.

3. The use of library materials by students may differ considerably from the use by professionals publishing in a field. Studies based only on references in journals do not provide adequate data on the educational needs served by an academic library.

4. Published studies do not usually consider use variations by subfield, an important consideration for the academic librarian

who must balance the conflicting needs of different departments.

5. A study of the local user group can provide a time-averaged measure of the use of library materials. The ranking of a journal on a list can be strongly dependent on the time period under study.<sup>14</sup>

#### RESULTS AND DISCUSSION

Use of engineering library materials was measured by analysis of references in master's theses accepted by the WVU College of Engineering during the four years 1971-74. As the thesis is not a degree requirement, only 126 students out of the 296 graduates wrote a thesis during this period. A complete report on the results of this study is available on request from the author. An analysis of the data on journal citations has been published elsewhere.<sup>15</sup> The present discussion is concerned only with the relative use of journals and books. Table 1 presents a summary of the data on this topic.

It can be seen that only one-third of the references in the WVU engineering master's theses cited journals and that fully two-thirds of all references cited nonjournal items. This is the same percentage found by Garfield in his study of highly cited engineering works.<sup>16</sup> The percentage of non-journal citations varied from a low of about 50 percent in chemical engineering to a high of almost 90 percent in aerospace engineering. The figure for chemical engineering is very close to the 45 percent quoted above for applied chemistry.

These results indicated that information sources other than journals were of primary

importance in library support of the engineering master's program at WVU. In addition, it was recognized that relatively massive reductions in expenditures for subscriptions to engineering journals would have virtually no measurable effect on the availability of useful journals to support engineering students.<sup>17</sup> (Holland recently reported that major budget cuts in the engineering library at the University of Michigan would have little effect on service to users.<sup>18</sup>) Thus it was decided that when a choice had to be made between buying books or subscriptions, the subscriptions would be canceled.

The decision to buy books rather than subscriptions was reinforced by several considerations. First, the space problem at WVU is severe. The engineering book collection has been heavily weeded to the extent that the entire collection increased by only 10 percent in five years despite an annual acquisitions rate of 10 to 12 percent throughout this period. Second, bound volumes of engineering journals occupy 55 percent of available space in the engineering collection, but they account for only 13 percent of circulation despite a liberal policy that allows journals to circulate for two weeks just as any other book.

Finally, in fiscal 1973, when budget restrictions began to significantly affect the library's capacity to continue subscriptions, expenditures for subscriptions were 13 percent higher than book expenditures. In sum, the bulk of library resources in terms of money and space was being devoted to that part of the collection that received the least use.

TABLE 1  
CITATIONS TO JOURNALS IN WEST VIRGINIA UNIVERSITY ENGINEERING MASTER'S THESES  
1971-1974

Department	Number of Theses	Number of References	Citations to journals	
			Number	Percent of References
Aerospace	14	105	12	11.4%
Chemical	16	516	255	49.4%
Civil	30	888	199	22.4%
Electrical	28	543	219	40.3%
Industrial	18	640	201	31.4%
Mechanical	20	310	114	36.8%
Totals	126	3002	1000	33.3%

As a result of these considerations, expenditures for engineering subscriptions at WVU were reduced from \$25,000 in 1973 to \$23,000 in 1976. This reduction was achieved despite the fact that the average price of engineering subscriptions rose by about 50 percent during this time<sup>19</sup> and despite an increase of 34 percent in the total subscription expenditures by the WVU Library system. As a result of the cancellation of subscriptions, the library was able to continue spending about \$20,000 annually on engineering books. Had subscriptions not been canceled, expenditures for books would now be less than \$8,000, a figure that could not begin to support a quality collection in engineering.

The library user's perception of library service often takes precedence over strictly budgetary considerations or objective measures of library use. Therefore, faculty and student feedback is sought constantly concerning the adequacy of the WVU engineering collection.

Faculty were at first surprised to learn that journals were so little cited by their students. Some thought that this represented a deficiency in WVU's programs, until citation data from the published literature was presented. Others felt the low use of journals represented a deficiency on the part of engineers in general. These individuals seemed to feel that the use of journals by chemists and physicists represented an ideal that should characterize all of science and technology.

Perhaps the differences in literature use between engineering and the "pure" sciences reflect the deeper differences between the two fields. Engineers frequently use well-known principles to design a device for a new application, in which case standard reference books might be of greatest value. Unstable government funding and interdisciplinary studies may require reference to basic works in many different fields as engineers seek to extend their expertise to many different specialties. In the pure sciences there is a greater tendency toward long-term studies of highly specialized topics on the edge of what is known, and such work cannot be presented in books in a timely manner.

The faculty's uneasiness over the rela-

tively low use of journals did not extend to the selection of particular titles to be canceled. Apparently the list of titles selected for cancellation, prepared with the aid of citation data, coincided with the faculty's perception of what is useful and desirable. The entire list of canceled subscriptions was reviewed by the faculty a second time in the fall of 1976, two to three years after most of the subscriptions had been stopped. There were no requests for reinstatement of any title.

Funds released by canceling subscriptions have been used to continue efforts at building an extensive and timely book collection representing the full breadth of engineering interests at WVU. As a result, annual circulation is now 62 percent higher than it was four years ago, although student enrollment has increased by only 2 percent. Despite the massive cancellations and the rapidly increasing use of the library accompanying the growth in quality of the book collection, there has been no increase in the number of interlibrary loan requests.

#### CONCLUSIONS

Satisfactory accommodations to library budget limitations have been made in the WVU engineering collection with the aid of citation analysis. Objective data relating to the use of all portions of the library collection aided in eliminating the less useful journals in favor of more useful books. While long-term effects of inflation may yet be serious if costs continue to rise, short-term effects may be reduced in many libraries by using similar techniques. In particular it is important to examine those areas where service far exceeds need and to emphasize areas of service of greatest importance to the local group of library users.

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