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THE MANAGEMENT OF SCIENCE AND ENGINEERING COLLECTIONS AT MEDIUM-SIZED RESEARCH UNIVERSITIES IN THE MIDST OF NEW TECHNOLOGY

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The Scenario

Collection development and management in medium-sized research university libraries presents its own unique problems that are caused or influenced by factors related to their collection size, budgeting level, institutional identity, resource-sharing capabilities, collection development networking, and information sharing. Universities that belong to such organizations as the Research Libraries Group or that are the top members of the Association of Research Libraries are part of resource-sharing consortiums and collection development-information networks of great capabilities; they also attract substantially more additional funds from federal and private entities than the lesser known universities. Faculty members in medium-sized research universities - especially those where research plays an important role - have to compete with colleagues from larger institutions that have a lot more resources, under the same ground rules determined by the grant organizations; they also expect to develop courses of comparable quality to those offered at the large research universities. On the other side, at liberal arts colleges where teaching is often highly recognized, despite similar problems particularly in the areas of collection size and budgeting levels, collection development is centered around

course-related strategies.

Overall, medium-sized research libraries are faced with comparably less resources and identity, while faculty members require highly specialized levels of library materials and are subject to strict research expectations.

Serials Resources and the Need for Reassessment

The prices of serials have been the subject of great attention in recent years. The entire university community - researchers, publishers and librarians - are active participants of what R. Ivis from Louisiana State University

has called "one of the most difficult issues that the academic community has faced in years."[2]

Science and technology journals are one of the areas most seriously affected by this crisis. By observing the figures given by Young and Carpenter in their annual report of periodical prices,[3] we can see that the average subscription price in 1989 for U.S. science and engineering journals was 2, 3, 4 or even 10 times higher than the average prices for social sciences, business, humanities, arts or education periodicals. Also, from 1981 on, the annual percentage increase for U.S. scientific and technical titles has been around the 11% mark. In addition, since several major scientific publishers are from abroad, other factors such as differential pricing for U.S. libraries and the fluctuation of American currency in foreign countries make these percentages in some cases as high as 20% or more, as reported by Mark Sandler.[4] At the same time, most libraries receive annual budget increments in the 3 to 6 percentage range.

Young and Carpenter in the same report show that, based on a constant 1977 U.S. dollar, the price-index for American scientific and engineering journals by subjects in 1989 were, for example, 316.2 for agriculture; 358.9 for engineering; 392.5 for chemistry and physics; and 421.9 for zoology. During the same period, the price-index for education was 293.2; history, 255.3; business and economics, 311.1; sociology and anthropology, 339.1; and literature and language, 248.8. During the 1977-87 period, the consumer's price-index for all items in the U.S. was only 187.5.[5] The economic effects of this disparity are important since libraries usually receive budget increments around the increase in the cost of living expenses.

Some of the reasons cited for the increased prices of scientific and technical journals are: the very narrow market of scientific titles; the escalated growth of print material in these fields; publication costs such as printing, paper and labor; and the start-up costs that are involved in the creation of new titles. Whether all of these reasons are justifiable continues to be a topic of debate among the groups involved. We should take a look at how all this affects a typical medium-sized research university with programs in technical areas. In this case, 40% of the total

library budget may be dedicated to library materials; 60% to 65% of that amount corresponds to the total serials expenditures, and it is most likely that half of the serials obligations are for the support of its engineering and science programs. About 30% of the entire library materials budget is dedicated to the support of subscriptions of technical journals.

If we look at the division of resources in individual academic departments, the ratio of periodicals to monographs is very high for the sciences and engineering: chemistry, for example, may range from 92.4% periodicals to 7.6% monographs, while Geology may range from 75.8% periodicals to 24.2% monographs. A double digit increase of prices can have severe consequences in a short time period on the collection development process. Under the prevailing economic conditions and through the changes occurring in the transfer of technical information, the role of the library as the solid archive of scientific literature is in danger of diminishing.

There is a need to reassess the current trend. One major concern is how faculty from medium-sized research universities can have access to publications that are needed, in the process of competing with other research facilities. Another concern is the value that these publications have in training students to become qualified scientists and engineers. We need to know the importance of paper subscriptions.

In a study recently done by the staff of NASA to investigate the technical communications practices of [6] aeronautical engineers and scientists, it was found that the use of journal articles as a technical information product was 28.3% for 6 or more times use per month; 36.8% for 1 to 5 times use per month; and 34.9% for no use at all. The same study reported that 2% use the library daily; 15% once a week; while 47.8% once or less than once per month. These results may not be a great surprise at all, but in view of the present economic restrictions, we should then emphasize the rapid delivery of documentation as an alternative to ownership.

It is known that in quickly developing fields, the transfer of information occurs at other levels such as through scientists' networking and pre-published reports rather than in articles published in journals. Peter S. Graham[7] has suggested some reasons why current research is

not oriented toward formal scholarly communication: first of all, teamwork in an electronic mode causes scientists to produce informal reports; second, current research tends to solve problems at hand where a review of the literature is not always needed; and third, the redundancy of information finds the researcher without enough time to confront such an enormous task.

The Role of the Specialist

The campus and the library are adapting to changes created by new technology - the introduction of online catalogs, shared computer systems like CARL UNCOVER, CD-ROM databases and networks, electronic mail, and communication systems that cross the physical boundaries of the library making information available at homes, offices, labs and student halls are influencing the way services are provided and collections are built. With new information products appearing at a fast rate, the need to evaluate new library technologies and products as they can be used to support academic research and teaching is a critical task of the subject librarian.

As new digital and optical formats are introduced, periodicals and monographs are still the main source of scientific and technical information. These new alternatives must be incorporated into the basic mission of collection development.[8] As has been expressed by Lawrence Thomas, "developing library collections is a matter of complex human behavior requiring decisions affected by economics, politics and scholarship." Technology is another factor that is now involved in the process.

Subject librarians are responsible for developing and maintaining subject collections, serving as library liaisons to academic departments, and maintaining an awareness of the current research and teaching emphases of academic programs. They assist in evaluating the feasibility of new information technologies in meeting information needs; participate in the budgeting process; assist in the fiscal administration of the collection development program; and provide in-depth research and reference assistance, bibliographic instruction and online searching for their areas of concentration. It is important for medium-sized research libraries to have science librarians who can perform all these duties and provide them within an organizational structure with clear reporting lines.

On this last topic of collection development

organization in academic libraries, Bonita Bryant[9] said that the most usual case found in libraries was staff from all units of the library having selection assignments. In this situation, when lack of leadership is present, then the systematic building of collections is inhibited. In general, the entire way in how collections are developed is a matter of concern, despite the fact that large portions of the university libraries' budget is dedicated to collections. The whole process can become more complex when ownership versus access has to be considered; local, regional and national resources need to be identified; solid knowledge of teaching and research orientation of academic departments needs to be nurtured; and well established liaison with faculty must be developed. All these critical tasks influenced by new technologies are better carried out by professional librarians who can concentrate on specific areas. In this kind of organizational framework, and as described by Bart Harloe,[10] "the librarian is a multitalented professional who might be expected to perform more than one role in the organization."

In the midst of new technology, the science and engineering librarian is an important element to produce change, whose expertise is needed in order to maximize the efforts of the library administration in creating services and collections according to today's high level of user expectations.

Collection Development and Information Services

Medium-sized research libraries require librarians who are knowledgeable in their collections, sources of publications in specific fields, specialized databases, and, in technical areas; knowledgeable in specialized collections such as technical reports, patents and engineering specifications. The initiator of the selection of these resources is the subject librarian. It is important to clarify that in this paper the term "collection development" goes beyond the traditional meaning of "selection of paper formats" and is more in agreement with the idea indicated by Charles B. Osburn,[11] that "the management of academic library services assumed a vast new dimension of complexity when our profession concluded that its business is foremost the provision of access to information." Information services and collection development in an information management environment are two complementary functions: one is an extension of the other and vice versa.

Miriam A. Drake has suggested that "information management in contrast to traditional librarianship, emphasizes individual service content and the value output."[12] A valid question is then how to achieve such high levels of service when a common opinion found in the literature of reference services is the fact that general reference staff are in most cases overworked[13] and that the work at the desk is a high-stress and energy consuming activity. Under these conditions, it is inappropriate to add subject-related responsibilities to staff members who are already working in a variety of different tasks.

The same author, M.A. Drake, also suggested that "In an academic institution information management strategies must build on the content of academic courses, the substance of research programs, the components of service activities, and specific data needed for administrative decision support," and added that "Knowing the nature of the user's context and how information will be used is crucial to managing information and providing services of value."[14]

Subject librarians working as information specialists bring the library resources to the users and at the same time the public service responsibility of the selectors enhances their understanding about the strengths and weaknesses of the collection because of the direct contact established with the users. It is logical to assume that those involved in a well organized collection development program for scientific and technical fields would be the best qualified to serve the information and research needs of the users from academic units with which they maintain a liaison. The incorporation of information activities into the process of collection development expects adequate personnel allocations and administrative support.

Scholarly Communication and the Researcher

As indicated by Evelyn Daniel,[15] faculty members are serving different roles in today's universities as researchers, consultants and teachers. They are obligated to high standards for tenure and promotion, and they have to compete for sabbatical leaves and internal research support. They must demonstrate research productivity in the form of scholarly writing and find external support for their research projects. Researchers usually work in an

environment that provides its own network: informal communications among scientists and engineers is a common practice. In addition, electronic networking also plays an important role in this scenario.

The whole process of communicating current results has changed drastically in the last twenty-five years. Thomas W. [16] Shaughnessy, who was charged with drafting a position paper on scholarly communication by the Association of Research Libraries, pointed out that informal channels of communication are preferred by researchers in need of more rapid access to research results. In the present publication process, information from fast-moving fields loses some of its value because of time delays and that in certain areas - like the sciences - every 10 to 15 years the literature doubles in volume. Shaughnessy also added that "telecommunications technology, double digit inflation in the price of scholarly books and journals, the decline of the dollar vis--vis foreign currencies, [and] attempts by governmental agencies to curtail access to information - have significantly affected the role of research libraries within the system."

It is important to recognize that print copies of some materials are needed - core journal collections of main scientific subjects, for example - but electronic products and services and document delivery on demand must become commonplace in the way scientists use information.

Peggy Johnson, [17] on the subject of implementing technology, included, among others, three factors necessary to implementing strategies for change: communication, leadership and incentives. These factors which have proven to be successful with library staff can also be used to motivate our faculty when new technologies are introduced. Faculty members can effectively help to produce the change needed.

New Technology - A Route for Change

Producing change in the way information is provided and collection development decisions are made in science and engineering is a complex process because of the many factors involved, which may be as numerous as those present in the system of scholarly communication. Fortunately, a good number of medium-sized research libraries have specialized librarians in science and engineering. Because these science and engineering librarians make very valuable contributions

to the process of transition by helping to achieve the changes needed, it is important that their roles be maintained rather than banished.

In the midst of new technology there are several things that a library administration can do in order to create change: it can control serials expenditures and guarantee access to scientific information and documents when needed; incorporate the selection of digital and optical formats into the basic mission of collection development; incorporate information management and collection development activities within a common framework; and support electronic products and services of information gathering sources, as well as document delivery on demand. On a campus-wide level, the library administration can also communicate ideas, provide leadership, and create incentives in order to integrate academic staff into the new system.

The library administration can also facilitate the development of bibliographic instruction programs about computer-based library products and systems for researchers, faculty and students in scientific areas; it can support science and engineering librarians in providing the high degree of services expected of them, as well as give them an organizational structure with clear reporting lines. On the other hand, it should control the proliferation of on-campus information-related technologies that might be outside the domain of the library.

The library administration should create an environment of open communication to encourage librarians and faculty to participate in the change: it can accomplish this by providing leadership with well defined goals and courses of action as well as lines of responsibilities, and by creating incentives, as in the case of faculty members, to utilize new technology as a way to access and manage the flow of scientific information more effectively. Finally, it can also encourage librarians, faculty and staff to produce change through innovative thinking. By following these guidelines, the university community can hope to achieve better quality research and higher productivity and maintain the library as a strong pillar in the system of scholarly communication.

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