Collection Assessment in Science Libraries:
An Overview

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ABSTRACT

Describes and evaluates the methodologies of collection evaluation and assessment as applied in scientific libraries. Discusses the Information process in the scientific community and relates that process to the structure of scientific literature, current publishing trends, and the economics of information delivery. Includes recommendations for ongoing as well as one-time, collection evaluation projects.

INTRODUCTION

"Regular, systematic collection assessments are essential to a well-managed collection development program."¹

"Collection quality depends on a library's collection development program — its policies, procedures, and methods — and how well that program fits with the library's stated goals and objectives."²

Collection assessment is generally defined as the process of measuring or determining the degree to which a library actually acquired the books, journals, and other materials it intended to acquire, especially in relation to a statement of policy. If the policy has been maintained in response to changes in the publishing world, the institutional environment, and, of course, user needs, it can serve as the basis for collection assessment efforts in any type of library. Collection assessment may also be viewed as an effort to determine how well the collection which now exists meets the needs of today's user group. And, as we shall see, there are other reasons which can motivate a collection assessment effort.

Our session this morning focuses on the methods of collection assessment in science libraries, and I have been asked to provide an overview of collection assessment principles, a context, if you will, for the presentations in the later session. I'd like to do so by establishing a context for collection assessment itself, first through a brief discussion of the scientific literature — how it develops, what its structure is, etc. This is important because many collection assessment studies result in a comparison of the existing collection with some segment of the universe of literature available on a particular topic. Librarians undertaking collection assessments in science libraries will benefit from an understanding of the structure of the scientific literature.

Secondly, collection assessment is an integral part of collection development because it ultimately reveals how well a library's collection development process has functioned. To discuss collection assessment within that context, therefore, it is appropriate to devote some attention to the underpinnings of collection development broadly, as these fundamentals are essential to an understanding of collection assessment. Of particular interest are the reasons for drafting collection development policy. These rationales become essential concerns in the assessment process and can be of direct benefit in the planning and analysis stages of collection assessment.

Lastly, I want to provide an overview of collection assessment — the rationales, the methods, planning and implementation of plans, and reporting the results. You will see that collection assessment in science
libraries does not depart dramatically from the same activity in other types of libraries, and that the underlying principles are the same. Because it will only be possible to cover the major points of collection assessment in the time allotted, I want to refer you to three publications which will cover the topic in much greater detail and in a more comprehensive way. You may find it useful to peruse these sources in deciding how to assess the collections in your libraries. Each includes extensive bibliographies on techniques, studies, and advantages and disadvantages of different approaches.


*Lancaster, F. W. If You Want to Evaluate Your Library ... Champaign, IL: University of Illinois, Graduate School of Library and Information Science, 1988.


THE SCIENTIFIC LITERATURE

The primary role of the literature of a scientific discipline is to record and transmit discoveries and ideas which advance the state of knowledge within that discipline. Another function of scientific literature is to help solve problems in the research process or the application of findings derived from research. The ability to do this is directly affected by the amount and quality of relevant information available. Scientific literature can be regarded metaphorically as a form of external memory from which we can extract and add at will. One may also view it as a structure made up of additions of small segments until a larger picture emerges. Ortega y Gasset postulates that “science advances by many small discoveries.” However one views it, that literature becomes a record of and for scholarship, hence, the “scholarly” record.

In Little Science, Big Science, Derek de Solla Price plotted growth rates of scientific literature over time and concluded that the literature of most scientific disciplines doubles every fifteen years. This growth rate has been relatively constant across disciplines. There is also a significantly high death rate for the scientific literature. Periodicals cease to be published and books become obsolescent. Price’s theory has recently been challenged by Stephen Lock, editor of British Medical Journal, in the pages of CBE Views. Lock notes that though there are approximately 100,000 science journals being published, a substantially smaller number (he suggests 60% for biomedical journals) are “serious” and that the notion of an explosion in the literature is greatly exaggerated. He concludes that the rate of expansion has been a relatively constant 5-7% each year. Whatever the case, there remains a vast scientific literature from which we as librarians must select items appropriate for a particular library collection.

The scientific literature can be examined structurally in many different ways: by format, by subject, by date, by country of origin, by publisher, by language, or by other device. Though each of these may serve an important function in collection development and assessment, the three principal ways in which the literature is divided are format, subject, and date. In examining the scientific literature by format, there are two principal levels of materials, each by its name reflecting in a real sense its relative importance within the literature. These two levels are
1. PRIMARY level material, which includes source documents, such as true journals, monographs, treatises, manuscripts, charts and maps, prints and portraits, and collateral reference items which contain original observations, e.g., annotated bibliographies and dictionaries.

2. SECONDARY level material, which includes all of the "synthetic" literature, or repackaging of the primary literature, made up of textbooks, reviews, popular treatments, annuals, handbooks, encyclopedias, indexes, etc.

Within each of these levels there are additional hierarchies. It is generally acknowledged that the true journal literature represents the most important format of the published literature of a scientific discipline, with monographs assuming a subordinate role. The visual record is also of great importance in the scientific literature, and it is present in both journals and monographs in the form of plates, photomicrographs, portraits, etc. Visual representations constitute an integral part of the literature of science and may indeed be each worth a thousand words because they alone or in sequence may form the very essence of an article. Only in art is the visual as important to the scholarly record.

When examining the scholarly record of science by subject, one may assign importance indicators, as most collection development policies do. The terms in these policies generally divide the literature into categories, e.g., core, related, peripheral, and out-of-scope. Many libraries utilize some version of these terms in describing collection development policy.

Scientific literature can also be explored by date. The most obvious method is to view the record by century. Another commonly used method is to carve out blocks around major advances in the science, such as the discovery of one of the building blocks of the science or the development of a particular method which had a broadening effect on the science. In looking backward at the literature, it is a frequent misperception that the older something is, the more important. While this may frequently be the case, it is not necessarily true with the scientific literature, especially as one reflects on Ortega y Gasset’s building blocks phenomenon.

COLLECTION DEVELOPMENT

Collection development may be regarded in the same way; for limited time periods we as librarians develop collections by building parts of those collections through selection in discrete topics, resulting in a mosaic of related parts. As collection development describes the building of the mosaic, collection assessment is the analysis of the mosaic.

Collection development as a specialized function in science libraries is a relatively recent phenomenon, though the concept and the rubric have been generally employed in academic libraries for some time. Until the last decade, selection activities in science libraries have usually been assumed by the acquisitions librarian or have been regarded as the exclusive responsibility of the library director. The term collection development had its origin in academe, and was first used in science and other specialized libraries in the late 1970s.

Science librarians have, of course, been developing collections since the establishment of the first science library, but in the last decade or so, the processes, policies, and philosophies surrounding that activity have been scrutinized and articulated in such a way that a new specialty has arisen. The library’s collection is the foundation upon which all other library services are dependent. Developing the collection is one of the most important — if not the most important — of pursuits in librarianship.

Documentation of selection principles in particular has led to the more systematic codification of overall policies and procedures, and to the expansion of responsibilities regarded as selection-related. Collection development in many libraries embraces a wide variety of functions.

Librarians frequently assume responsibility for selection, as well as other functions such as budget planning, resources sharing, and collection management. These activities, which are not necessarily new but may be newly emphasized, span the traditional technical services and public services division within most libraries. Success in collection development requires a more sophisticated understanding of the research
process, the professions dependent on the library, and a solid knowledge of the creation and use of scientific literature and information. This knowledge has, in most instances, been acquired by librarians through experience rather than through formal library school training.

A library's collections should be developed in a manner consistent with its overall goals, and collection development implies not only the selection of specific materials but also a master plan — a vision of how the library, responding to its unique set of circumstances and responsibilities, will build its collections and make the wisest use of its resources.

The basic functions of collection development include the following:

1. Identification of literature — maintaining an awareness of new publications.
2. Selection of literature — assessing new titles which add to the intellectual base of the collection.
3. Deselection or withdrawal of literature — maintaining the currency of the collection.
4. Preservation of literature and establishing priorities for preservation.
5. Evaluation or collection assessment — determining how well the overall program is doing.
6. Collection management — replacement, circulation, etc.
7. Budget control — allocation of resources, budget projections, responding to changes in the publishing industry.

Libraries exist within an institutional context, and the purposes of the institution and the library's user groups need to be identified and kept at the forefront of the collection development process. The goals of the library must then be connected to the goals of the institution. Depending on the institutional structure, collection development functions are addressed within that structure and within the library in a variety of ways.

The particular organizational type will be dictated by the library setting and staffing availability or expertise. No organizational model is "the best," but all must maximize talent and minimize conflict between organizational components. The structure should be flexible and should recognize that collection development assumes an equal organizational status with public and technical services. The success of the latter depends in large measure on the success of the former.

The combination of collection development and purchasing responsibility in one individual is the most frequent model in academic science libraries. Science bibliographers, or subject specialists, are rare and are usually found in settings where the library is a unit or branch of a large institution. As organizational models provide a construct for the collection development process, the type of collection may also require that a greater emphasis is placed on some selection principles. Whatever the organization or type or material, the differences should be evident in the policies and procedures which govern the selection and deselection processes. These requirements and differences are important factors in collection assessment as well.

POLICY AND SELECTION

It is unusual indeed to find a library, particularly one in the sciences, which can have as a realistic goal a collection which includes all items which the user group might need. It is clear that choices must be made. These choices are made within the framework provided by a well-documented collection development policy. In general, financial support in sciences libraries has declined during the recent past though the number of in-scope titles being published continues to increase. These two factors together have caused libraries to develop more rigorous selection methodologies and also to define more closely the criteria by which decisions are made. A decision to acquire a journal title, for example, carries with it a future commitment of funds for
binding and staff time for processing; such mortgages on the future require that libraries adhere more closely to collection development policies and criteria.

The belief that collection development policies are important to libraries was not always the case, nor indeed were they always thought necessary. Prior to the "information explosion," when many libraries felt that it was still possible for them to acquire everything published, or at least everything within a defined area, there was little need to articulate policies to govern the process. There has been a gradual recognition of the value of documenting the policies and procedures which surround collection development. To date, no formal guidelines for these policies exist specifically for science libraries, but in 1978 the American Library Association promulgated, under the editorship of David Perkins, the first edition of Guidelines for Collection Development. This work has much which is of use and pertinence to science librarians, and a new edition is in preparation.

There are many reasons to justify the drafting of a collection development policy, and they vary from institution to institution. The following list contains some examples of reasons to document the policy and the process. Each of these in turn can be modified to become a "use" for such a document, and can be incorporated into a plan for collection assessment. A collection development policy

1. Relates the goals of the library to the goals of the institution.

2. Provides a rational basis for selection and deselection decisions.

3. Demonstrates that collections are developed to support specific institutional programs.

4. Assures that the needs of the inarticulate and reticent will be served, as well as those of the articulate and vocal.

5. Establishes a framework for budget allocations and lends legitimacy to those allocations.

6. Communicates to users and other institutions the nature and limits of the collection.

7. Assigns responsibility for collection development and defines relationships among staff and with other libraries or institutions.

8. Promotes consistency in collection development decision making and minimizes individual interpretation of policies.

9. Educates staff and users to the importance of collection development and its place within the library.

10. Ensures currency in the collection.

11. Provides a base for long-range planning.

12. Articulates criteria which govern collection development.

A collection development policy, especially by articulating collecting levels and focuses for the particular collection, serves as a benchmark for collection assessment and evaluation studies.

COLLECTION ASSESSMENT

"Collections have been evaluated since libraries began building them, and the literature related to the many methods available is large." Mosher traces programmatic collection evaluation back to the mid-nineteenth century with Jewett's 1849 comparative analysis of citations in several lists of notable books in international law, chemistry and anthropology. The lists were compared against holdings of major libraries to substantiate the budget request for the Smithsonian Library which he directed. Following Jewett, collection evaluations were principally narrative descriptions of the high points of the collection — the great works of
scholarship, medieval authors, etc. It was not until the 1930s and 1940s that true collection assessment began to emerge. Its principal purpose was to demonstrate the inadequacy of holdings. The most popular method of evaluation in the early part of the twentieth century was comparison of individual holdings to those in a scholarly or select bibliography. These bibliographies had the endorsement of major professional associations, including ALA. The librarian used the bibliography as an "indirect expert" to make qualitative statements about the utility of the collection.

As already noted, the drafting of policy and criteria and the documentation of procedures for implementing those policies and criteria provide the framework for developing a collection over time. Collection assessment or evaluation allows the librarian to examine how well that framework has served and continues to serve the library and the institution. Collection evaluation studies can be complex or simple and can be done as projects or integrated into collection development routines.

Data from such studies allow libraries to make adjustments to those routines and also to enhance practical routines, such as budget justifications and requests for additional funding support or for the re-allocation of existing funds. They allow also for greater assurance in setting collection development priorities and for developing a systematic plan for collection enrichment.

Collection assessment studies themselves are useful for staff education because these studies require that one become familiar with the literature of a discipline. This familiarity should result in a greater awareness of the elements of that literature and lead to more finely honed collection development skills among the librarians in charge of building the collection in a particular discipline. Results from studies may also be helpful in enhancing faculty/user and library communication, as well as selector to selector communication in larger settings. The effort establishes a common base for discussion with users in a targeted discipline, fostering communication and increasing awareness of both the collection development process and the choices facing selectors and scholars.

Collection assessment also has important implications for and linkages to a number of other library functions, including reference and public services, interlibrary lending and borrowing, cataloging, acquisitions, and preservation. The data, as well as the experience of participation in collection assessment studies, can have beneficial applications in nearly all library activities.

Some of the uses for the data from collection assessment studies have been noted above. The reasons for undertaking such an effort in a library may derive from those uses or may stand alone. Among these rationales are the following:

1. To determine the effectiveness of the acquisitions program.
2. To enhance the service capabilities of the library.
3. To identify and address weaknesses or lacunae in the collections.
4. To determine preservation priorities.
5. To provide information for collection enhancement.
6. To enhance the skills of collection development staff by intense exposure to a subject or format.
7. To place the library's collection in perspective with the collections of other similar libraries.
8. To provide information for cooperative collection development programs.
9. To verify a library's collection strengths as reported to regional or national collection inventory projects such as the RLG Conspectus and the North American Collections Inventory Project.

10. To increase understanding of the literature of various disciplines in the health sciences.

The professional literature of collection evaluation and assessment in research and academic libraries is fairly extensive, including a substantial literature on weeding. By contrast, the literature on collection assessment in sciences libraries specifically is relatively sparse. Lockett only includes a handful of citations with direct bearing on science collections, among them a 1968 evaluation of the science/technology collection in a university library, a local study using ILL analysis to justify scientific backfile acquisitions, and a very thorough review of citation studies in science and technology. Kelland, whose work references an interesting methodology for evaluating a vertebrate zoology collection. There is a large literature discussing publication patterns in the sciences, scientific communication, citation analysis, serials review projects, and the development of the literatures of various scientific disciplines. Notable in the latter category are the Institute for Scientific Information (ISI) citation studies, which can be extremely useful in determining literature universes in some disciplines. All of these sources can be drawn upon as necessary to support a collection assessment program.

PLANNING STEPS

An overall collection assessment program may be viewed as a series of discrete projects governed by a common philosophy and plan. The planning steps for each project may be influenced or dictated by the particular topic, but several steps will be common to them all:

1. Determination of the scope of assessment.
2. Setting of specific goals.
5. Determination of resource needs, such as personnel, computer support, consultants.
6. Documentation review, e.g., existing policy, the institutional research agenda.
7. Identification of measures or standards against which the assessment results will be compared.

The projects comprising a collection assessment program should, over time, focus on practically all aspects of the collection. Studies may be conducted on

1. Subjects, both specific and broad.
2. Literature formats, such as serials, monographs, audiovisuals.
3. Collecting levels as stated in the collection development policy.
4. Literature types, such as government documents, theses, annual reports.
5. Materials produced to support a particular purpose such as education, reference, materials testing, etc.
6. Materials in a selected language or language group.
7. Materials published in a selected country or region.

8. Materials published during discrete time periods.

9. Materials written by or about a particular author or institution.

10. Materials produced by a particular publisher or group of publishers, such as associations.

METHODS

A variety of methods may be applied in collection assessment studies, and these methods generally fall into two categories: quantitative, or numeric, and qualitative, or judgmental. Lockett, Lancaster, and Hall all compare methods and agree that there is no single universal method for conducting collection assessment studies. They all recommend, however, a combination of approaches to provide data sets which can be compared and weighed.

Collection assessments generally cannot be structured from the premise that it is possible to examine every item or title which may exist as part of that imprecise universe. Such an approach is also not necessary if the assessment proceeds under a well structured plan that includes a variety of methods to open windows into aspects of the literature — by type, by geographic origin, and by use. From these analyses of smaller segments of the literature, it is possible to develop inferences and apply them to the overall subject collection under scrutiny. In devising a structure for a discipline-based collection assessment, one must take into account the development and unusual characteristics of the discipline’s literature, and the interrelationship of the discipline with other disciplines.

Quantitative studies are principally bibliographic and include such activities as comparing lists against files; analysis of citations drawn from a selected group of articles; examination of statistical compilations such as interlibrary loan “non-files”; and collection growth rates. Qualitative studies may also be bibliographic and are characterized by value judgments. Examples of this type of study include the checking of standard or approved lists of items — an inductive approach; the seeking of advice from subject specialists or other experts, and the application of that advice to quantitative data; and sampling the opinion of users of a segment of a library collection.

It should be pointed out that citation analyses in collection assessment are different from the citation analyses which are more traditionally found in bibliometrics, e.g., “scatter,” “obsolescence,” and Bradford-Zipf analyses. Citation analysis in collection assessment utilizes citations to develop a list for comparison against a collection; this process is not an analysis of the citations themselves.

Though time does not permit an in-depth comparison and discussion of individual collection assessment methods, I do want to call your attention to a new method of assessment called “cumulative layering.” Stielow and Tibbo discuss this technique in detail and describe it as a model which accommodates and relates the data from a range of collection analysis techniques. It is a technique which is most useful for macroassessments. It attempts to balance quantitative and qualitative measures through a broad contextual or general systems framework to embrace the entirety of the assessment process. The model provides an interesting solution to one of the fundamental difficulties of large scale collection assessment activities — the interrelationship of data about a single collection from a set of seemingly unrelated methodologies.

To achieve the goals of most collection assessment programs, the principal methodologies tend to be quantitative, which are the most time intensive methods. They provide substantial statistical data, however, and produce a solid base from which interpretation and planning can be accomplished. The types of lists useful for checking vary from discipline to discipline and format to format, but should include such items as “great works in...” recommended lists from accrediting agencies; “core list of titles in...” citation studies, especially those from ISI; and literature analyses in book and periodical form. For studies focused on publications of a given country or in a particular language, national bibliographies and the expertise of book
and periodical dealers can be utilized. Expert advice can, and in many instances should, be sought from professional groups and from individuals with expertise and interest in a topic.

PERSONNEL AND REPORTS

Having examined a number of ways to look at collections, the inevitable question arises — who is going to do this? Staff from all areas of the library should be encouraged to participate in collection assessment studies. Individuals who will assume primary roles in the program are those staff members with selection responsibility. Other staff members who may be called upon include catalogers because of their knowledge of the literature, reference librarians because of their service knowledge and awareness of user group needs, format experts, and subject specialists.

Technical support staff, if available, can generally be expected to complete bibliographic checking tasks, and assistance with statistical interpretation and computational methods may be sought from outside the library. An individual staff member should be identified to coordinate the assessment study. Librarians with selection responsibility should include assessment studies as an ongoing part of their responsibilities. Even librarians in one-person libraries can and should undertake collection assessment studies. The study can be as involved as the staff time available, and data derived from other library routines can frequently be utilized to assess the collection.

To provide an historical record as well as an action plan to address difficulties, written reports with a description of the project, methods employed, data derived, and an analysis of the findings should be done at the conclusion of each project. The report should include, where necessary, a draft of a revised collection development policy statement for the topic.

Reports can be formatted according to some variation on the following outline:

1. Definition of topic and description of objectives.
2. Statement of scope of project.
3. Documentation, lists, etc.
4. Methodology.
5. Findings:
   - Description of existing collection.
   - Other collections (as appropriate).
   - Strengths and weaknesses.
6. Analysis.
7. Recommendations.

Reports should be shared within the library and with users and outside agencies as appropriate. A centralized and comprehensive file of collection assessment studies should be established and maintained.

The implementation of a comprehensive assessment program will be dictated by the local situation, but it is useful for any type and size of library to institute a routine for evaluating the collection subject by subject, section by section. A small number of major assessment projects may be identified for completion and a schedule drawn up. Additional projects may be scheduled if personnel and other resources become available. Smaller, more discrete projects focused on formats or topics should also be scheduled, especially in connection with other collection development activities.
SUMMARY

In summary, we have looked at collection assessment in broad terms — the reasons for evaluation, the methodologies, planning and implementation, and reporting the results. To underscore these points, three metaphors come to mind. The first is a ball of twine. Collection assessment may be viewed as unraveling the ball and rewinding it to reflect an updated image of the collection development process. Because it is necessary to unwind the whole ball, however, one may wind up with a result that resembles a knotted mass of string.

The key word in collection assessment is SAMPLE — look at different aspects or parts, not the whole collection, nor even the whole bibliography. For macroassessments, introduce a series of samples which can be called STRATIFICATION. A simpler and more appropriate metaphor is the box of candy called the Whitman’s Sampler — you do not need to eat the whole box to know what the candy tastes like.

My favorite metaphor, however, is the layered cake. A collection may be viewed as a series of layers, and a slice tells you how good is the whole. Therefore, my advice is to approach the task with metaphor number three in mind, and you will find that collection assessment is a “piece of cake!”

REFERENCES


