Learning About the Information Seeking of Interdisciplinary Scholars and Students

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ABSTRACT

THE INFORMATION NEEDS AND information-seeking behavior of scholars and students in interdisciplinary fields has been studied very little. The few scattered studies available suggest that such fields may require striking and distinctive information-seeking adaptations by researchers that mark this area as different and very much deserving of research. Kinds of research needed at both basic and applied levels and with respect to both scholars and students are discussed.

INTRODUCTION

Successive decades of research on information needs and information-seeking behavior have emphasized the study of different broad constituencies of specialists. In the 1950s and 1960s—in part because of the availability of U.S. Federal grant money—the emphasis was on the needs of scientists and engineers (see Meadows, 1974). Needs in the social sciences were attended to in the 1970s, especially with some major research studies that were performed in Great Britain (see review in Hogeweg-de-Haart, 1984). Finally, in part through the support of, and activity of, the Getty Trust in the arts, attention turned to the arts and humanities in the 1980s and 1990s (see Watson-Boone, 1994; Bates, 1994; Bates et al., 1993, 1995).

At least two more broad constituencies remain woefully lacking in research on information seeking:

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1. The performers—as distinct from the scholars in the arts—the artists, designers, musicians, actors, dancers.
2. Interdisciplinary researchers—people engaged in the study of fields that span two or more of the established academic disciplines.

It is the second of these two groups that is the focus of this article.

Prior Suggestive Research

Research on information use and information-seeking behavior of people in interdisciplinary fields is sparse to nonexistent. To those whose studies have been missed, my apologies, but a literature review in the conventional places and under conventional terms resulted in the same low hit rate encountered in the past. With increasing interest in interdisciplinary work in scholarship, in fields such as popular culture, film studies, ethnic studies, gay and lesbian studies, and women's studies, it is high time research on information seeking was done in this area.

But research on the information-seeking behavior of scholars and students in interdisciplinary fields would do even more than fill in an obvious gap in our knowledge of this segment of academia. There is reason to suspect that the problems and information- seeking patterns of this group may be dramatically different from those of the scholars in the classical academic disciplines such as history, literature, etc. even where an interdisciplinary field may draw its inspiration and researchers from people trained in these very same established disciplines.

In 1962, L. J. B. Mote published a study which contained some provocative results. Mote divided the scientific users of the Shell Thornton Research Centre Library (United Kingdom) into three groups according to whether their fields of research were low, medium, or high scatter. Low scatter fields were defined as those in "which the underlying principles are well developed, the literature is well organized, and the width of the subject area is fairly well defined" (p. 170). In high scatter fields, the number of different subjects is great and the organization of the literature is almost nonexistent. The medium group fell between the other two in degree of scatter.

Mote (1962), drawing from a sample of 178 people, found that the average number of inquiries requiring thirty or more minutes to answer per person during a three-year period was, for the low to high scatter group, 1.4, 3.6, and 20 (yes, twenty!), respectively. No one in the low scatter group made more than six inquiries and no one in the high scatter group made fewer than ten inquiries (p. 172). In a smaller sampling, the same pattern was found with requests that required under thirty minutes to resolve.

The low and high scatter groups diverged from each other by a factor of over ten to one. This is a most striking and suggestive result. Even

though the study was done in the sciences and engineering, we may well wonder if such divergences might also be found in "high scatter" fields such as area and ethnic studies where the researcher must cross several disciplines to locate all relevant background material for a research project. Could it thus be the case that a researcher in an interdisciplinary field could have ten times as many problems with the process of gathering information for research as people in conventional disciplinary fields?

More recently, Packer and Soergel (1979) also studied scientists (chemists, in this case) in fields with low and high scatter. They focused on techniques used for keeping up to date, or "current awareness" techniques. They found that taking advantage of selective dissemination of information (SDI) services helped the scientists' efficiency in high scatter fields and actually *reduced* efficiency for those in low scatter fields. To put it differently, diametrically opposing strategies were optimal for researchers in high versus low scatter fields. (SDI is a technique whereby bibliographic citations or copies of new materials received in the library are selectively sent to individual researchers. The selection is based on profiles prepared of each researcher's interests.) So again we see the high/low scatter difference in the character of fields producing a marked effect—in this case, scientists needing to engage in different strategies depending on how focused or scattered the field.

Support comes from another quarter as well for the premise that interdisciplinary information seeking is particularly plagued by problems. The Group on Interdisciplinary Searching of the International Council for Scientific and Technical Information studied the problems specific to interdisciplinary information seeking. Their *Journal of Documentation* article (Weisgerber, 1993) consists of a dense twenty pages of problems and possible remedies in six areas: "1) coverage and technical content of the database, 2) bibliographic information, 3) textual content, 4) numeric data, 5) file organisation, and 6) interdisciplinary searching on multiple hosts" (p. 231). An example of an information-seeking problem is that conference proceedings are cited in a number of different ways within and across databases (p. 238).

Still another study produced results that have enormous implications for the provision of information services to researchers. Again, working in the sciences, Julie M. Hurd (1992) studied the journal citation patterns in the research papers produced by chemistry faculty at her university (University of Illinois at Chicago). She found that a great many of the citations were to work outside the researcher's discipline. Over 49 percent of the journals cited in her sample's publications were in fields outside chemistry. Individual chemistry professors differed in what percentages were from the outside—the range was 0 to 100 percent. On the other hand, there were practically no citations outside the sciences (p. 293) (earlier, Paul Metz [1983] had found similar outside-of-field

circulation of books to faculty. Also, Howard Pikoff [1991] found that professors, when offered the opportunity to see new acquisitions lists for subject areas all over the Library of Congress classification, frequently selected topics outside their discipline as well as intradiscipline areas).

Hurd (1992) found, further, that chemistry researchers with high citation rates outside the field of chemistry were those researchers who were working in fields that were, by definition, interdisciplinary—e.g., biochemistry and physical chemistry. These chemists cited, respectively, 85 percent and 64 percent of their references to nonchemistry journals, mostly in biology and physics. On the other hand, chemists at the core of the discipline, in inorganic and organic chemistry, cited nonchemistry journals only 29 percent and 24 percent of the time, respectively (p. 294). These results suggest that there is indeed higher scatter in interdisciplinary fields but also that even core fields have connections outside the core.

Hurd (1992) describes some of the implications of her results for provision of information services to scientists as follows:

> The high level of interdisciplinary information use measured for these chemists appears to argue against the narrow departmental library type of organization. A chemistry library, narrowly defined and stocked, would only partially meet their needs; a broader, divisional science library seems better suited to support their highly interdisciplinary research. (p. 295)

Over the years there has been a strong pattern at major universities of developing discipline-sized libraries in parallel to discipline-oriented departments. Hurd's results suggest that the assumption behind that practice—that libraries, in their size and organization, would do best to mirror the intellectual "turf" organization of disciplines—is misguided.

Prospective Possibilities in Basic Research

All the studies discussed in the previous section are notable for their striking results. In each case, the implications are major, not minor, ones involving small adjustments. These results suggest that there may be dramatic differences in the kinds of strategies needed and the amount of effort needed to seek information, depending on the degree of coherence of the bibliographic resources of a field. In sum, studying researcher information seeking in interdisciplinary fields may tell us not only about the needs and problems of people in those fields—something we very much need to learn about—but also about what factors, in general, contribute to ease and difficulty in information seeking in scholarship.

In fact, the results of the Mote study touch on one of the most fundamental—and therefore rarely examined—assumptions in our field. It is taken as a given in library and information science that the organization, description, and indexing of information in indexes, catalogs, and refer-

ence books contributes to the successful and speedy retrieval of information by users. Do we know that it does this in fact? Both the Mote (1962) and Packer and Soergel (1979) studies indirectly suggest that such information organization does make a tremendous difference.

On the other hand, Stoan (1984) has argued persuasively that the model librarians have developed of information searching in academic libraries bears little resemblance to actual research techniques used by scholars and their graduate students. Our conception of the kinds of information access and library organization that will be useful to scholarly users might, in fact, match poorly with their real needs. Thus the question remains open as to whether libraries' access apparatus is, in fact, optimally supportive of scholars' library research.

We might learn much more about just what kinds of organization produce what sort of an effect were we to compare fields that are well controlled—such as conventional academic disciplines—against fields that are not well controlled—such as interdisciplinary concentrations.

The Mote (1962), Packer and Soergel (1979), and Hurd (1992) studies were all done in the sciences and engineering, and we know that there are major differences between the sciences and the humanities and humanistically-oriented social sciences that are the emphasis in this article (see Bates, 1994; Bates et al., 1993). Nonetheless, these studies are highly suggestive.

It certainly seems to be a reasonable preliminary hypothesis that scholars in interdisciplinary fields may have to engage in both substantially more information seeking—and of a different kind—than scholars in a conventional discipline.

In reflecting on the activities of scholars in these fields, one can identify several possible sources of these differences. A scholar can be seen as the cynosure of an extensive social and documentary infrastructure. Academic fields develop a common vocabulary and research style, establish journals, found academic departments, create professional associations, hold conferences, and communicate informally in a number of ways. Libraries, special collections in libraries, and archives are set up with a focus or emphasis that may influence the kind of research done. (For instance, what might be the impact on historical or political science research of having separate presidential libraries around the country, making it easy to concentrate on a single administration, and hard to cut across several administrations?) Bibliographic and other research reference sources are published and collected in scholars' own libraries and in academic libraries. When failures, changes, and gaps anywhere in this extensive scholarly communication apparatus can be identified in interdisciplinary—in contrast to conventional—academic fields, these differences could reasonably be expected to have a substantial impact on the conduct of research.

This scholarly apparatus is in fact so extensive that one could generate dozens of hypotheses about possible differences among the fields. Instead, whole classes of hypotheses will be condensed by talking about broad areas where we might expect differences to be found.

First, we need basic descriptive information: *Are* there differences between interdisciplinary fields and conventional disciplines in the information needs and information-seeking behavior of their member scholars? Is research and "keeping up" harder for people in interdisciplinary fields? Must the scholar know two or three times as many information resources of each type to cover the territory of interest across two or more fields, or, likewise, must the scholar know and stay in touch with two or three times as many fellow researchers?

Or do compensatory mechanisms develop, mechanisms unique to interdisciplinary research, that make the scholar's task no more difficult than that of scholars in conventional fields? We do not know the answer to these questions at this point.

Second, we might ask whether there is a natural life cycle to the study of a research specialty topic. Diana Crane (1972) found this to be so in her investigation of communication among scientists in subfields of sociology and mathematics. She charted periods of initial slow growth, followed by explosive growth as new researchers are drawn into the field, and finally, a tapering off of research and publication as a subject matures as a topic of interest (p. 172).

Is an interdisciplinary field simply a new field that has not yet earned full separate-field status? In other words, do disciplines generally feel "interdisciplinary" when they are new? This might evolve because scholars are often drawn to a new field from existing fields, and ideas and research problems in existing fields may be the stimulus for the development of the new field. On the other hand, might some fields remain genuinely interdisciplinary through time, continuing to draw on people from several fields and continuing to need nourishment from several different intellectual traditions? These are hard questions to answer and should probably be left to researchers in scholarly communication and the sociology of science.

For our purposes in information science, these questions might be constructed in the following manner: What is the life history of development of various channels of communication and various forms, or genres, of information resources in a field? Do interdisciplinary fields go through characteristic stages of development, each stage associated with certain typical patterns of ease and difficulty in gathering primary and secondary information for research purposes? Have different interdisciplinary fields responded differently to the challenges of such research with some fields, perhaps, more successful in their response than others?

In the process of studying these various questions, much work needs to be done to define "interdisciplinarity" operationally. Is it, in fact, detectable through high scatter of information resources? Or is there some more essential measure that is closer to the heart of the meaning of the concept?

Do we start from formal theoretical categories and define what the real-life consequences should be based on the theory, and then test the theory? Or do we take a bottom-up approach and identify one or more characteristics, such as Hurd's out-of-field citation rate, study that statistic in a variety of environments, and develop hypotheses to test further? There are so many possible measures to be taken and questions to be tested in this area that a final decision on methodology must await more specific hypotheses in each.

However, this author confesses to a bias toward the latter approach at this stage of our knowledge. Questions of what is interdisciplinarity have generated a small blizzard of books and articles (e.g., Chubin et al., 1986; Becher, 1989; Klein, 1990; Easton & Schelling, 1991). At this stage, our empirical (as opposed to theoretical) understanding of what it means to work in, and search for, information resources in an interdisciplinary field is minimal. Some basic descriptive work, perhaps using several operational empirical measures to discover the "lay of the land," will likely turn up results as novel and stimulating as the studies discussed earlier. Based on those findings, the next steps in the study of interdisciplinary information seeking could be planned more rationally.

Prospective Possibilities in Applied Research

In addition to doing basic research, we in library and information science are also engaged in a profession with many practical questions to answer regarding the provision of services to meet information needs and uses. It seems reasonable to hypothesize that certain types of resources and services would be particularly useful for the interdisciplinary scholar:

- "One-stop searching" could readily be done in resources that are themselves multidisciplinary, such as the "Dialindex" database of index terms and hits on terms across databases provided by DIALOG Information Services, as well as DIALOG's "OneSearch" capability in which several databases can be searched simultaneously for topics of interest. Indeed, scholars in the Getty Online Searching Project were particularly taken with the OneSearch capability and found that it revealed work in other fields relevant to their own work of which they had been unaware previously (Bates et al., 1995). Likewise the "Permuterm" subject indexes—i.e., indexes of title words of articles—of the three citation databases produced by the Institute for Scientific Information (ISI)—*Arts & Humanities Citation Index, Social Sciences Citation Index,* and *Science Citation Index*—each function as subject indexes across a wide range of subject fields.
- Citation indexes themselves would be particularly useful for interdisciplinary research as well. The principle of ISI's citation indexes is that they list all the materials ever published that happen to be cited in a given time period, such as a year, in a carefully selected set of thousands of scholarly journals. The scholar may be surprised to discover that someone in another field has used his or her work or that the study of a favorite topic of interest is going on in another field one has never heard of.

Making these links through citations instead of through subject terms is particularly valuable because the same theme or issue is often discussed in different vocabulary from one field to another (see Weisgerber, 1993, pp. 241-44, for a catalog of problems associated with subject indexing access. Smith [1974] also found difficulties with mapping subject terms from database to database). By following up citations to works of proven value, there is no need to know another field's vocabulary in order to locate the information.

- The provision of selective dissemination of information services would be particularly valuable to interdisciplinary scholars compared to those in conventional disciplines. This hypothesis coincides with the Packer and Soergel (1979) findings discussed earlier. It is by no means clear, however, that this hypothesis will be demonstrated to hold true in the humanities, where scholars like to do their own searching and browsing in the literature.

Practical testing of the above hypotheses could be done in a variety of ways. For example, bibliographic instruction classes could be offered specifically for people in interdisciplinary fields and which included the above sorts of sources. Plumbing people's reactions at the time and later, after some experience with these sources, could give a sense of how beneficial researchers found them to be. Though scholars are ordinarily loathe to admit to any deficiencies in their information-searching techniques, they might be more inclined to take a special class if it is offered as a way to learn new online sources.

Next, if, as assumed, it is more difficult for interdisciplinary scholars to do research in documentary resources, then might it not also be so for students? Some work has already been done in this area (SantaVicca, 1986; Bartolo & Smith, 1993), but much remains to be studied. Should students in such fields have more intensive—and different—training in library research and targeted to their special needs? An experiment could be conducted to test a bibliographic instruction package directed to students of interdisciplinary fields. We can surmise in the short term as to what kinds of training they need, but clearly the best long-term solution is to get the basic research data, discussed earlier, upon which to base course design.

To this point of the discussion, secondary sources—the kind that are the principal concern of libraries—have been the focus. But some primary archival sources in some interdisciplinary fields may be different also from those in conventional disciplines. Scholars in all the ethnic studies fields, as well as women's studies and gay and lesbian studies, may not have the usual range of documentary sources available to them. Because the people being studied in these fields were often outsiders and relatively powerless in the establishment structures of society, information must be gathered in unconventional ways, including through oral histories.

CONCLUSION

Altogether, the mix of research and library techniques needed by scholars and students in interdisciplinary fields may be unique to such fields. As such, these people constitute a significant and distinctive class of scholars, much deserving of research on their information needs and information-seeking behavior. Results from such studies would shed light as well on deeper questions regarding the life history of fields and disciplines and the inherent nature of interdisciplinary research.

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