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## Introduction

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EVERY LIBRARY IS A COMPLEX OF INFORMATION SYSTEMS that promotes the process of intellectual exchange. Bibliographic systems, indexing systems, document delivery systems, and the librarians who design them and provide assistance, work interdependently to foster the use of our huge stock of knowledge. The collections, tools, and services within each library make up an ecology of information systems dedicated to passing knowledge from one person to another. According to the late economist Kenneth E. Boulding (1968), without professions of intellectual exchange, the body of knowledge would be a “mere pile of intellectual accumulations instead of an organic and operating whole” (p. 147). However, do our systems really function as an operating whole? The stock of knowledge is continually increasing in both scope and specificity. It is in a state of flux, an ongoing process of growth and reconfiguration, with the exterior boundaries expanding and the internal geography becoming more and more complex. Creating and sustaining information environments that allow the unrestrained interchange of knowledge is, undoubtedly, one of our field’s greatest challenges.

In our attempts to make functional systems out of piles of intellectual content, librarians make many decisions that influence the course of exchange. They decide what to include in collections, what each item is about, and where it will reside—physically and virtually. Some of our most important work is navigational. We plot intellectual connections by deciding how to represent materials and how they relate to each other. We further influence intellectual directions by steering, or failing to steer, users in advantageous directions. The established academic disciplines and

our current systems of information do not always explicitly represent newer territories and the interdisciplinary associations that link them. To find the answers that lie in the networks between disciplines, we learn to collect and combine elements by engineering paths around and through disciplinary divisions.

The division of knowledge has long been a concern of library and information science. In 1968, the librarian of Johns Hopkins University, John H. Berthel, predicted that the dichotomy within universities between specialization and synthesis would become a critical problem for research libraries. While specialization creates new divisions, synthesis dismantles old ones, and the partitions and mergers between disciplines impact all phases of the information transfer cycle—i.e., production, access, use, and distribution. Our profession has the often dissonant responsibilities of building frameworks for controlling information and breaking down the barriers that disrupt the free flow of information. As a result, libraries lie in the balance of tensions between established disciplinary structures and the growth of interdisciplinary knowledge.

Interdisciplinarity has become a topic of wide interest, penetrating the sciences, social sciences, and the humanities. Many researchers practice it, and others study it. Scholars in the emergent area of knowledge studies have made many observations that call attention to the importance of interdisciplinary inquiry for the advancement of knowledge. For example, they have claimed that path-breaking ideas usually come from cross-disciplinary investigation (Turner, 1991), and that disciplinary boundaries are the fault lines that conceal future scientific revolutions (Fuller, 1988). Perhaps even more important for library and information science is the assertion that upgrading our knowledge systems will require more than bridge building and spot repairs if we wish to maintain the cultural and intellectual integrity that underlies our institutions of education and research (Klein, 1993; Allan, 1986). Accordingly, as preservers and purveyors of cultural and intellectual materials, librarians will need to resist superficial solutions to the complex problems of knowledge exchange. Constructing a strong and useful foundation for research and education depends on an in-depth understanding of knowledge structures and how people interact with information and produce new knowledge.

This issue of *Library Trends* is a forum for dialogue on the interdisciplinary nature of knowledge and the information work involved in inquiry that crosses disciplines. The collection is, in itself, an interdisciplinary compilation. It includes articles by a professor of humanities and two social scientists, whose earlier work in knowledge studies has been particularly opportune for our field. These contributions—by Klein, Pahre, and Dogan—provide an analytical framework for the volume, shedding light on contemporary patterns of knowledge production. Their

articles are interwoven with those by library and information science researchers and practitioners, who draw from these and other allied scholars for their research and practice-based analyses of interdisciplinary information use. As a group, the authors provide a range of perspectives. They cover the context and practice of interdisciplinary inquiry and the cross-disciplinary communities that produce knowledge. A group of studies addresses specific integrative information techniques, followed by a discussion of structural consequences of integration. The concluding articles examine the implications for the administration of library services and the profession as a whole.

The true introduction to this collection is by Julie Thompson Klein, the author of two pivotal books on interdisciplinarity (1990, in press) that are highly relevant to our field. Her opening piece lays the groundwork for this issue of *Library Trends* with an evaluation of the activities and problems involved in interdisciplinary inquiry and the encompassing institutional structures. Her analysis ultimately calls into question the alignment between the current arrangement of knowledge and the needs of information users. This criticism appears particularly astute next to the review of LIS research by Marcia J. Bates. The lack of fit between users and information systems and services seems inevitable considering the dearth of research on the information-seeking behavior of interdisciplinary researchers. The literature shows there is much to learn from this unique group of users, and Bates makes informed recommendations for both basic and applied approaches to the problem.

My study of interdisciplinary scientists begins to address the lack of empirical work described by Bates. The results indicate that the interdisciplinary research process involves the exchange of many types of information and exploration in unfamiliar subject areas. I propose initiatives for making research libraries more supportive of the information strategies used by boundary-crossing researchers. While my analysis mentions the threat of information overload and other deterrents to interdisciplinary progress, Patrick Wilson examines the problem in depth from a policy perspective. He compares the risk of overload in team and solo interdisciplinary research and identifies barriers that can limit the attainment of expertise in new specialties. The potential of social policies on knowledge production is apparent within the context presented by Wilson, and this important theme surfaces again in the concluding discussion offered by Michael F. Winter.

One of the problems with studying, or serving, interdisciplinary information needs is that it has become increasingly difficult to define what constitutes a user group. Wilson's delineation between individual and team research presents one possible breakdown for analysis, and I have suggested that the actual research problems may be the best grounds for grouping interdisciplinary researchers. Robert Pahre argues that our

knowledge communities are best understood through a combination of social and intellectual explanations. He demonstrates how purely epistemological or sociological investigations are insufficient for analyzing communities and their information environments. Ostensibly, the information practices of individuals and groups display the reconfiguration of knowledge communities. As evidenced by Patricia Clark's study of Internet discussion groups, the nonlinear aspect of networked electronic information is of particular interest, since it appears to disclose interdisciplinary connections as well as cultivate them. She examines cultural aspects of electronic information use, highlighting the self-organizing and transdisciplinary nature of networked electronic communication.

Our professional expertise takes on an added dimension when directed toward the discovery of interdisciplinary connections. Three contributors, White, Smith, and Fiscella, illustrate the critical role of information specialists in cross-disciplinary intellectual exchange. Howard D. White explicates how bibliographic search techniques can reveal interdisciplinarity as well as promote synthesis across disciplines. As White's article suggests, assessing degrees of integration is a very complicated matter. Our field has not yet undertaken this type of evaluation, but we have developed services that enhance interdisciplinary research. Jack T. Smith, who is part of a meta-analysis team, provides background on integrative research and an account of the librarian's role in a multidisciplinary research group. Through an analysis of two methods of bibliographic compilation, Joan B. Fiscella documents the utility of "pragmatic" bibliography for research that crosses disciplines. Clearly, information services, if performed in the interest of interdisciplinary investigation, have much to contribute to the integration of research and knowledge.

While interdisciplinary inquiry may produce integrative results, Mattei Dogan emphasizes the fragmentation that occurs when science grows and reconfigures. He challenges the very notion of interdisciplinarity, suggesting that the term *hybridization* is a more accurate description of the process. Complementing Pahre's discussion of the formation of communities around different types of information, Dogan provides further insights into how concepts, theories, and methods function in the hybridization process. His concern with specialization foreshadows the approaches taken by Searing and Winter, who have differing perspectives on general and specialized approaches to serving interdisciplinary information users.

Susan E. Searing cautions that we need to address interdisciplinary issues broadly—across all levels of library operations. She contends that transforming our research libraries will require institution-wide awareness of trends in scholarship, since the organization of universities and prevailing political climates complicates the administration of libraries.

Michael F. Winter also presents a macro-interpretation, discussing the profession of librarianship within the social environment of knowledge. He advises that subject specialization may be the only way that librarians can cope with the highly specialized nature of research and scholarship. Winter also envisions an expanded role for the profession, where librarians function as evaluators and integrators and contribute to “social policy studies” of knowledge.

Indeed, the authors of this volume have demonstrated that interdisciplinary inquiry is firmly within the purview of library and information science. Yet many questions remain. How can the dynamics of knowledge and the associated patterns of information use be monitored? What methods can libraries use to assess how well their services support the contemporary intellectual environment? What principles should guide the construction and reshaping of our rapidly growing complex of information systems? Our profession is in a strategic position to tackle the information service and policy problems that affect the quality of intellectual exchange within the ever-changing body of knowledge. Moreover, it would seem that our vested interests and commitment to the free flow of information obligate us to do so.

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