Online Searching in the Reference Room

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Introduction: Humans and Machines

VISUALIZE A SCENE IN the hallway of a mid-city business building. Standing to the left just outside an office door is a tall, good-looking young executive, his left hand perched on his hip, and his right hand held thoughtfully up to his chin. He is listening attentively to the janitor, an older, shorter man who has taken a few minutes out from his mopping to expound on a subject of vital interest to both of them. Down the hall behind them the twilight of evening and the lights of the other office buildings shine through a large window and twinkle off the wet floor, outlining the momentarily forgotten attaché case and mop bucket. Below this picture of productive social intercourse, for this is an advertisement in the *Wall Street Journal*,[1] is the message, "At Sperry, listening is not a 9 to 5 job." The ad continues with a brief statement about the importance of careful listening on the success of any company endeavor.

The attitude of the Sperry Corporation, a major manufacturer of computer systems, is significant as well as refreshing, and it relates very closely to the development of online bibliographic searching in library reference departments. Listening is one of the major facets of effective human interaction, which is important for good business and absolutely essential for successful service in the reference room, either at the desk or at the online terminal. Interpersonal relations are a necessary part of the information transfer process, and consideration of them will

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form the core of this paper on online searching in a reference setting. The major concerns will be with the processes and activities that make online searching such a natural part of reference departments. And after considering the role of the searcher versus that of the end-user, an attempt will be made to predict the future trends of reference service in an increasingly online environment.

Integration of Online Searching in Reference Departments

In the ten years that online access to a variety of bibliographic databases has been widely available, libraries, and particularly reference librarians, have been strong supporters of offering access to them within the context of the other library reference services. A 1976 survey of some members within the American Library Association's Reference and Adult Services Division found very strong agreement with the idea that academic and research libraries should provide computerized search services (95.6 percent of the respondents). Furthermore, there was nearly as strong an agreement (over 80 percent) that special libraries, college libraries, large public libraries, and government libraries should be searching. For medium and small public libraries, however, opinions were divided as to whether or not they should offer online search services—24 percent of the respondents felt that they should, 39 percent indicated they should not, and 33 percent were in between.[2]

Although reference librarians are clearly enthusiastic about online searching, especially in the academic, research, and larger public libraries, several recent surveys have indicated that the service is not by any means universal, even in those types of libraries.[3] Where search services have been established, libraries have generally recognized searching as a reference function and located it within the reference department.[4]

Unfortunately, there have been some problems with the introduction of online searching in reference departments. For one thing, not all reference librarians have been enthusiastic about searching. Where there has been a polarized staff, with some librarians searching and others not, the situation has been eased by the searchers making efforts to introduce and familiarize their colleagues with online searching. Also, the emphasis on searching in library schools encourages its greater acceptance in reference departments as staff turnover takes place.[5] Although only 58.3 percent of RASD members felt, in 1976, that online literature searching should be part of their own library's reference department,[6] the percentage would probably be higher today since online searching continues to grow in importance as a library reference function.

The introduction of online searching has also posed administrative problems for libraries. Most notably, it has represented an added duty for the librarians. Training staff, interviewing patrons, and formulating and executing searches all take time. Keeping statistics, setting up accounting procedures, monitoring a fee structure, and promoting the service are additional aspects of the administrative costs of the search service.[7]

Despite these staff and administrative problems with integrating search services into library reference departments, there are advantages and benefits that more than counterbalance the disadvantages. For one thing, many reference questions are best searched online, with only limited assistance from printed sources, while others are best suited for the opposite perspective—a heavier reliance on the printed sources with online searching more or less incidental. This spillover of one medium into another results in a "continuum of information," often without clear lines of demarcation.[8] Another benefit of integrated services is that patrons who might otherwise be reluctant to ask for help at the reference desk are willing to approach librarians for online searches. Librarians report that they are able to instruct the requesters in search strategies through printed reference sources while working with them at the terminal.[9]

Another positive aspect to having a search service established in the reference department is the enrichment of the librarian's professional skills. The reference librarian who searches a database online develops a better understanding of both the nature of the literature and the vagaries of the arrangement and indexing in that database than would normally be gained from simple referrals to the printed equivalent, where the patron does most of the work of searching.

Reference Aspects of the Search Process

Most academic library online search services were established to assist in the compilation of bibliographies, usually with costs such as online connect-time charges and the offline prints recovered by the libraries charging fees for this service. In addition, many libraries have allowed their reference librarians to use their terminals to help find answers to ready-reference questions. In contrast to the literature searching, this ready reference use of the terminal is normally done without charge to the requester. Major types of questions that might benefit from the librarians' ability to use the terminal include subject questions (such as finding a few references or ascertaining appropriate index

terms), verifying citations to journal and monograph citations, author searches, and address questions.[10] Other ready reference uses of the searching terminal might include requests for statistics, comparisons of journals, information about people and groups, listings of works published by small publishers, and so forth.[11] The major cataloging databases—such as OCLC and RLIN—are widely used for reference purposes also, but that use will not be considered here since this paper is concerned with the online bibliographic databases which are searched primarily for reference information.

Libraries that use an online terminal for ready reference questions have indicated a high rate of success. Two subject libraries at the University of Minnesota that evaluated their use of online searching on reference questions found that their experienced searchers used the databases more willingly and were more successful in their use of them than were their less-experienced colleagues. The success rate, as judged by the patrons, was 84 percent for the experienced searchers, 53 percent for the less-experienced ones, with an overall success rate of 72 percent.[12] At the University of Maryland's McKeldin Library, the percentage of questions that were answered successfully by using a database started out at 49 percent but quickly increased to 64 percent as the program continued.[13] Of the 232 reference questions searched online at the Pennsylvania State University from mid-1978 through late 1980, 70 percent were judged to have been successful.[14] Not only was the success rate quite comparable at all three institutions, but the average length of time online to search the ready reference questions was also similar: 5.4 minutes at Minnesota, 4 minutes at Maryland, 4.3 minutes at Penn State.[15]

The University of Maryland has carried online searching for ready reference questions to its next logical step. The reference staff have found it helpful to compile a card index which is used to assist the librarians when they turn to the terminal with a reference question. Index entries are filed under appropriate subject headings—for example, art exhibits, directories, obituaries—that the librarian checks when preparing to use the online resource for help with a question. Each card suggests databases, search headings, and strategies for the librarians to use for that type of question. The advantages to having such information readily available include the ability to skip checking the system and database manuals, a time-consuming process that sometimes militates against rapidity of doing ready-reference searches online.[16]

While using online searching to aid in answering reference questions is important at many academic library reference desks, the more

formally structured literature search service is still the major use of online databases in libraries. The library's computer-based bibliographic search service is established as a parallel to the regular reference service, with many points of similarity between the two services but with some significant differences as well.

The first and perhaps most obvious parallel between the online search and the ready reference question is the importance of an effective presearch interview. The interview is important for the computer search because the cost of online time requires efficiency and avoiding errors.[17] The searcher needs to understand clearly what the client wants, while the client needs to learn what the machine can do. In fact, often the patron states the problem too broadly, much as for any other reference question, and the librarian has to pin the requester down to a specific topic.[18] The searcher needs to distinguish between statements made by the requester and the real meaning of the topic.[19]

Consider the presearch interview in more detail. It often begins with the librarian going over some of the major procedural issues such as the costs involved in the search, the formats available, and the time it takes to get search prints back.[20] Continuing from there the basic elements of the interview situation are: explaining the benefits and limitations of online searching; describing when a computer search is or is not appropriate; mentioning other sources; discussing the subject of the search; developing an appropriate search strategy; explaining features of the search system; describing and then choosing appropriate databases to search; and describing the sort of procedures that will be followed online, including the structuring of terms, reviewing citations, and ordering offline printing. Not all of those basic elements would be present in each interview, depending on the patron's experience, the difficulty of the topic, and whether or not the requester was planning to be present during the search. Such an interview might range from five to sixty minutes in length, with twenty to forty minutes being the usual range.[21]

While those basic elements of a presearch interview might appear to bear little resemblance to the situation that prevails at a reference desk, in fact the similarity in procedures is striking. During the course of the presearch interview, for instance, the patron and the librarian should discuss all aspects of a topic until it is completely understood. The searcher (or librarian) should use open-ended questions in an effort to make sure that all the necessary questions—when, where, why, what, who, how, which properties, and opposite conditions—are properly considered during the discussion.[22]

Some factors that may tend to inhibit the effectiveness of the pre-search interview include time pressures on either the patron or the searcher, uncertainty of roles, fear that the searcher will discover the requester's lack of knowledge, fear that the idea or proposal might be pirated, and inaccurate descriptions of the user's needs.[23] Certain personal characteristics of the search requester also might impede an effective presearch interview, such as language difficulties, a patron who is too busy to talk with the searcher, one who is slow-learning or confused, and one who tries to dominate the search. On the other hand, the searcher can adversely affect the success of the interview by making it either too short or too long. Another problem can be a new searcher who has to deal with nervousness, inexperience, and lack of judgment on how many citations to expect in the search results.[24]

All of these potentially inhibiting factors may also be present at the reference desk. For example, the nervous, inexperienced librarian at either the reference desk or the search terminal, when faced with an obscure or difficult question, can discover creative ways to stall and flounder around (though very professionally, of course): at the desk, thumbing through the *Library of Congress Subject Headings* volumes always looks good, and at the terminal the comparable activity is carefully looking through a database or vendor manual. Both activities may lead to good information but they also may buy the inexperienced librarian a bit of time to ask more questions and begin to make decisions on the best routes to the needed information.

After the topic is thoroughly understood by the searcher and the capabilities of the system adequately explained to the requester, the next major step in the presearch process is for the librarian to select the databases that will be searched. The searcher might consider several different factors in the selection process, of which the most obvious one is determining the subject coverage of each database. The subject of the database can be judged from descriptive information about it, by using it online in a trial and error method, or by consulting vocabulary listings, list of journals, or lists of codes and classification schemes specific to the database. Another area for the searcher to consider in selecting a database is the nature of the source documents covered—such as journal articles, monographs, or dissertations. A third consideration is the period of time covered by the database, and a fourth is which elements in each record are searchable and which are printable.[25] An additional factor that would help in the selection of appropriate databases to search would be the experience of the searcher in the success of various topics in the relevant databases. For any library that subscribes to the print equivalents of the databases being considered for an online

search, another obvious option for the searcher is to examine some issues of the indexes and abstracts to help determine the best choices.

One approach to choosing the best databases to use in a search is to analyze the question using a series of decision points. The decisions range from the general to the specific, with choices on each level being made from an array of possibilities, menu-fashion. An interesting example of this method was developed by Donati for choosing the best databases to use in a search of business topics.[26]

Although few librarians at a reference desk would analyze questions in such a formal fasion as Donati's, reference librarians choose among printed sources in a similar fashion. The first, almost subconscious decision, is the type of reference work needed: directory, encyclopedia, dictionary, bibliography, handbook, text, or whatever. The next decision level involves the comprehensiveness, language, time period and other similar factors about the needed citations. But as Donati says—in a comment that might as well apply to the reference desk as the search terminal—when making choices of databases to search, there is no substitute for the intelligent searcher who can analyze the questions according to appropriate criteria and base selections on the decisions reached.[27]

One issue related to the presearch interview that does not really have a reference desk counterpart is the question of whether or not the patron should be present during the actual running of the search. Judging from recent surveys, it would seem that the majority of academic libraries are quite flexible about whether or not to have the requester present for the search: only a limited number of libraries always or never have the patron present.[28] Knapp, arguing the importance of having the requester present, says the feedback from the users will improve the quality of the search. When the most appropriate search structure is used and the results are still disappointing, only the presence of the user can allow a modification of the search to bring up alternate references that will really be useful.[29] Somerville adds to this argument the point that the requester who is present for a search has a better first-hand awareness of the decisions that were made during the search and the nature of the searching process. She adds, however, that there are factors which might argue against having the requester present for the search, such as difficulty of scheduling, the time-wasting because of long discussions, and searcher nervousness which is induced by the requester's presence.[30]

An explanation of the differences in presence or absence of patrons may be based on whether the topic is in the social sciences or the sciences and technology. In a study done at the University of Utah Library in

1975-76, Hoover showed that for almost all of the social science searches in *ERIC* and *Psychological Abstracts* the patrons were present, but for searches in *Chemical Abstracts* and *NTIS*, only about one-third were conducted with the requester present. Hoover found that searches done using the less precise, less specific language of the social sciences often required online revision. The more precise science and technology vocabularies gave satisfactory results using the original search formulations.[31]

A final area for comparison between the interview conducted for online searches and those held at the reference desk for questions considers the skills and attributes necessary for the librarian to be successful in either role. Among the cognitive skills that are important for the searcher is the ability to analyze concepts, to focus on the primary subject of a search. The searcher must recognize subjects that overlap, those that relate but are tangential, and those that are unrelated. Another necessary skill is the ability to think in a flexible manner, to see different possible solutions to a problem. Thinking of synonyms for search terms also is important to the construction of a search. The ability to anticipate variations in word forms and the ability to spell are important.[32] Other personal attributes that characterize the successful online searcher include self-confidence, an outgoing personality, an ability to build good rapport with patrons, a good memory for search details, perseverance when expected results don't turn up, patience in the face of computer or communications problems, and efficient work habits at the terminal.[33]

As has been indicated already, the reference-interviewing and fact-elucidating techniques of the online searcher must be highly developed in order to conduct successful searches. These online skills have a spinoff in that they enrich the librarian's reference desk skills as well.[34] While any reference librarian could study a list of the cognitive skills and personal attributes of the successful searcher and claim, quite validly, that the same characteristics are important at the reference desk, these are some overall differences between the skills needed at the two reference service points. The searcher's skills are somewhat more cognitive in dealing with the user's information needs; somewhat less of the personal interactive skills, which are so critical in reference desk settings, are needed at the search terminal. Getting patrons to open up about their topics is less likely to be a problem in the search situation than at the desk.[35]

Future Role of the Reference Librarian

One of the major reasons for examining the presearch interview, the selection of databases, and the skills of the searcher has been to come to a conclusion about the future role of the reference librarian. But while those activities and attributes may be strikingly similar to those of their reference desk counterparts, the librarian may still not have a viable future if nearly all significant information becomes available online and if end-users become capable of doing, and are willing to do, nearly all their own searching. The second possibility, end-user searching, needs to be examined first to gain a perspective on the future of the reference profession.

Nielsen observes, in a very perceptive article, "that a technological goal for online development is to create systems which substantially reduce the need for intermediaries."[36] Among them are several different user-friendly interface systems which have been developed to allow different types of users to do their own online searching. These take various approaches, such as making a complex system available to users less skilled in searching by making available a simplified search procedure, developing a computer intermediary that allows the user to search different systems with the same commands, or designing a system for searching different databases without the user needing to restructure the search.[37]

In addition to developing technology which will help the user to search without the need for an intermediary, there are economic forces affecting this development. Vendors as well as database producers are competing for business by offering workshops and training sessions to end-users as well as to librarians. They are also publishing better manuals in an effort to attract more business.[38] In fact, libraries themselves can hardly afford any other option than to have patrons do their own searching as they design online access systems to their own bibliographic holdings.[39]

The question of whether or not the end-users can be successfully taught to do their own searching, and if they will be interested and willing to do it, has been studied in three different experiments lately. One was a pilot course taught at the Oregon State University for upper level undergraduate and graduate biology students with the purpose of the students learning to do their own searching. The instructors learned from the experience that, while they were interested in developing materials that would increase the searching skills of the end-users, the students were more interested in obtaining information from the online systems than they were in learning a new skill. The students, however,

were enthusiastic about their ability to do searches whenever they needed to. As a follow-up to the course, a searching terminal was provided next to the students' laboratory to evaluate how they used BIOSIS online. The results showed that the students were creative about finding alternatives for search terms but they did not use the concept and biosystematic codes. In contrast to librarian searchers, they spent less time constructing search strategies and using thesauri or manuals, and more time online. A conclusion was that, even though the searches may have been less thorough, they may well have been just as effective as the professionally conducted ones.[40]

Another recent report came up with similar findings. A graduate level research methods course taught at Ohio State University in 1981 included training in the AGRICOLA and NTIS databases. By the end of the course, most of the students felt they could handle choosing an online database, preparing the strategy, and doing the search online. However, most felt they still had the need for coaching from the librarians during the first two steps. And only a slight majority said they would be able to handle the third step, the actual search, without coaching.[41]

A third, very intriguing study of end-user searching was conducted at the Raytheon Company for one year. The experiment was set up to have twenty engineers and scientists trained to use COMPENDEX, NTIS, and the INSPEC group of databases on Dialog. They had seven introductory months of free searching followd by five months at cost. The experiment was designed to determine if the engineers and scientists would use online searching as an information retrieval tool in their regular work on a casual, as-needed basis. The study showed that most of the participants would continue to use the searching terminal, but some would not. Other than one person who had trouble because of an inability to type, the nonusers had two principal reasons for not using the terminal: either they used the searching system too infrequently to maintain proficiency, or they felt that the qualitative differences between their own searches and the searches done by an intermediary were not enough to warrant their time and trouble.[42]

How did the engineers and scientists themselves view the information transfer process during the Raytheon/Dialog experiment? Most were enthusiastic. They found some frustrations with document delivery and problems with some of the complexities of the searching system, but on the whole they saw great value in doing their own searching. One of the conclusions was that scientists and engineers do not share equally the verbal facility and sensitivity to syntax that is necessary for effective

online searching, much as librarians and information professionals are not equal in these abilities. This fact alone would seem to guarantee the need for search intermediaries for a long time.[43]

Arguments for and against end-users doing their own searching were summarized recently by Brooks. Arguing in favor is the fact that appointments do not have to be made. Furthermore, the subject of the request does not have to be translated to an intermediary. On the other hand, arguments against include the fact that end-users search less frequently than the librarians, which results in end-user difficulty in maintaining familiarity with systems and databases. Another problem is the lack of end-user training in the methods of organizing information and developing search strategies. Brooks goes on to argue that online searching by end-users will increase as people become more computer literate. She feels that this will not eliminate the professional searcher, however. The skilled searcher is more cost effective than the end-user at the terminal, and for many end-users, the time involved in learning and maintaining search skills is not worth it.[44]

A very convincing argument involves looking at three different areas of expertise involved in searching the online bibliographic data-bases: knowledge of the database being searched—its coverage, structure, approach and elements; knowledge of the search system; and knowledge of the subject itself. Few online searchers are highly competent in all three areas. For some searches, the expertise of an intermediary in the intricacies of the system and the particulars of the database is more important than the specialized subject knowledge of the end-user, while for other searches the reverse is true. And of course for some, both the intermediary and the end-user knowledge are equally important in achieving a successful search. While effective results can be obtained by intermediaries who do not know the subject of the search well, or by end-users who do not know all the characteristics of the online databases and searching systems, the best results are obtained when all three knowledge areas are combined during the searching session.[45]

The best conclusion is for librarians to recognize that the end-users inevitably will—and should—do a fair amount of their own online bibliographic searching. If this is so, then how much are librarians involved in training the end-users to do their own searching? Apparently very little—in only a few libraries are users themselves taught to search.[46] Educating end-users to do their own searching may well be a responsibility that librarians, library educators, and information scientists should assume as well as the database producers.[47] Academic librarians who are trained as searchers might be able to offer credit courses, at

least on campuses where they have faculty status, to teach search techniques to students. On campuses where librarians are not already teaching credit courses, political, economic and administrative issues would have to be resolved before such teaching could begin. A second approach might be for libraries to make terminals available to the public, either on coin-operated machines or through some other means of covering the costs. Another way to foster end-user searching would be for librarians to work with database producers and vendors to help them develop user-friendly search systems. And finally, librarians could accept, as part of the library's normal outreach service, the encouragement and training of users to do their own searching, much as they accept the responsibility of teaching patrons, either individually or through course-related instruction, how to find information in the printed collections and reference works.

Underlying so much of this issue of end-user searching is the question of whether such a development will somehow deprofessionalize the reference librarian. Nielsen concludes that end-user access will bring about the deprofessionalizing results predicted by sociological theory, and he suggests that librarians should decide if it is in their interests to foster that trend.[48] Faibisoff and Hurych conclude, on the other hand, that not only is increased searching by end-users likely, but it will bring many beneifts to the library profession. They feel that the results of end-user searching will be that the higher level, more complex and demanding searches will continue to be referred to the librarian intermediary.[49] An earlier article by Meadow argued the same theme: as the searching languages become easier, end-users will begin to do their own bibliographic searching. The result will be a requirement for more highly skilled searchers, with search interviews and searches performed on a higher level of sophistication than they are presently.[50]

A lot of the anxiety about deprofessionalization dates back to the early days of online literature searching in libraries, when librarians began to feel an immediate increase in their professional status as a result of their new activity. A report based on visits to a number of libraries in 1975-76 indicated that the impact of searching on the reference staff was one of a heightened sense of being in control, of being a professional and not just a library clerk. Librarians were thinking of making the reference desk a spot for directional information and referral, so that all of the more in-depth bibliographic reference service would take place in the office setting.[51] With such an office consultation service, and with charging fees, it became easy to imagine a librarian/patron relationship developing much like that of the doctor/patient or

the lawyer/client.[52] Thus, despite the increased pressure on the reference librarians' time due to the additional searching responsibility, at one large research library the reference librarians all wanted to do more searches.[53] One might assume, however, that such eagerness would mature into a more realistic balancing of searching with other reference duties.

It is also reasonable to suggest that the maturing of online reference service will allow librarians to realize the inherent values of their intermediary roles at both the desk and the online terminal. They may thus learn to ignore the issues of role and status, which only distract from the central concerns of the reference librarian's profession—insuring that people find the information they need to work and live effective lives.

Conclusion

Unlike the personnel at the Sperry Corporation, who may need to be reminded that listening is an important part of their business, good reference librarians are keenly aware of the fact that effective listening and interacting with people are essential elements of both on-desk and online reference services. In addition to these interpersonal skills, a librarian at either the terminal or the desk should possess first-rate cognitive and analytical abilities as well as the capability of choosing appropriate reference sources or databases. Similarly, the reference room and the adjoining online search service are just as surely linked by the patrons' information needs, which often can be satisfied by both printed and online sources.

Predicting the future importance of print sources versus the online databases in the reference room is difficult, however. Some librarians feel that, inevitably, online databases will steadily replace the use of the printed equivalents, but this position is a hard one to prove. Actually, it may turn out that some online databases will have little economic viability in the marketplace, and their print equivalents may remain more popular and acceptable. A recent study of one online database and its print and microfiche counterparts found that the online version offered no substantial advantages over the other two formats.[54]

Despite the many benefits of the online literature search—speed, accuracy, thoroughness, comprehensiveness—there is still an inherent limitation in online searching. The serendipity factor, the chance discovery of information and ideas, is usually lessened during the online search. This element of chance feeds the creativity and imagination of

any student, scholar, scientist, executive or citizen who is researching virtually any subject. Of course, the print materials in the reference room and throughout the library represent just a portion of the many sources of information that people have.

But without denying the tremendous advantages of the online literature search—or the online search of the library's bibliographic holdings, for that matter—the ability to browse among the book and journal collections or to chance across additional sources in the reference room is a vital element in the creative process. Sperry concludes its message about listening with the thought, "you never know where the next great idea is coming from,"[55] but the same point would be true about effective use of the library, the reference room, and that human information resource, the reference librarian.

Which leads to the final question: What is the future of the reference room and the reference librarian for those information seekers who do continue to need the breadth, depth and comprehensiveness of the library? One answer is that the amount of disseminated information (published or online) and the technology of offering it will probably continue to grow faster than the technology of accessing information. A second factor which points just as surely to the need for an intermediary is the difficulty many people have in defining their own informational needs in terms necessary to retrieve what is needed from reference sources. A third difficulty for a lot of people is coping with the many different types and constructions of reference sources. And a fourth issue is the tendency of many researchers to branch out beyond their own specializations, thus needing help in charting the way through unfamiliar informational territory. In other words, as online service becomes an ever stronger part of the library, general reference service and the general reference staff will become an increasingly vital part of the spectrum of informational sources.

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