The Computer as an Instructional Device: New Directions for Library User Education

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> Nothing in education is so astonishing as the amount of ignorance it
> accumulates in the form of inert facts. Adams had looked at most of
> the accumulations of art in the storehouses called Art Museums; yet he
> did not know how to look at the art exhibits of 1900. He had studied
> Karl Marx and his doctrines of history with profound attention, yet he
> could not apply them at Paris.[1]

FROM ALL THE HEADY PREDICTIONS of a new information age, one bring-
ing with it a paperless society, a single observation emerges as a cer-
tainty: the field of library user education will be no more likely than any
other area of teaching or research to escape the transformations stimu-
lated by the advent of the computer into the information systems. This
assertion is knowingly offered in spite of the fact that although automa-
tion is certainly one of the few truly major developments in librarian-
ship in the past decades, its application to public services is only just
beginning. On-line bibliographic data base searching, though offered
by an increasing number of libraries, is hardly a universal service, and
there is still only a handful of libraries experimenting with public access
to on-line card catalogs.

It is understandably difficult, then, to peer very far into the future
and predict the possible ramifications of these developments for library
user education. Nonetheless, experience with automation at Ohio State

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University, including in large part the education of patrons in the use of the on-line catalog, and reading of the literature and the reports therein of experiences with automation at other institutions lead this author to two major, if basic, conclusions. First, the machine itself, that is, the computer terminal alone, divorced of any particular service, provokes the greatest change in patron interaction with librarians and library services. Second, if these changed perceptions are to be converted into actual changes in the status and duties of librarians, librarians must actively pursue the new possibilities and ride the coattails, as it were, of this newfound image maker. For librarians engaged in user education, such changes can free them from the confines of a desk and the accumulated ignorance of inert facts about using a particular library or tool, leaving them free to interact instead on a campus-wide basis, and with diverse groups of users, as information transfer specialists.

This paper can be only an outline of the argument leading to these conclusions, positing one picture of the future of information access, pointing out some of the current practices and discussions that seem to lead away from the possibilities of this future, and concluding with a fuller look at the implications of automation for library user education. Predictions of the future are always risky, and predictions like this, requiring a preliminary clearing of minor or distracting side issues, run the additional risks of appearing dispersed and negative. But any prediction can redeem itself by taking apparently disparate issues and relating them in a context that refocuses the ongoing debate on more productive topics. This paper offers such a context and redirection.

A Scenario for the Future of Information Access

The entry of vendors from the industrial sector into the field of automated information handling, the growing public sensitivity to the control of information and its proper transfer, and the recent signs of governmental intent to formulate an "information policy" all threaten to impinge on librarians' isolation, drawing them out of the safe recesses of the library and thrusting them into the center of a stormy, yet central, debate for the future. Gardner and Wax articulated the problem:

> In the end, online search services are intended to support the research efforts of individual researchers and scholars. Libraries provide the services to help satisfy their users' information needs; the online search service vendors view users as customers and, quite properly, contributors to their profits. The government's primary intent has been to promote the efficient operation of the nation's research effort.

And while all three sectors have made valuable contributions to the
process of information transfer, the end user is left with services which
are both expensive and inconvenient.[2]

The frustration the information user must feel at being caught in this
impasse becomes clear when his present dilemma is set in the context of
any scenario of the future of information handling and the changes he
must equip himself to anticipate. Finding such anticipations is easy
enough. Indeed, the anxious fascination with the dawning "Informa-
tion Age" has spawned what is now almost a cottage industry manufac-
turing scenarios of the future of communication and research. One of
the more authoritative of these predictions, of which librarians ought to
be cognizant, is the recent report of the National Enquiry on Scholarly
Communication.[3] The enquiry addresses the issues of scholarly com-
munication with due soberness, and even its most risky predictions are
not given lightly.

Nonetheless, the description of the future scholar-adventurer taken
from the report illustrates most graphically the computer's possible
impact on how we will communicate with and therefore teach one
another. The enquiry portrays a typical academician of the future at
work in his office, connected via the computer terminal beside him to all
the stored bibliographic citations, full-text documents and other availa-
ble information in his field. On the terminal he identifies what informa-
tion he wants and either calls up the display directly or sends a message
requesting loan or purchase of a print copy of the item. When he is ready
to produce an article, he uses the same terminal to compose, proofread
and edit it; stores it in the computer's memory for access as desired by
other members of the network; or produces, if needed, a final typewrit-
ten copy. The enquiry's predictions mean that the whole research
process will be not only much faster, but also more individualized and
dispersed.

Writers like Lancaster, Bennett and Martin, dealing with on-line
bibliographic systems, predict a similar dispersal of these systems
beyond the library's walls.[4] These commentators and others foresee the
full and necessary development of on-line bibliographic systems culmi-
nating in systems that can be searched directly by the primary user—the
scientist, the lawyer, the academician—without the intrusion of an
intermediary such as a librarian. Already at Ohio State University the
introduction of the on-line card catalog has made possible the Tele-
phone Center, a phone service through which patrons can ascertain the
location and availability of any book or journal the OSU Libraries own,
have it paged from the shelves and charged out to them, and in many

cases, even have it mailed to their offices or dorm rooms. It seems like a full-fledged realization of the fantasy world of the professor who announced to his class, "The best thing about being a senior professor is that I now own all the important works in my field and no longer have to go to the library."

In a reversal from past developments in research and teaching, however, the decentralization of information processing will not extend the trend toward specialization and isolation, represented by this exemplary professor, but will actually stem it. If all the data bases are accessed the same way on the same terminal, it follows that it will be amazingly easy for a researcher or student to locate and consult work done in a related or totally disparate discipline on the topic of his concern. Individualized research queries and decentralized access to research materials will no longer mean, as they used to, increased compartmentalization within disciplinary lines.

Against this picture of the future, or any time of technological upheaval, Henry Adams's advice to strip education to its skeletal and portable skills emerges as the key to survival by adaptability.

The Two-Pronged Campaign for Library User Education

Reducing library instruction to its essentials will require a two-pronged campaign from librarians. One maneuver is introspective and analytic, leading to a delineation of the structural framework of library research. The other movement is an outward one, aimed at assuring the development of portable and flexible on-line systems that can serve the varied requirements of both librarians and patrons.

Of course, the traditional groupings of library resources and access along disciplinary lines will also merge. If librarians can no longer teach "Resources for Sociology" or "Research and Methods in Biology," how will the skills and knowledge of research be repackaged? Library user education will have to rise to the challenge of presenting to students the principles and patterns underlying the information flow in any field, and the types, rather than specific cases, of major reference tools and research libraries. In other words, instead of teaching the use of a particular index, such as the *MLA International Bibliography,* a librarian may use it as an example from which to teach the purpose and role of the national association in a given field, and the kinds and purposes of indexing, illustrating the instruction with examples of many different ones and showing how they differ from abstracts and

reviews of the literature. Likewise, any particular library will be used as a single instance of its type, and the instruction will center on the type and its purpose in the larger information network. Concepts such as these, and the even more basic ones of how to articulate a question and how to evaluate any information given in response, will always underlie research regardless of information format, be it handwritten, typeset or computer-displayed.

However, this radical realignment of library user education from a current role as apologist for the library and its sources to a comprehensive study of information and its flow (resulting perhaps in a full-fledged academic department of "Information Access" or "Information Usage"), is again one of the prophecies that await some mundane developments in the present. The linchpin of this future development is standardized, simple access to the operation of data bases. To secure this access for library patrons and other information users, the user education librarians, clearly marked as people particularly concerned with patrons' needs, should be able to offer the singular service of acting as an advocacy group, relaying to the vendors the specific steps they can take to standardize and simplify their wares for eventual widespread public access. Now, when on-line systems are only beginning to enter libraries, is the time for this action, because the systems are still relatively unformed and untested and are therefore open to adjustment as users' needs become better known.

As a matter of fact, there is a growing number of loud and persistent voices crying for guidance through the hitherto-uncharted wilds of the "man/machine interface." Martin and Bennett have repeatedly called attention to the need on the part of system designers for intelligent, well-presented and persistent statements of users' requirements and capabilities in working with computers.[5] For once, user education librarians, by concerted group and individual efforts, have the opportunity to formulate the tools and services they will have to present to patrons, instead of trying to cope with what they have been given as a finished product.

Some Current Questions for Library User Education

Such active participation, if it is to be effective, however, demands that user education librarians acquaint themselves with several new areas, such as the basic principles of information science, user surveys and research techniques. John Bennett, in a stimulating "Challenge

Paper'' delivered at a workshop on the user interface in 1971, listed these as well as other areas of concern for those interested in affecting the development of on-line systems.[6] Joining in the search for solutions to these problems will, of course, raise a host of minor issues and red herrings that will have to be sorted through. The challenge is to deal with these questions without losing sight of the ultimate goal of aiding both librarians and patrons to equip themselves for the future.

The guiding principle for this discussion was presented in 1976 by Frederick Kilgour in his article, "Computerization: The Advent of Humanization in the College Library."[7] Automation is humanizing, according to Kilgour, when it allows the user to tailor the library's files and sources to his individual needs and simultaneously frees the librarian from routine, machine-like tasks. The machine becomes dehumanizing when the user and the staff are subservient to it and become mechanical in their tasks—witness the pressman reduced to feeding paper to a high-speed press and given no control over the speed. The proposition for debate becomes whether the librarian is to become the slave of the machine (in this case the computer) in the same way.

Lest the problem seem overstated and merely rhetorical, experience with an on-line catalog at Ohio State University has shown that the mere introduction of terminals into the library generated a seemingly endless stream of detailed and frequently tedious questions on nothing more substantive than how to use the hardware, e.g., how to clear the screen, back-space and enter. Likewise, the wording of an error message can confuse more than it clarifies, thus imposing another time-consuming burden on the person responsible for instructing users.[8] These particular problems show some signs of abating with time as more high schools teach students how to use computers and, more importantly, as OSU improves its own system. The similar tedium of endlessly explaining minute differences between the search commands used on different data bases, or issuing updates on the ever-changing intricacies of the systems, can only be avoided by the active collaboration of the manufacturer and those familiar with users' needs and capabilities.

Those responsible for planning the integration of on-line search services into library routines and library instruction must actively seek out the most creative and liberating use of the machines and new capabilities by librarians. To wait passively for these developments is to submit to slavery. But what, then, are these new capabilities? As with most questions about the future, answers, suggestions, prophecies and even jeremiads abound. The best approach is through the back door,

looking first at what is *not* new, in a fundamental sense of the word, and what is *not* essential to on-line services.

David Wax and others have claimed that the presence of on-line services itself creates a new demand that librarians stage active programs of marketing and promotion in order to acquaint their customers with the availability of on-line search services and to attract their patronage. [9] Wax and Atherton give lists and instructions for producing a minimum of these materials, most of which are brochures and mailers of kinds already long known to librarians involved in user education. With the possible exception of an increased use of mailed announcements, most of what Wax, Atherton and others have to say is already customary procedure for user education librarians. It is only the consistency and persistence with which the campaign must be mounted in order to recoup the costs to the library of providing on-line services that are new, and not the idea or the media proposed for the message.

There is good reason to believe that within the academic world the era of straitened budgets and declining enrollments alone would have very likely required more aggressive marketing and promotion from librarians, as they have had to fend for themselves against other, more visible departments for support from the university administration. Futhermore, even if this widely predicted budget crunch had never materialized, a host of other developments within the library itself, such as greater use of microforms, increased networking, and on-line catalogs, would have necessitated most of the same marketing techniques, with only the prod of high cost to the library left out. Acceptance of more aggressive marketing and promotion is definitely required by the introduction of on-line services, but it is not and cannot be restricted to them. All library services, and indeed the library as a concept itself, need some aggressive public relations for the library to hold its place in campus life. The entry into marketing is not nearly so new as overdue.

Again, there is great interest in and discussion of the possibility of a new scope for user education in the seemingly different interview techniques now used by librarians working with patrons needing on-line searches. Atherton, Cooper and Knapp have each explored the "informative interview" in more detail, but arrive at opposing conclusions. [10] Pauline Atherton, citing this development as the most important impact of on-line searching on the reference library staff, gives the following paraphrase of reference librarians' comments:

> I can be more of a professional librarian at the computer terminal than I ever could at the reference desk. During the presearch interview I really feel like an analyst who needs to get a very clear understanding

of the search request. I know and the user knows it all is in good hands.

Now I am perceived as a professional information specialist and not just as a library clerk. The user knows he is dealing with someone very much like a doctor who can diagnose and treat him professionally.[11]

Knapp disagrees and concludes: "The reference interview in the computer-based setting is not radically different from interviewing at the reference desk. The differences are generally more of degree than of kind."[12]

What is in fact taking place, then, is a recurrence of the old debate about *doing* as opposed to *teaching*, offering service or facilitating self-service, that has been carried on by reference librarians almost since the inception of reference desk service. The introduction of on-line services has certainly precipitated developments in the field by introducing the need for separate appointments and the concomitant changes in scheduling patterns, and thus has given more form and precision to the previously rather vague concept of a teaching interview. Like marketing and promotion, however, this change in reference service is something that was on the horizon, as exemplified by the development of research consultant services described by Ishaq and Cornick.[13] Once again, on-line searching has not caused this new service pattern, but has given it greater impetus and increased publicity.

There is, as well, one rather dishearteningly old-fashioned characteristic of the on-line informative interview. As the interview is now structured, the librarian does the searching of the data base for the patron. This may be temporarily justifiable because the systems now offered are so complex and varied that only a trained and practiced searcher can manipulate the data bases efficiently and effectively. Yet before librarians accept this task too willingly, caught up in the excitement and intrigue presented by a mammoth new toy, they ought to consider whether or not the excitement will wane with increased familiarity.

Perhaps the introduction of *Readers' Guide,* and certainly the development of citation indexes, provoked both interest and excitement in librarians. But how many who were willing at their introduction are still eager to search these indexes for any and every new paper topic requiring their use? Is it not preferable to recommend an index, explain its use, and allow the patron to do the actual searching on his own? Further, as data base searching extends beyond the confines of the library, librarians will increase their own and the users' satisfaction by leaving the reference desk and addressing the issues in the classroom,

explaining and recommending both sources and search procedures to groups having similar needs. Before tying themselves to stations and delimiting further their freedom to enter classrooms, librarians should concede that the intellectual stimulation of pressing keys on a computer keyboard and watching printouts come back may be quite a bit less than they hope to gain from their jobs when the novelty of the machine has worn off. It is a more productive use of librarians' time to pressure the data base producers and vendors to develop on-line systems that all use a standardized format and are easy enough to search that patrons can assist themselves.

Finally, on-line data base searching presents librarians with a "red herring" because it may obscure the true nature of library research by giving undue focus and significance to the exhaustive literature search. Faculty and graduate students most often need and want from the library statistics, addresses, biographical information, or bibliographical verification. In fact, they perform library-based literature searches very sporadically throughout their careers. Undergraduates need an introduction to the concept of research and the library's contribution to it, an explanation of how to phrase a meaningful question, and a method for evaluating the answer as to its appropriateness and correctness, in addition to a review of the card catalog or a more refined explanation of *Readers' Guide*. Data base searching in its current state of development satisfies only a small part of library users' needs. There is a strong temptation to substitute the part for the whole—offering a data base search as a cure for any library problem—when the computer seems so new and glamorous.

The Ultimate Transformation of Library User Education

The preceding analysis is not an attempt to dismiss the excitement surrounding the introduction of data base searching as just so much hoopla. Such a technological advance surely offers some new freedom for librarians. In fact, it offers so much freedom and an open invitation to such a new realm of activity that perhaps librarians will choose to scurry back to the relative safety of literature searching, the reference desk, and promotional brochures about both.

The advent of the computer into the library has a profound impact on librarians, not so much because of what it does or can do directly to the library or librarians, but because of the effect it has on library patrons. As Shoffner has stated: "The most important trend in libraries is really not automation as such. The most important thing is that there is continuing to be a perceptual change within the library about the role

of the library and the way in which the library operates."[14]

There is a certain mystique and novelty about the computer that fascinates and attracts most people. We have observed this fascination at Ohio State, where we see students bringing in other students or their visiting families to show our computer system to them. And the power of this attraction is not limited to the naïve user, as Joan Maier illustrates in likening the magnetism of the CRT terminal for the scientist to: "the snake charmer's pipe for the cobra....Observing them at the CRT was like watching the father play with his little boy's electric train."[15] Surveys of users of on-line services consistently report that the heaviest users, the ones most willing to pay for on-line searches, are graduate students and faculty.[16] The computer, then, draws out into the open members of the two most consistent but elusive groups of library users.

For the librarians the effect of this new reception is direct and challenging. Cuadra and many others have observed that: "the new perception also stems from seeing the librarian or information specialist operating at the terminal—engaging in what is obviously a highly specialized activity involving new technology. The librarian is perceived as being 'with it.' "[17] But Cuadra also slipped in the observation, which others have given more prominence, that just as users are impressed with the speed, efficiency and professionalism of on-line searching, they are more apt to begin demanding the same qualities from other library services.

We are back where we started and can ask again, with Cavan McCarthy this time, "And where, finally, do all these wonderful machines leave librarians?" His answer is the most down-to-earth yet precise one possible:

> Just where they always were, out in the cold, draughty interface
> between the user and the material. The big difference is that they are
> now even more exposed. Although librarians are supposed to be
> communications experts, they frequently hide behind slow, faulty
> communications channels; "If it was borrowed today, we won't know
> until tomorrow"; "Don't catalog it yet, see what BNB does with it."
> Or the far more insidious waste, the researchers who do not request
> articles because they never succeed in fighting through the bibliogra-
> phic thickets and finding them. But on-line working gives more
> information, faster. It is more difficult to hide; further effort will be
> required to keep abreast of the advances in level of service. In the end
> everybody wins; users get better service and librarians more satisfying
> jobs. The price is that librarians have to work harder.[18]

Life at the interface will be somewhat less harsh for librarians when

they have effectively relayed to both the commercial vendors of data bases and the library itself the remedial steps necessary to make all their systems easier to use. The remainder of the hardship will be made more tolerable by two major gains from automation which user education librarians can use to their benefit: the introduction of a new, attention-getting device that will publicize libraries and their services; and the new communications channels with faculty and graduate students, the power groups on campus, which computerized search services seem to open.

For library user education, these characteristics of automation translate into two very practical instructional aids. To begin with, the computer itself gives to library user education the ultimate instructional device. It is glamorous, as noted above, and it is portable and responsive; it assures attention and can be used to illustrate a variety of indexes, abstracts and citation sources. Second, the computer gains entry into the domain of the two key educational groups on campus, graduate students and faculty. The real future for library user education lies in combining these two possibilities and thereby increasing the impact of librarians, disproportionate to their numbers, by allowing them to educate the educators.

In a first move in this direction, Anne Lipow and her colleagues at Berkeley have made effective use of the computer in building a successful program of faculty seminars on new developments in the library.[19] F. Wilfrid Lancaster described the next logical step in such a program with an outline of a plan to educate professionals in the information services available to them.[20] He places on-line retrieval systems against a backdrop of the type of literature available, the function of other retrieval systems such as the card catalog, the use and organization of personal files, and even the future developments anticipated in information science. Such a presentation is necessary if we are to ensure that the educators on our campuses know how to use information resources and how to help librarians decide what students should be learning about them at each stage in their education.

Ironically, then, the freedom offered by automation will take user education librarians one more step out of the library. Librarians can and should organize, and demand that vendors standardize and simplify the accessing and searching procedures so they will no longer be tied to the desk, or to brochures or demonstrations explaining how to back-space, defining codes and search keys, or describing the mechanics of signing on and off. With the newfound freedom, entry, and visual medium, librarians can finally impart to users an awareness of such basic infor-

mation problems as variations of language (and therefore access from field to field), the place of printed as opposed to verbal resources, and the criteria for anticipating what will be published in journals as opposed to books. The challenge of automation is a total redefinition of the role and function of library user education. Are user education librarians in the business of explaining and defending the library, or are they in the business of encouraging and assuring knowledgeable access to information? Are they in the book or information business? If the latter, how do they fit into the larger construct, and what can they offer there as the particular service and expertise of the library and the librarian?

References

1. Adams, Henry. *The Education of Henry Adams: An Autobiography.* Boston, Houghton, Mifflin, 1918, p. 379.

2. Gardner, Jeffrey J., and Wax, David M. "Online Bibliographic Services," *Library Journal* 101:1830, Sept. 15, 1976; also appears *in* Bill Katz and Andrea Tarr, eds. *Reference and Information Services: A Reader.* Metuchen, N.J., Scarecrow Press, 1978, p. 240.

3. National Enquiry on Scholarly Communication. "Epilogue: A Longer View." In *Scholarly Communication.* Baltimore, Johns Hopkins University Press, 1979, pp. 30-35; also appears in *Chronicle of Higher Education* 18:15-16, May 7, 1979.

4. Lancaster, F. Wilfrid. "Have Information Services Been Successful? A Critique." *In* _____, ed. *The Use of Computers in Literature Searching and Related Reference Activities in Libraries: Proceedings of the 1975 Clinic on Library Applications of Data Processing.* Urbana-Champaign, University of Illinois Graduate School of Library Science, 1976, pp. 145-56; Bennett, John L. "The User Interface in Interactive Systems." *In* Carlos A. Cuadra and Ann W. Luke, eds. *Annual Review of Information Science and Technology.* Washington, D.C., ASIS, 1972, vol. 7, pp. 159-96; Martin, Thomas H. "The User Interface in Interactive Systems." *In* Carlos A. Cuadra and Ann W. Luke, eds. *Annual Review of Information Science and Technology.* Washington, D.C., ASIS, 1973, vol. 8, pp. 203-19.

5. Bennett, op. cit.; and Martin, op. cit.

6. Bennett, John L. "Interactive Bibliographic Search as a Challenge to Interface Design." *In* Donald E. Walker, ed. *Interactive Bibliographic Search: The User/Computer Interface.* Montvale, N.J., AFIPS Press, 1971, pp. 1-16.

7. Kilgour, Frederick G. "Computerization: The Advent of Humanization in the College Library," *Library Trends* 18:29-36, July 1969.

8. For further discussion of the experiences at Ohio State, *see* Herndon, Gail A., and Van Pulis, Noelle. "The On-line Library: Problems and Prospects for User Education." *In* Robert D. Stueart and Richard D. Johnson, eds. *New Horizons for Academic Libraries.* New York, K.G. Saur, 1979, pp. 539-44.

9. Wax, David M. "A Handbook for the Introduction of On-Line Bibliographic Search Services into Academic Libraries" (*Occasional Paper* No. 4). Washington, D.C., Association of Research Libraries, Office of University Library Management Studies, June 1976, pp. 23-27; Williams, Martha E. "Education and Training for On-Line Use of Data Bases," *Journal of Library Automation* 10:320-34, Dec. 1977; and Atherton, Pauline, and Christian, Roger W. *Librarians and Online Services.* White Plains, N.Y., Knowledge Industry, 1977, pp. 89-100.

10. Atherton, Pauline. "On-Line Bibliographic Services in Academic Libraries: Some Observations." *In* Peter G. Watson, ed. *On-Line Bibliographic Services—Where We Are, Where We're Going.* Chicago, ALA, Reference and Adult Services Division, 1977, pp. 24-30; Cooper, Noelle P. "Library Instruction at a University-Based Information Center: The Informative Interview," *RQ* 15:233-40, Spring 1976; and Knapp, Sara D. "The Reference Interview in the Computer-Based Setting," *RQ* 17:320-24, Summer 1978.

11. Atherton, op. cit., p. 26.

12. Knapp, op. cit., p. 324.

13. Ishaq, Mary R., and Cornick, Donna P. "Library and Research Consultants (LaRC): A Service for Graduate Students," *RQ* 18:168-76, Winter 1978.

14. Shoffner, Ralph M. "Outlook for the Future." *In* Susan K. Martin and Brett Butler, eds. *Library Automation: The State of the Art II.* Chicago, ALA, 1975, pp. 143-44.

15. Maier, Joan M. "User Reaction to Computerized Search Service," *Government Publications Review* 1:215, Winter 1973.

16. Briggs, R. Bruce. "The User Interface for Bibliographic Search Services." *In* Lancaster, *The Use of Computers,* op. cit., pp. 56-77; Brown, Carolyn P. "On-Line Bibliographic Retrieval Systems Use," *Special Libraries* 68:155-60, April 1977; Firschein, Oscar, and Summit, Roger K. "Online Search in the Public Library: Results of a Three-Year Study." *In* Bernard M. Fry and Clayton A. Shepherd, comps. *Information Management in the 1980's: Proceedings of the ASIS Annual Meeting.* Vol. 14. White Plains, N.Y., Knowledge Industry, 1977, fiche 3, pp. E10-F6; Kiewitt, Eva L. "A User Study of a Computer Retrieval System," *College & Research Libraries* 36:458-63, Nov. 1975; and Kobelski, Pamela, and Trumbore, Jean. "Student Use of Online Bibliographic Services," *Journal of Academic Librarianship* 4:14-18, March 1978.

17. Cuadra, Carlos A. "The Impact of On-Line Retrieval Service." *In* Watson, op. cit., p. 8.

18. McCarthy, Cavan. "The Terminal Librarian," *New Library World* 78:33, Feb. 1977; also appears *in* Katz and Tarr, op. cit., p. 254.

19. Lipow, Anne G. "User Education and Publicity for On-Line Services." *In* Watson, op. cit., pp. 67-77.

20. Lancaster, F. Wilfrid. "User Education: The Next Major Thrust in Information Science?" *Journal of Education for Librarianship* 11:55-63, Summer 1970.

Additional References

Borman, Lorraine, and Mittman, Benjamin. "Interactive Search of Bibliographic Data Bases in an Academic Environment," *Journal of the ASIS* 23:164-71, May-June 1972.

Cogswell, James A. "On-Line Search Services: Implications for Libraries and Library Users," *College & Research Libraries* 39:275-80, July 1978.

De Gennaro, Richard. "Providing Bibliographic Services from Machine-Readable Data Bases—The Library's Role," *Journal of Library Automation* 6:215-22, Dec. 1973.

Howie, Edmond. "Marketing of Information Services." Ph.D. diss., University of Pittsburgh, 1977.

Melnyk, Vera. "Man-Machine Interface: Frustration," *Journal of the ASIS* 23:392-401, Nov.-Dec. 1972.

Nitecki, Danuta A. "Integration of On-Line with Existing Reference Service." *In* Peter G. Watson, ed. *On-Line Bibliographic Services—Where We Are, Where We're Going.* Chicago, ALA, Reference and Adult Services Division, 1977, pp. 48-53.

Pensyl, Mary E., and Woodford, Susan E. "Patterns of Growth in a University's Fee-For-Service On-Line Search Center." *In* Bernard M. Fry and Clayton A. Shepherd, comps. *Information Management in the 1980's: Proceedings of the ASIS Annual*

Meeting. Vol. 14. White Plains, N.Y., Knowledge Industry, 1977, fiche 6, pp. E5-E9.

Rohlf, Robert H. "Building-Planning Implications of Automation." *In* Stephen R. Salmon, ed. *Library Automation: A State of the Art Review.* Chicago, ALA, 1969, pp. 33-36.

Tessier, Judith A., et al. "New Measures of User Satisfaction with Computer-Based Literature Searches," *Special Libraries* 68:383-89, Nov. 1977.

Woodford, Susan E., and Pensyl, Mary E. "Continuing User Education to Promote the Effective Use of an Established On-line Search Service in a University Community." *In* Fry and Shepherd, op. cit., fiche 10, pp. F12-G3.