
Reference Services and Staff Training for Patron-Use Software

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ABSTRACT

LIBRARIES DEVELOPING COLLECTIONS of materials in machine-readable formats have had to determine what level of assistance library staff should and could provide to patrons. Factors considered have included the library's mission, user needs, and staff time and skills. The issues involved in providing assistance to patrons using software programs on diskettes, bibliographic and full-text databases on CD-ROM, and numeric data files on magnetic tape, diskettes, and CD-ROM are explored. The response of libraries to the challenges posed by these new formats has varied depending on the type of library, the type of software, and the organizational environment. These new formats offer libraries opportunities to enhance their services but will require careful attention to staffing levels and training programs.

INTRODUCTION

As libraries have faced the question of whether and when to begin acquiring software for patron use, one of the first issues considered has been the level of assistance that would be provided to patrons. Could users be expected to use these materials independently or would they have questions? If so, what sort of questions? Would they need help just getting started? What if they attempted to use the software and had a problem? Would reference staff be able to answer their questions and troubleshoot software and hardware problems? Would they be able to even instruct patrons on using the software? And if they *could* do so, should they? Where

would the librarian's role end and that of the computer specialist's or classroom instructor's begin?

Although assisting patrons and instructing them in the use of library materials does fall within Galvin's 1978 definition of minimal levels of reference service (p. 220), helping patrons use microcomputer software could involve librarians in complex questions for which they may be initially ill equipped and could open up a potentially very time consuming new area of service. Furthermore, public service librarians are already feeling over-extended and pressed for time given the pressures to develop and maintain other new services such as bibliographic instruction programs and mediated or end-user search services. Concerns have already been raised about the effect of such stresses on the quality of reference services (Miller, 1984).

In considering these issues, the professional literature relative to patron-use software will be considered as it relates to three subtopics based on content and format: (1) software programs on diskettes; (2) bibliographic and full-text databases on optical disks, generally CD-ROMs; and (3) numeric data files in machine-readable format (initially on magnetic tape but later on diskettes and CD-ROMs). Each of these areas has generated a distinct literature that includes discussions of user assistance and staff training. Although numeric data files (on magnetic tape) appeared in libraries first, it is more convenient to discuss these last due to the way in which they overlap with the other two categories to be considered.

The term *reference assistance* will be used broadly in this discussion to include almost any type of assistance patrons might need in order to make effective use of library-owned materials. Depending on library size, type, and physical arrangement, this assistance might actually be delivered from a number of service points, including the reference desk, circulation desk, government documents department, instructional materials center, or the library systems office. The actual service provider may or may not be a reference librarian; what might fall to the reference librarian in smaller libraries may be delegated to paraprofessionals or student employees in larger libraries. The term *software* will be used broadly to refer to anything in machine-readable format whether data file or program.

Although all types of libraries collect software for patron use, the question of what constitutes appropriate levels of reference service appears to have arisen primarily in public and academic libraries, at least in terms of the published literature. School librarians have, of course, published much about the important role they can play in integrating microcomputers into the curriculum, but the appropriateness of this role appears to be taken for granted, as is the maximum level of service generally offered by special librarians.

Thus, although school and special libraries will be included in the discussion, the primary focus will be on public and academic libraries.

SOFTWARE ON DISKETTES: PUBLIC ACCESS MICROCOMPUTERS IN THE LIBRARY

Libraries started collecting software and making equipment available to their patrons shortly after the personal computer was invented (Dewey, 1986, p. 232). As this new service got off the ground, one of the great unknowns was just how much help users would need and how library staff could respond. In the face of this uncertainty and with a generally low level of staff microcomputer expertise to call upon, public and academic libraries adding this new service tended to adopt conservative service levels. This public library policy is typical of those appearing in early case studies: "A staff member will be available to provide minimum assistance when needed. THE LIBRARY'S ROLE, HOWEVER, IS ONE OF GUIDANCE, NOT INSTRUCTION" (Thompson, 1985, p. 80).

Libraries generally find that patrons need much help, judging from the results of several surveys (Uppgard, 1987, p. 30; Hess, 1988, pp. 87-90; Avallone, 1985, p. 106). Typical of anecdotal reports are these comments: "Booking appointments and helping users with software inundated our reference librarians past the point of exhaustion" (Polly, 1985, p. 13); "users expected an expert to be on hand whenever the library was open" (Julien, 1985, p. 384); "Although we do not want to get too deeply involved in assisting users with their work, we find that they will not allow us to remain uninvolved" (Piele, 1985, p. 6); "Our efforts at purely 'self-help' have only kept our involvement limited at a cost to the quality of our service" (Avallone, 1985, p. 106).

Of course, the level of assistance needed by patrons has depended on the number of microcomputers involved, the types of users attracted, their level of computer expertise, and the type of software collected (Thompson, 1985, p. 81; Seiden, 1988, p. 65; Robertson, 1986, pp. 80-81). For example, most computer-assisted instruction programs offer fewer opportunities for creativity and thus require fewer skills than do such application programs as word processors, spreadsheets, and database managers.

Initial policies have often been modified as library staff learned more about their users' needs. Libraries that had adopted a very conservative service philosophy at the outset (we'll show the patron how to turn on the computer, insert the disk, and boot the program, but after that they're on their own) found that it was unrealistic to offer the same level of service for microcomputers as for photocopiers (Reynolds, 1985, p. 190). And as librarians gained self-

confidence in working with microcomputers, they often found themselves able and willing to be more helpful (Piele, 1985, p. 5).

A particularly wide variation in service philosophies developed in academic libraries. For example, in Uppgard's 1987 survey of academic libraries, sixteen of the forty-five libraries housing microcomputer laboratories reported that support for users had a "significant, time-consuming impact," while twelve reported no impact. Those libraries reporting no impact (and thus no service) did not appear to have been involved in planning or operating the lab and its services because another campus unit was doing so (p. 30). In discussions held by ACRL's Microcomputer Services in Academic Libraries Discussion Group, librarians reported service levels in their libraries ranging from fully developed to nonexistent. A frequent comment of librarians from libraries of the latter type has been that a microcomputer lab was "dumped" on their library simply because the library had available space and long hours. (Issues for 1985 and 1986 of the ACRL Microcomputer Services in Academic Libraries Discussion Group newsletter are available from Linda Piele, Library/Learning Center, University of Wisconsin-Parkside, Box No. 2000 Wood Road, Kenosha, WI 53141.) Thus, an important factor in determining the service philosophy of academic libraries may have been the source of the public microcomputers and the role of the library in their supervision.

When responsibility for operating the lab is given to a unit other than the library, such absentee supervision can lead to poorly resolved responsibility for user assistance and situations in which library staff end up assisting patrons surreptitiously. MacLean (1988) suggested that in such cases, rather than asking whether reference librarians ought to help patrons with software questions just as they help them with other library materials, the question should be phrased: "Can reference librarians be expected not to help library users who ask questions related to their use of microcomputers" (p. 22)?

When computer literacy has formed part of a library's mission, more aggressive service programs, including workshops and consulting services, have resulted (Hart, 1985). Often libraries saw information literacy as their real goal, with computer literacy as a means to that end (Hubbard & Wilson, 1986, p. 15; Davison, 1987, p. 63; Curtis & Lippincott, 1987, p. 108; Piele et al., 1986, p. 376). Cornell's Mann Library, whose staff contributed chapters on various aspects of its microcomputer services to a book edited by Curtis (1987), demonstrates an especially thoughtful approach to defining information literacy goals and developing extensive services accordingly.

Careful attention to the definition and communication of service

levels can do much to minimize patron and staff frustration (Hall, 1986, p. 341; Reynolds, 1985, p. 190; Dewey, 1984, p. 62). Following are examples of services that might be offered at three levels:

Minimum

- showing patrons how to turn the computer on, insert a disk, boot, and exit a program;
- showing patrons how to format a disk;
- suggesting appropriate packages to meet a user's particular needs;
- providing tutorial software on general computer use and on the use of particular packages in the library's collection.

Medium

- providing specific answers to specific problems in using particular software packages;
- assisting patrons in performing normal operations of application packages;
- referring patrons to pertinent sections of manuals;
- developing additional documentation for packages that present difficulties;
- providing training workshops for users;
- using utility programs to retrieve lost or scrambled patron files or showing patrons how to use such programs;
- helping patrons transfer files from one software program to another.

Maximum

- providing in-depth consulting on use of bibliography management software;
- providing assistance in using patron-owned software that is not part of the library's collection (may include configuring software for library owned equipment);
- helping faculty to author instructional software (Rusk & Eversole, 1985, p. 17);
- evaluating bibliography management software packages and making evaluations available to the campus community (Chiang & Stewart, 1987, p. 169).

It might be assumed that as library patrons become more skilled in the use of computers, their need for assistance would decrease. This appears to be the case only in terms of routine questions. Mann Library (Madden, 1987b, pp. 96-97) and Texas A & M (Hall, 1986, p. 341) report that as users become more sophisticated, they may actually become more demanding and present library staff with more difficult problems to solve. Madden (1987b, p. 97) and Piele et al. (1986, p. 377) also report that instruction programs, particularly seminars on bibliography management, may generate more, not less, demand for specialized consulting as librarians reveal themselves to

have special expertise in this area.

Faced with heavy user demand for assistance, libraries have found a number of ways to extend their time and skills, including:

- Use of student assistants, pages and volunteers.
- Differentiating service levels for different types of software and labeling software accordingly (Hess, 1988, p. 95; Nollan, 1986).
- Developing a distributed approach to service in which expertise in particular areas on campus or in the community is identified and referrals made accordingly (Seiden, 1988, p. 79; Madden, 1987b, p. 96).
- Requiring that patrons complete an orientation program before being allowed to use library microcomputers. Such an orientation program might be produced on videotape (Polly, 1985, p. 14).

Staff Training

For libraries adding microcomputers for public and student use, staff training has been a major concern. At a time when relatively few library staff had used microcomputers, training programs were often aimed at overcoming initial fears. Dewey (1984) offered twelve useful suggestions for training novice staff members for public access microcomputer installations, stressing the need to keep the training hands on, low key, and fun. He recommended holding regular training sessions and spreading them out over several weeks (pp. 56-57). Rappaport (1985) described an extensive staff training program for public access microcomputing carried out at many branches of the New York Public Library that was likewise designed to make staff comfortable with computers.

After generally familiarizing staff who will be involved in assisting patrons, the additional training needed will depend on the type of software collected and the level of service to be offered. If general microcomputer application programs are to be a staple of the facility, more extensive training will be needed. Fortunately, many training options are available. Ideally, the staff member's own learning style can be accommodated, and staff can choose among working through tutorials, watching a videotape, and attending workshops and short courses available on most campuses or in the community. If many staff members need such training, in-house instruction may be most cost effective. Such training for public access sites will differ little in design from training programs designed to teach staff to use microcomputers for library-related tasks. Baskin and Spencer (1983) offered useful recommendations for designing in-house training programs, covering such topics as rhythm, timing, variety, the use of humor, accommodation of learning styles, and logistics. An extensive four-level in-service training program for media center

staff and teachers was described by Woolls (1986).

Competency in the use of microcomputers among library staff has grown considerably in recent years. Librarians and other staff are likely to use microcomputers as tools to accomplish library-related professional tasks, from writing reports, compiling bibliographies, and keeping track of budgets to searching remote and CD-ROM databases. These computer skills and the general sense of being comfortable with the use of microcomputers, carry over well into public access situations (MacLean, 1988, p. 22; Piele, 1982, p. 21), although, as Lane (1990) points out, "those who support a microcomputer system will always need more training than those who need only to use that system" (p. 94). They will need to be acquainted with a wider variety of software and additional ways of using familiar programs.

Because the use of student assistants to provide help in microcomputer labs is so prevalent in academic libraries, special attention should be given to their training needs. Students will generally be hired, at least in part, on the basis of their computer skills and background so that training will be focused on the particular software used in the library, library policies and procedures, and human relations skills. Checklists of competencies that should be demonstrated within a given period can help organize training efforts. These can be arranged at several levels with promotions contingent on demonstrating higher levels of competency. Students may be asked to specialize in one type of software or to become the resident expert on particular packages as they arrive (Madden, 1987a, p. 26). These staff members can then prepare any necessary documentation and point out potential trouble spots to other assistants.

Time spent cultivating the library's service philosophy may be even more critical than technical training. Hess (1988) offers the following instructions for student assistants, developed and contributed by one of the libraries that completed her survey of academic libraries:

Goal—to make patrons feel good about using micros.

First step—make sure you know what the problem is.

First question—IS THIS BACKED UP?

Tell them *why*, not just how.

Unless you know otherwise, assume they know nothing.

Refer to the documentation often when helping, even if *you* know how.

Stand up as they approach and smile.

End most sessions with: "Just let me know if you need any more help"

(p. 95).

BIBLIOGRAPHIC AND FULL-TEXT DATABASES ON CD-ROM

In contrast to their somewhat diffident attitude toward providing

assistance for patrons using collections of software on diskettes and the wide variation in service philosophies that resulted, reference librarians showed little hesitation in adopting CD-ROM technology as their own and assuming a full-service reference posture toward it. In Salomon's (1988) survey of 150 academic libraries, she found that, although most respondents thought that assisting CD-ROM users would mean more work, only 8 percent thought that traditional reference questions should have a higher priority (p. 210). The reference department at the University of Pennsylvania was typical in determining that "librarians on desk duty should help CD users just as they would help patrons with printed or microform indexes" (Bryan & Chenoweth, 1989, p. 97). This view of CD-ROM materials as deserving of full reference services is reflected in the decision of most libraries to locate workstations in the reference area within sight of the reference desk (Stewart, 1990, pp. 4-5).

Despite their commitment to full reference service, librarians have found it a challenge to attain this goal. The need to develop new skills and the heavy demand for assistance have caused practical difficulties. The problem posed by insufficient time has been particularly difficult to solve as librarians have discovered that it simply takes more time to teach a patron to use a CD-ROM index and troubleshoot the process than to use a printed one. Carey and Massey-Burzio (1989) point out that in a printed index users look up only one term at a time and have only one type of vocabulary to worry about. In a CD-ROM index, they may be juggling several terms, some descriptors and some free-text, and trying to tie it all together with a search strategy. The patron will need help not only with the search protocols but with the concepts as well. In addition, they will need help with the keyboard and the printer (p. 990).

As a result, libraries have found themselves overwhelmed by the workload at the reference desk (Stewart, 1990, p. 12). Librarians report spending anywhere from one (Nissley et al., 1989, p. 98) to forty minutes (Pope, 1989, p. 94) to assist individual patrons in getting started. Trying to assist users of CD-ROM indexes while coping with ongoing reference traffic may mean service compromises. Youngkin et al. (1990) identify many variables that will affect the amount of assistance a user actually receives, including "staff members' own level of expertise and perception of the patron's need, the needs of other patrons coming to the desk, and the patron's questions, personality, demand for assistance, experience with computers and the SilverPlatter software, subject expertise, knowledge of the MEDLINE database, and purpose of the search" (p. 127).

Coons and Stewart (1988) note the frustration felt by many librarians who observe evidence of poor search strategies left on

screens, presumably due to lack of sufficient assistance: "Although five or ten minutes of individualized instruction could have prevented these errors, we are not always able to provide it, and students do not always ask"(p. 35).

However, users seem to be more satisfied with the results they are getting than are librarians. Glitz and Yokote (1990) report that a formal evaluation at UCLA's Biomedical Library revealed that users were both overwhelmingly satisfied and seriously "underutilizing the system" (p. 271). Allen (1989, 1990b) found similar discrepancies between users' self-reported satisfaction and the quality of their search results in studies carried out at the Undergraduate Library at the University of Illinois at Urbana-Champaign. Ritch (1990) identified at least one of the reasons for the discrepancy between user and librarian satisfaction: "Most systems are easy to use and hard to master. They engage the user so swiftly in simple searches that there is little motivation to seek assistance in adding more advanced features, however invaluable, to existing skills" (p. 33).

In holding themselves accountable for the quality of their patrons' searches, are librarians striving for an inappropriately high level of service? O'Leary (1990) acknowledged that a user's search strategy may be "deplorable by the standards of an experienced online searcher, but if that person goes away happy, who is to say which standard should apply" (p. 31)? Schultz and Salomon (1990) pointed out that most patrons don't use printed sources to full advantage either and that many undergraduate students really do need only "a few good articles" (p. 57).

Counter arguments run along several lines. Those concerned with lifelong learning skills cite the need to ensure that student patrons understand the concepts involved, not just the protocols of a specific system, in order to "be able to take advantage of future developments throughout their careers" (Plutchak, 1990, p. 114). Plutchak (1989) also deplores the inefficiency represented by poor searches in arguing that librarians should assume responsibility for doing something about the "satisfied but inept end user." He urges libraries to take a proactive role in exercising their responsibility for "the overall use of information resources" (p. 48). Reese (1990) pointed out that patrons differ considerably in their needs for high quality searches and that a level of service appropriate to meet the relatively modest needs of undergraduates would be inappropriate for doctoral students who must conduct carefully constructed literature reviews (p. 47).

Rapp et al. (1989) lent historical perspective to the issue by citing Bacon's 1915 article which discussed many of the same issues in terms of the then controversial "end-user" access to the *Readers' Guide to Periodical Literature* (p. 13). Harter and Jackson (1988) observed

that the question is an "uncomfortable" one for librarians because "it raises deep-seated ethical and professional concerns" (p. 519). They called for more research into what users really need from electronic search systems (p. 525).

A useful example of such research on user needs and search strategy effectiveness was conducted by Liebscher and Marchionini (1988). They studied the behavior and success of elementary school students using a full-text CD-ROM encyclopedia in terms of their use of browsing versus analytical (i.e., using Boolean operators) search methods. The researchers found that, given the objectives of the search task and the particular tool, the browse method was at least as effective as the analytic method.

User surveys indicate that patrons prefer to learn how to use CD-ROM databases by having one-on-one instruction available to them at precisely the time they need it (Allen, 1990a, p. 91; LePoer & Mularski, 1989, p. 43; Steffey & Meyer, 1989, p. 39; Lynn & Bacsanyi, 1989, p. 21). Because librarians are not able to provide this level of service consistently, they have found a number of ways to stretch their time and expertise.

As in the case of microcomputer labs, paraprofessionals and student assistants are used by many academic libraries to orient patrons to CD-ROM databases and to troubleshoot problems as they arise. We would agree with Bonta and Kalin's (1989) contention that the high proportion of questions from users that are mechanical in nature (using printers, starting the system, changing disks, etc.) is sufficient justification for doing so (p. 11).

Another tactic has been to develop alternate methods of giving instruction to students, such as making vendor supplied documentation readily available, pointing out help screens and system-supplied tutorials to patrons, and developing additional brief handouts, posters, and keyboard templates for each database. Some libraries have developed search strategy worksheets that users are encouraged to complete before actually sitting down at a workstation (Eaton et al., 1989, p. 61). The University of Pennsylvania developed onscreen tutorials for each of its CD-ROM databases (Bryan & Chenoweth, 1989, p. 95), and the University of Houston is developing a front-end expert system for its CD-ROM local area network that will help users select databases (and print materials) appropriately (Bailey & Gunning, 1990).

In addition, many libraries have offered special workshops for new users, and most report incorporating demonstrations and use of CD-ROM indexes into their ongoing bibliographic instruction programs. Formal instruction is often seen as a more desirable setting for instructing patrons in search strategy concepts (as opposed to

search mechanics).

Staff Training

The second reality that has affected the ability of libraries to meet their goal of providing CD-ROM users with a high level of service has been the initial lack of skills on the part of the service providers—i.e., the librarians themselves. Although libraries have found it challenging to provide the needed initial and ongoing training, the literature suggests that they have generally felt more successful in this area than in meeting the challenge of maintaining and upgrading skills over time.

It has been necessary to design training programs to meet a variety of needs. Librarians already involved in offering online search services have found it easiest to make the adjustment to CD-ROM search software, but even they have had to learn the new search systems. For other librarians, CD-ROM workstations may have been the first microcomputers (as opposed to terminals) that they have used. Thus keyboard and printer mechanics had to be learned in addition to the concepts and protocols of computerized literature searching. Also, many nonprofessional staff have been involved in assisting the public, from student employees to circulation staff, and these staff members have needed some level of training. Finally, because search software is often updated and new products are purchased, the training in this area has had to be developed into an ongoing process.

Many librarians have found it stressful to learn a variety of search systems and databases in a short period of time (Carrey & Massey-Burzio, 1989). To some degree, they may have been attempting to achieve an unnecessarily high level of expertise. At Brandeis, for example, librarians found, to their surprise, that "not only are most patrons satisfied with the simplest of searches, but that it is quite acceptable for us to try a variety of approaches and to check the manual when necessary as we assist our patrons" (Carey & Massey-Burzio, 1989, p. 989).

Skills needed by those who assist patrons can be divided into two categories:

1. *Basic Skills*: use of workstation keyboards; entering and exiting systems; loading and changing disks; turning equipment off and on; warm booting a system; use of documentation, including thesauri, online help, and tutorials; loading paper and fixing paper jams; changing ribbons and ink cartridges; procedures for referring patrons who need help formulating searches.
2. *Searching Skills*: knowing the types of databases available and the types of questions for which each would be used; entering search terms; using controlled vocabulary and free text options,

including proximity operators, if available; combining sets; truncation; limiting; database fields and field-specific searching; displaying, printing, and downloading; error message interpretation; use of DOS.

Two levels of training may be established with some staff learning only basic level skills and others all skills. For example, at Hahneman University, student assistants are trained only on hardware skills, while reference and circulation staff are trained to use both hardware and software. This library also developed an explicit seven-step protocol for assisting new users which staff are trained to follow (Silver, 1988, p. 65).

In addition to training in CD-ROM skills, it may be desirable to give staff additional training in the use of microcomputers. For example, Glitz and Yokote (1990) report that the need for additional microcomputer literacy on the part of the reference staff at the UCLA Biomedical Library became apparent with the advent of its CD-ROM service. Reference staff attended workshops on the use of microcomputers that were available on that campus in order to become familiar with the use of database management and word processing programs (p. 273).

Staff responsible for maintaining a LAN configuration will need special training in hardware and systems. At Howard County Library in Maryland, when its Info-Lan was installed, three days of intensive training was supplied by a consultant working with the library on the project (Hill & Demmitt, 1990, p. 241).

Libraries have employed a variety of training tactics, including:

- Setting up a workstation in a staff area before introducing the service and each new database to the public in order to allow time for self-instruction and practice.
- Devising practice questions and self-paced exercises for each database for staff to practice on. These may be combined with small group sessions (Maxymuk, 1990, pp. 24-25).
- Assigning each database to an individual staff member who becomes the local expert on it and trains other staff (Tucker et al., 1988, p. 39).
- Developing special instruction sheets for staff with answers to most frequently asked questions.
- Making screen dumps of online documentation to supplement other printed documentation.
- Making demonstrations of CD-ROM products a regular part of reference meetings.
- Developing a manual for student staff (Anders, 1990, p. 185).
- Establishing two levels of expertise; all staff, including those staffing the reference desk only a few hours each week, can be

expected to be able to handle the basics, with a few designated to become very knowledgeable about particular systems (Warren, 1989, p. 4).

- Developing checklists of needed skills and giving them to staff to complete; training can then be given to staff members individually depending on their needs (Carey & Massey-Burzio, 1989, p. 990).

Libraries have found that training cannot be a one-time thing. Not only are new products received and old products updated, but skill refreshers are needed, especially for staff who work only a few hours a week on the reference desk, or for databases that are less frequently used. And, of course, new staff must be oriented and trained. This is a particular problem among staff with high rates of turnover such as students and interns. Initial training programs might be designed with these ongoing training needs in mind. For example, skills checklists, self-paced exercises, and manuals, once developed, can be used to train new staff.

NUMERIC DATA FILES

Until a few years ago, libraries wishing to collect and provide access to numeric information in machine-readable form had to deal with magnetic tapes and the large computers necessary to mount them. The complications involved were too daunting for all but a few academic libraries to overcome. Libraries that did so included the University of Florida (Jones & Wittkopf, 1980; Jones, 1982; Pope, 1984), the Social Science Library at Yale University (Dionne, 1984), the University of British Columbia (Ruus, 1982a), and Lawrence University in Appleton, Wisconsin (Isaacson, 1982).

As numeric data began to be made available on diskettes and CD-ROM, the opportunity to collect and provide access to information in machine-readable form became available to any library with microcomputer and CD-ROM workstations. With much statistical data becoming available *only* in machine-readable formats, Jones and Seale (1988) predict that reference librarians will have little choice but to deal with statistical data in this format (p. 7).

Of course, the awkwardness of the format has not been the only difficulty involved in providing access to numeric data on magnetic tape or CD-ROM. Dealing with numeric rather than bibliographic or full-text data raises special service issues and training needs. What can be learned in these areas from libraries that have previously dealt with numeric data on magnetic tape?

In defining the level of service to be provided for users of magnetic tapes in their collections, libraries have typically referred to guidelines already in place for print materials. The University of Florida library,

for example, attempts to think only in terms of the basic library goal of connecting the user to the information he or she needs, "whether from a printed source located through an index or from a data set" (Jones, 1982, p. 390). Service, therefore, has involved providing access by helping the patron to identify and locate the data needed, usually by examining code books and other documentation, and loading or arranging to have the tape loaded. Librarians have also provided printed guides and other written instructions and have integrated the use of machine-readable numeric data sources into bibliographic instruction programs (Jones, 1982, p. 394). Although reference librarians at the University of Florida have occasionally coded requests to have the data extracted, this process has usually been handled by library systems staff as has programming needed to extract data (Pope, 1984, p. 268).

Data analysis has been specifically excluded from the services offered by most libraries. Although it is acknowledged that patrons need access to statistical consultation, librarians are not seen as the appropriate source of this expertise (Jones, 1982, p. 390; Dionne, 1984, p. 243; Isaacson, 1982, p. 168; Ruus, 1982a, p. 403). Jones and Seale (1988) describe the system at the University of Florida where the reference librarian "acts as a bridge, interpreter, and coordinator with either a systems, consulting, or research unit on campus or a group within the library" (p. 8). Pope (1984) describes in some detail the coordination and the precise steps that may be involved in such a team approach involving reference librarians (p. 268).

Bernard and Jones (1984) attempt to differentiate clearly the librarian's role from that of the social scientist. They contend that librarians should not get involved in evaluating the quality of machine-readable data files (MRDFs). Nor should they "act as even the most low-level consultants on the use of SPSS and other similar packages" (p. 96). They should, on the other hand, teach users (who, one assumes, are primarily graduate students in the social sciences) "the documentation skills (and not the statistical skills) that people need in order to use MRDFs...scholars need instruction both in the content of MRDFs and on the methods for interrogating MRDFs" (p. 97).

Mignon (1980), writing about the use of remote statistical databases, also contends that librarians should not get involved in providing statistical analysis: "This calls for the judgment not of a literature searcher but of an experienced statistician" (p. 183). He compares the judgment required for knowing how far to go in manipulating statistical data in answering reference queries to the ethical problem faced by librarians in dealing with legal and medical questions (p. 183). He does, however, give examples of several types

of data retrieval and manipulation *not* involving the use of statistics that could be part of the reference librarian's repertoire (p. 184).

Opinions on the librarian's role in establishing the validity of particular data are divided. Dionne (1984) appears to disagree with Bernard and Jones (as cited earlier) in asserting that librarians must assume responsibility for being aware of the validity of the data they are providing to patrons, and that they should inform patrons of any problems (pp. 244-45).

Libraries collecting numeric data files on diskettes and CD-ROMs will face many of the same service issues and may adopt similar policies and strategies as the pioneers who have dealt with magnetic tapes. For example, when the Davis Library at the University of North Carolina established its Machine Readable Data Files Center, it adopted a service policy providing basic access but drew the line at consulting in technical or statistical areas (Jones & Seale, 1988, p. 141).

It appears that the skills and time required to assist users with numeric data files on CD-ROM will depend in large part on the design of particular products. Some arrive as stand-alone products with sophisticated retrieval and analysis capabilities built in. Offering both a menu driven and a command searching mode, products such as *Disclosure* do not require extraordinary effort to train staff and yet allow the user a high level of control over the output (Halperin & Pagell, 1986).

Other data files, such as the U. S. Census disks, lack what Paisley (1990) terms "post-retrieval features" (p. ix) but do come equipped with simple menu-driven retrieval capabilities that allow the user to view and print data. However, because the census disks are formatted to allow them to be accessed by database management programs such as dBASE, anyone with access to a microcomputer, hard disk, an appropriate program, and the necessary skills will be able to manipulate and repackage the data (Munroe, 1989, p. 508).

If libraries choose to make such additional hardware and software available, they will need to determine the level of service to be offered to users. Will the ability of users to exploit these capabilities be dependent totally on their own skills or will librarians assist them, perhaps even serving as intermediaries? If Holloway and Jackson (1989) are correct in predicting that more and more data files on CD-ROM will be accessible with standard microcomputer application software (p. 59), libraries will have many opportunities to offer such enhanced services. Kuhlman and Lee (1986) urged all types of libraries—public and academic as well as special—to take full advantage of these new capabilities by providing patrons with "timely, definite answers" rather than simply the sources for answers (p. 760).

However, Cornick (1989) warned that the amount of time that will be required to provide all but the most basic services with most numeric data files should not be underestimated:

if data bases on compact discs create problems for the staff in providing assistance, machine-readable data files can cause nightmares. Usually the files are complex and may arrive in "compressed" or "squeezed" formats with little or no understandable documentation to help unravel the mysteries. Hours of staff time will be required to understand each data file, write documentation, and teach staff and patrons about them. (p. 148)

She went on to report that staff at the University of North Carolina's Machine Readable Data File Center in Davis Library typically spend one hour working with each patron accessing a large data file (not counting time spent examining the file in preparation for the patron's appointment) (p. 149). Jones and Seale (1988) also stressed the difficulties encountered by reference librarians working with large data sets and explained why this is a difficult and time-consuming process (p. 8).

Two authors have provided particularly useful discussions related to possible service levels. Ruus (1980) applied Rothstein's three service levels (minimum, middling, maximum) to the range of services that a data archive might offer; Gerken (1988), updating the discussion by including diskettes and CD-ROMs, also defined three levels of service. The following are examples of services that might be offered at three levels:

Basic

- maintain reference tools and help patrons identify and locate appropriate data files;
- provide stand-alone CD-ROM numeric databases on either a self-service or intermediary basis;
- integrate information about the availability and use of numeric databases into instruction programs;
- make microcomputer workstations and programs (e.g., database managers and spreadsheets) available for users who wish to repackage data;
- provide referral to expert services available outside the library;
- establish cooperative arrangements with expert-specialists to facilitate referral of patrons;
- consult on citation formats for numeric data in machine-readable formats.

Intermediate

- act as intermediary between user and database by extracting data;
- provide CD-ROM databases that are accessed by standard microcomputer application programs, such as *dBASE* and

Lotus 1-2-3;

- train and assist users in the use of database management and spreadsheet programs used to retrieve and repackage data;
- assist in transferring files to users' own diskettes;
- prepare documentation to supplement inadequate vendor documentation;
- instruct users in the use of code books and other documentation;
- evaluate validity of data and explain any problems to patrons.

Maximum

- repackage data in a form useful to the user;
- provide programming necessary to retrieve data;
- interpret statistical products;
- provide data analysis;
- consult on statistical and research methodology.

Just as with software on diskettes and public-access microcomputer facilities, factors affecting the level of service that a particular library will wish, or be able, to offer include the type of library and its mission, the size of the library, the availability of expert consultants outside the library, and the type of patron (student, community, faculty, researcher, administration). Strategies used by librarians to extend their expertise and time in assisting users with programs on diskettes and bibliographic and full-text CD-ROM databases can be used with numeric data files as well. For example, in academic libraries, student consultants can be used to assist patrons wanting to use application software to retrieve and repackage data, and the distributed service model can be employed to take advantage of expertise elsewhere in the institution or community (Gerken, 1988, p. 64).

Training

One of the problems that reference librarians are likely to face as they begin working with numeric databases is that, as Kuhlman and Lee (1986) point out, their literary skills are generally more highly developed than their numerical skills (p. 760). Thus training is probably even more critical in this area than with bibliographic and full-text CD-ROM products, as fewer librarians will be able to train themselves.

However, training needs will depend in large part on the particular data files collected. For stand-alone CD-ROM products, librarians will need to become familiar with the content and retrieval software, including any post-retrieval features. Strategies used to train staff in the use of bibliographic CD-ROMs would be appropriate for these products as well.

When working with other types of data files, the ability to use

standard microcomputer database management and spreadsheet programs to access and repackage data will be needed. Additional microcomputer skills that will be helpful when assisting users with data files are the ability to work with ASCII files and to convert files in order to transfer them from one application program to another. Training in these areas is available on most college campuses and in most communities. In large libraries with systems staff, special workshops may be developed for reference librarians.

Dionne (1984) believes that librarians' ability to work with social science data will be enhanced if they gain some familiarity with statistical techniques and quantitative research methodology, even if they do not offer consultation in these areas (p. 243). Librarians planning to work intensively with numeric data files may benefit from training opportunities that data archivists have utilized. These include training programs offered by the census bureau, by the International Association for Social Science Information Service and Technology (IASSIST), by CAUSE, and by the Inter-University Consortium for Political and Social Research (ICPSR). In addition, Ruus (1982b) suggests that librarians audit courses in research methodology with a quantitative bent, such as almost any university offers (p. 461).

CONCLUSION

Although software on diskettes, bibliographical and full-text databases on CD-ROMs, and numerical data files have been treated separately here, there is clearly a great deal of overlap among the three subtopics in terms of service issues and training. For example, librarians who have been heavily involved with the first two software categories will be relatively well-prepared to face the challenge of adding numerical data files to their repertoire. The fact that they are not microcomputer novices may make it possible to establish higher service levels initially than would otherwise be the case.

Although the level of assistance being offered by libraries to patrons using microcomputer software will continue to vary widely, the trend may be for libraries to offer higher levels of assistance. Moran (1989), for example, predicts that patrons will demand even more new services as libraries make more information technology available to them: "The possibilities in this area are limitless and will be constrained only by the amount of time librarians have available to be divided among competing demands." She offers as an example of such new services, helping patrons to download information in machine-readable form and construct personal databases (p. 36).

The view that technology will lead librarians to reevaluate their

service role is widely shared. Miller and Gratch (1989) identify questions they believe must be asked for this and succeeding generations of technology: "Do we push ahead or react conservatively? Do we stress end-use or mediation? Do we teach or try to remain uninvolved? Are we instructors with an important proactive role, acting as consultants to our clientele, or are we CD-ROM disc jockeys slinging whatever technology is current" (p. 399)? This emphasis on the role of librarians as consultants, a characteristic of higher service levels, is a common theme of those writing about the future of libraries (Surprenant & Perry-Holmes, 1985, p. 236; Harter & Jackson, 1988, p. 521; Hallman, 1990, p. 207).

What are the obstacles that must be overcome if higher service levels are to be more widely offered? First, making difficult choices between comfortable old services and stressful new ones will require courage on the part of librarians. Rothstein (1961), who was advocating a more consultative role for librarians thirty years ago at a time when technology had little impact on the reference desk, identified fear as one reason that librarians were loathe to move beyond a minimum level of reference service: "Fear, first of all, that the library can never hope to have the manpower to render more than severely limited assistance. Fear, again, that the patrons will take undue advantage and make exorbitant demands. And finally, 'errorphobia,' my new word for that old malady: the librarian's fear of making a mistake" (p. 14).

Even Rothstein (1961), however, acknowledged the very real additional obstacles to maximum service levels posed by the need for highly trained staff and the large amounts of staff time involved in providing such service to large numbers of patrons (pp. 16-17). Training programs such as those devised by reference librarians to bring themselves and other staff up to speed on CD-ROM bibliographical databases are just as feasible in other areas of software support, and external sources of training are readily available. But the time problem will find no easy solutions. Although increased library effectiveness can help administrators make the case for more staff, creativity and flexibility in the way staff is allocated will continue to be necessary, as will fresh ways of looking at all available resources. Strategies that have been helpful in the past, and that can be looked at again, include the use of paraprofessional and student staff in appropriate roles (including technical consulting), staff specialization, and distributed service models in which libraries develop effective referral networks.

REFERENCES

- Allen, G. (1989). Patron response to bibliographic databases in CD-ROM. *RQ*, 29(1), 103-110.

- Allen, G. (1990a). CD-ROM training: What do the patrons want? *RQ*, 30(1), 88-93.
- Allen, G. (1990b). Database selection by patrons using CD-ROM. *College & Research Libraries*, 51(1), 69-75.
- Anders, V. (1990). The Wiley laser disk service at Evans Library, Texas A & M. In H. Curtis (Ed.), *Public access microcomputers in academic libraries: The Mann Library model at Cornell University* (pp. 179-191). Chicago, IL: American Library Association.
- Avallone, S. (1985). Public access to microcomputers. *Library Journal*, 110(8), 105-106.
- Bacon, C. (1915). The Readers' Guide: Why not let the reader use it. *Wilson Library Bulletin*, 1(3), 40-42.
- Bailey, C. W. Jr., & Gunning, K. The intelligent reference information system. *CD-ROM Librarian*, 5(8), 10-19.
- Baskin, L., & Spencer, M. (1983). Training staff to use computers. In L. C. Smith (Ed.), *Professional competencies: Technology and the librarian* (Papers presented at the 20th Annual Clinic on Library Applications of Data Processing, 24-26 April 1983) (pp. 84-96). Urbana-Champaign, IL: University of Illinois, Graduate School of Library and Information Science.
- Bernard, H. R., & Jones, R. (1984). The use of MRDFs in the social sciences: An anthropologist and a librarian look at the issues. In M. Westerman (Ed.), *Nonbibliographic machine-readable data bases in ARL libraries* (SPEC Kit #105, pp. 94-99). Washington, DC: Systems and Procedures Exchange Center/Office of Management Studies/Association of Research Libraries.
- Bonta, B. D., & Kalin, S. (1989). CD-ROM implementation: A reference staff takes charge. *Reference Services Review*, 17(2), 7-11, 93.
- Bryan, J. G., & Chenoweth, R. (1989). CD indexes and abstracts in reference: Choices and decisions at the University of Pennsylvania. *The Serials Librarian*, 16(1/2), 83-100.
- Carey, J., & Massey-Burzio, V. (1989). Installing a local area compact disk network. *College & Research Libraries News*, 50(11), 988-991.
- Chiang, K., & Stewart, L. (1987). Teaching users to manage their own databases. In H. Curtis (Ed.), *Public access microcomputers in academic libraries: The Mann Library model at Cornell University* (pp. 157-170). Chicago, IL: American Library Association.
- Coons, B., & Stewart, L. (1988). Mainstreaming CD-ROM into library operations. *The Laserdisk Professional*, 3(September), 29-40.
- Cornick, D. (1989). Automated reference service: Pressing F1 for help. *North Carolina Libraries*, 47(Fall), 145-150.
- Curtis, H. (Ed.). (1987). *Public access microcomputers in academic libraries: The Mann Library model at Cornell University*. Chicago, IL: American Library Association.
- Curtis, H., & Lippincott, J. (1987). Overview of instructional programs. In H. Curtis (Ed.), *Public access microcomputers in academic libraries: The Mann Library model at Cornell University* (pp. 107-122). Chicago, IL: American Library Association.
- Davison, S. G. (1987). Microcomputers and information skills. In J. E. Herring (Ed.), *The microcomputer, the school librarian, and the teacher: An introduction with case studies* (pp. 63-78). London, England: Clive Bingley.
- Dewey, P. R. (1984). *Public access microcomputers: A handbook for librarians*. White Plains, NY: Knowledge Industry Publications.
- Dewey, P. R. (1986). "Hack" is not a dirty word—the tenth anniversary of patron access microcomputer centers in libraries. *Library Software Review*, 5(4), 232-235.
- Dionne, J. (1984). Why librarians need to know about numeric databases. In C. Chen & P. Herson (Eds.), *Numeric databases* (pp. 237-246). Norwood, NJ: Ablex.
- Eaton, N. L.; MacDonald, L. B.; & Saule, M. R. (1989). *CD-ROM and other optical information systems: Implementation issues for libraries*. Phoenix, AZ: Oryx Press.
- Galvin, T. J. (1978). Reference services and libraries. In A. Kent, H. Lancour, & J. E. Daily (Eds.), *Encyclopedia of library and information science* (Vol. 25, pp. 210-226). New York: Marcel Dekker.

- Gerken, A. (1988). What is a data archive and what should the information specialist know about managing locally maintained numeric data files? *Database*, 11(4), 60-65.
- Glitz, B., & Yokote, G. A. (1990). CD-ROM technology in a biomedical library. In L. Stewart, K. S. Chiang, & B. Coons (Eds.), *Public access CD-ROMs in libraries: Case studies* (pp. 267-277). Westport, CT: Meckler.
- Hall, H. W. (1986). Microcomputer centers in libraries: Staffing considerations. *Library Software Review*, 5(6), 341-344.
- Hallman, C. N. (1990). Technology: Trigger for change in reference librarianship. *Journal of Academic Librarianship*, 16(4), 204-208.
- Halperin, M., & Pagell, R. A. (1986). Compact disclosure: Realizing CD-ROM's potential. *Online*, 10(6), 69-73.
- Hart, J. W. (1985). The library's role in fostering computer literacy. In P. Spyers-Duran & T. W. Mann, Jr. (Eds.), *Issues in academic librarianship: Views and case studies for the 1980s and 1990s* (pp. 179-190). Westport, CT: Greenwood Press.
- Harter, S. P., & Jackson, S. M. (1988). Optical disc systems in libraries: Problems and issues. *RQ*, 27(4), 516-527.
- Hess, A. (1988). Notable collections of microcomputer software and hardware in academia: The findings of a study: 1986-87. *Library Software Review*, 7(2), 74-107.
- Hill, N., & Demmitt, J. (1990). INFO-LAN: A CD-ROM local area network in a public library. In L. Stewart, K. S. Chiang, & B. Coons (Eds.), *Public access CD-ROMs in libraries: Case studies* (pp. 235-247). Westport, CT: Meckler.
- Holloway, C., & Jackson, M. (1989). Microcomputer data files for libraries: A selected bibliography. *Online*, 13(1), 59-66.
- Hubbard, A., & Wilson, B. (1986). An integrated information management education program...Defining a new role for librarians in helping end-users. *Online*, 10(2), 15-23.
- Isaacson, K. (1982). Machine-readable information in the library. *RQ*, 22(2), 164-170.
- Jones, R. (1982). The data library in the University of Florida Libraries. *Library Trends*, 30(3), 383-396.
- Jones, R., & Seale, C. (1988). Expanding networks: Reference services for MRDF. *Reference Services Review*, 16(1-2), 7-12.
- Jones, R., & Wittkopf, B. (1980). Computerized census data: Meeting demands in an academic library. *RQ*, 19(3), 246-251.
- Julien, D. (1985). Expanding service: Public access microcomputers. *Wilson Library Bulletin*, 59(6), 381-385.
- Kuhlman, J. R., & Lee, E. S. (1986). Data-power to the people. *American Libraries*, 17(10), 757-760, 778.
- Lane, E. S. (1990). *Microcomputer management & maintenance for libraries*. Westport, CT: Meckler.
- LePoer, P. M., & Mularski, C. A. (1989). CD-ROMs impact on libraries and users. *The Laserdisk Professional*, 2(4), 39-45.
- Liebscher, P., & Marchionini, G. (1988). Browse and analytical search strategies in a full-text CD-ROM encyclopedia. *School Library Media Quarterly*, 16(4), 223-233.
- Lynn, P., & Bacsanyi, K. (1989). CD-ROMs: Instructional methods and user reactions. *Reference Services Review*, 17(2), 17-25.
- MacLean, P. (1988). State University of New York at Geneseo. In J. Uppgard (Ed.), *Developing microcomputer work areas in academic libraries* (pp. 17-28). Westport, CT: Meckler.
- Madden, J. (1987a). Policy considerations and day-to-day operations. In H. Curtis (Ed.), *Public access microcomputers in academic libraries: The Mann Library model at Cornell University* (pp. 18-31). Chicago, IL: American Library Association.
- Madden, J. (1987b). Software circulation and patron support. In H. Curtis (Ed.), *Public access microcomputers in academic libraries: The Mann Library model at Cornell University* (pp. 89-103). Chicago, IL: American Library Association.
- Maxymuk, J. (1990). Implementing a CD-ROM installation: The Temple program.

- The Laserdisk Professional*, 3(1), 24-27.
- Mignon, E. (1980). Numeric data bases in professional librarianship curriculum: Implications for behavioral and social science librarians. *Behavioral & Social Sciences Librarian*, 1(3), 181-187.
- Miller, W. (1984). What's wrong with reference: Coping with success and failure at the reference desk. *American Libraries*, 15(5), 303-306, 321-322.
- Miller, W., & Gratch, B. (1989). Making connections: Computerized reference services and people. *Library Trends*, 37(4), 387-401.
- Moran, B. B. (1989). The unintended revolution in academic libraries: 1939 to 1989 and beyond. *College & Research Libraries*, 50(1), 25-41.
- Munroe, M. (1989). Packaging census information using census test disk #2 with DBASE. *Illinois Libraries*, 71(9), 505-508.
- Nissley, M.; Anderson, P.; & Gaal, P. (1989). ROMping through ERIC: Measuring satisfaction and effectiveness. *The Laserdisk Professional*, 2(1), 95-100.
- Nollan, R. (Ed.). (1986). *Microcomputer software policies in ARL libraries* (SPEC Kit #123). Washington, DC: System and Procedures Exchange Center/Office of Management Studies/Association of Research Libraries.
- O'Leary, M. (1990). Local online: The genie is out of the bottle—part 2. *Online*, 14(2), 27-33.
- Paisley, W. (1990). Information on disk and tape: A moveable feast. In *Directory of portable databases* (vol. 1, issue 1, pp. vii-x). New York: Cuadra/Elsevier.
- Piele, L. J. (1982). Circulating microcomputer software. *ACCESS: Microcomputers in Libraries*, 2(4), 7-8, 20-23.
- Piele, L. J. (1985). Summary of survey results. *Microcomputer Services in Academic Libraries Discussion Group News* (available from Linda Piele, University of Wisconsin-Parkside, Kenosha, WI 53141).
- Piele, L. J.; Pryor, J.; & Tuckett, H. W. (1986). Teaching microcomputer literacy: New roles for academic librarians. *College & Research Libraries*, 47(4), 374-378.
- Plutchak, T. S. (1989). On the satisfied and inept end user. *Medical Reference Services Quarterly*, 8(1), 45-48.
- Plutchak, T. S. (1990). New approaches to access: CD-ROM at the St. Louis University Medical Center Library. In L. Stewart, K. S. Chiang, & B. Coons (Eds.), *Public access CD-ROMs in libraries: Case studies* (pp. 109-121). Westport, CT: Meckler.
- Polly, J. A. (1985). Burning-in: Four years at the public library's microcomputer. *Small Computers in Libraries*, 5(8), 13-15.
- Pope, C. (1989). An evaluation of ERIC on CD-ROM in a college library. *The Electronic Library*, 7(2), 94-97.
- Pope, N. F. (1984). Providing machine-readable numeric information in the University of Florida Libraries: A case study. In C. Chen & P. Herson (Eds.), *Numeric databases* (pp. 263-282). Norwood, NJ: Ablex.
- Rapp, B. A.; Siegel, E. R.; Woodsmall, R. M.; & Lyon-Hartmann, G. (1989). Medline on CD-ROM: Summary report of a nationwide evaluation. In B. A. Rapp, E. R. Siegel, R. M. Woodsmall, & B. Lyon-Hartmann (Eds.), *MEDLINE on CD-ROM: National Library of Medicine evaluation forum* (pp. 7-24). Medford, NJ: Learned Information.
- Rappaport, S. (1985). Getting librarians involved with computers. *Library Journal*, 110(11), 44-45.
- Reese, J. (1990). CD-ROM: A successful format in the education library. In L. Stewart, K. S. Chiang, & B. Coons (Eds.), *Public access CD-ROMs in libraries: Case studies* (pp. 39-57). Westport, CT: Meckler.
- Reynolds, D. (1985). *Library automation issues and applications*. New York: Bowker.
- Ritch, A. (1990). The UC Santa Cruz experience. In M. K. Duggan (Ed.), *CD-ROM in the library: Today and tomorrow* (pp. 27-36). Boston, MA: G. K. Hall.
- Robertson, S. D. (1986). *Public microcomputing: Facilities and usage in public libraries*. Studio City, CA: Pacific Information.
- Rothstein, S. (1961). Reference service: The new dimension in librarianship. *College & Research Libraries*, 22(1), 11-18.
- Rusk, M. D., & Eversole, O. H., III. (1985). Microcomputing: A challenge for college libraries. *Community & Junior College Libraries*, 3(3), 13-20.

- Ruus, L. G. M. (1980). User services in a data library. *IASSIST Newsletter*, 4(2), 29-33.
- Ruus, L. G. M. (1982a). The University of British Columbia data library: An overview. *Library Trends*, 30(3), 397-406.
- Ruus, L. G. M. (1982b). Training of data services professionals: Past, present, and future. *Library Trends*, 30(3), 455-465.
- Salomon, K. (1988). The impact of CD-ROM on reference departments. *RQ*, 28(2), 203-219.
- Schultz, K., & Salomon, K. (1990). End users respond to CD-ROM. *Library Journal*, 115(2), 56-57.
- Seiden, P. (1988). A librarian/manager's point of view. In J. Uppgard (Ed.), *Developing microcomputer work areas in academic libraries* (pp. 65-81). Westport, CT: Meckler.
- Silver, H. (1988). Managing a CD-ROM installation...a case study at Hahnemann University. *Online*, 12(2), 61-66.
- Steffey, R. J., & Meyer, N. (1989). Evaluating user success and satisfaction with CD-ROM. *Laserdisk Professional*, 2(5), 35-45.
- Stewart, L. (1990). An overview of public access issues. In L. Stewart, K. S. Chiang, & B. Coons (Eds.), *Public access CD-ROMs in libraries: Case studies* (pp. 1-22). Westport, CT: Meckler.
- Surprenant, T. T., & Perry-Holmes, C. (1985). The reference librarian of the future: A scenario. *RQ*, 25(2), 234-238.
- Thompson, R. E. (1985). A room of their own: Optimal setting for patrons and patron computers. *Technical Services Quarterly*, 2(3/4), 73-91.
- Tucker, S. L.; Anders, V.; Clark, K.; & Kinyon, W. R. (1988). How to manage an extensive laserdisk installation: The Texas A&M experience. *Online*, 12(3), 34-46.
- Uppgard, J. (1987). Public access microcomputers in academic libraries. *Small Computers in Libraries*, 7(1), 28-32.
- Warren, D. (1989). Supporting CD-ROM in an academic library. *Australasian College Libraries*, 7(March), 3-7.
- Woolls, E. B. (1986). Training staff and teachers in the use of microcomputers. In E. B. Woolls & D. V. Loertscher (Eds.), *The microcomputer facility and the school library media specialist* (pp. 156-164). Chicago, IL: American Library Association.
- Youngkin, M. E.; McCloskey, K. M.; Dougherty, N. E.; & Peay, W. J. (1990). CD-ROM utilization in a health sciences setting. In L. Stewart, K. S. Chiang, & B. Coons (Eds.), *Public access CD-ROMs in libraries: Case studies* (pp. 123-134). Westport, CT: Meckler.