Software for Patron Use in Libraries: Physical Access

MARY LOUISE BRADY, ILENE F. ROCKMAN & DAVID B. WALCH

ABSTRACT

PHYSICAL ACCESS ISSUES IN providing patron-use software are not limited to circulation. Providing hardware in the library rather than simply circulating these items creates a number of other issues to consider. The working relationships between libraries and computing centers must be addressed as circulation policies and procedures are developed. Alternatives to circulating floppies include the use of hard disk technologies and local area networks (LANs). Freeware, shareware, and site licenses are cost-effective ways of making certain types of software available. Security issues include the danger of viruses and other potential disasters. Examples from academic, public, and school libraries reflect different approaches for providing physical access to software.

INTRODUCTION

The overwhelming impact brought about by emerging microcomputer technology in the early 1980s was felt by nearly every facet of society, including libraries. Several libraries forged ahead in making this new technology available to their users, and in doing so, encountered new problems, unique challenges, and a different jargon that would cause them to carefully review and rethink how they would accommodate their users' desire to access both microcomputer software and hardware. This article focuses on physical access and

Mary Louise Brady, Learning Resources and Curriculum, California Polytechnic State University, San Luis Obispo, CA 93407
Ilene F. Rockman, Library Services, California Polytechnic State University, San Luis Obispo, CA 93407
David B. Walch, Library Services, California Polytechnic State University, San Luis Obispo, CA 93407
LIBRARY TRENDS, Vol. 40, No. 1, Summer 1991, pp. 63-84

reviews many of the issues encountered in making this relatively new type of material available to the library user. Fundamental issues related to the circulation of "floppies" are reviewed. Hard disk and LAN options to these traditional circulation procedures are considered. While libraries have long fought the battle of book damage and torn-out pages, the advent of software has brought new concerns such as viruses and expanded requirements for coping with disasters and preservation. These concerns are explored in some depth. Microcomputer technology has also placed new demands and requirements on the library building as well as the budget. For academic libraries there has been a rethinking regarding their relationship with campus computing organizations in making both microcomputer hardware and software available. These issues are addressed. The article concludes with case studies that briefly describe how academic, public, and school libraries have successfully coped in providing physical access to microcomputer software and hardware.

Circulation Issues

During the early 1980s, as the popularity of microcomputers grew, and their prominence in the work, school, and home environments increased, libraries were faced with the challenge of adding these new materials to their collections. Without question, meeting this challenge required creative approaches and sound decisions for handling the circulation and storage of these new materials (Rockman & Kemp, 1986; Strauss, 1986). Although much has been learned over time and with experience about the treatment and lending of public access software, salient questions still remain:

1. What is an acceptable loan period?
2. Should some disks circulate individually for short term (in the library) and long term (outside the library) while others circulate only internally through a file server or local network arrangement?
3. Should all producers' software (e.g., commercial, shareware, public domain) have equal loan periods?
4. Should all functional types of software (e.g., utility, recreational, educational) have equal loan periods?
5. Should users be required to sign proficiency and copyright compliance statements before software is loaned?
6. Will returned software be checked for damage (rebooted) and completeness (disk and documentation)?
7. Will fines be levied for lost or damaged material?
8. Will limits be placed on the number of disks which can be loaned at any one time?
9. Will software conform to the same interlibrary loan and reserve

(hold) policies as other library materials?
10. Will original or back-up copies of the disk circulate?
11. How will disks be protected from viruses?
12. How will the purchase of site licenses affect the circulation of individual disks?
13. How should disks which accompany material as supplements (pocket parts) circulate—i.e., with the material or separately?
14. How will electronic security and theft detection systems affect the circulation of disks?
15. How should materials be processed (e.g., ownership stamps, labels, date due slips, etc.) for circulation?
16. Should disks be repackaged, protected, or cushioned against harm before circulating?

Often, the type of library, user clientele, size of collection, staffing patterns, budget, and local service policies will dictate answers to these questions. Once decisions are made, written policies to guide daily operations need to be established. In formulating policies and procedures for loaning software, it is important "to strike a balance between providing effective access for users and reasonable protection" for libraries (Demas, 1985, p. 20). Also useful to consider before beginning to circulate software is how a library will deal with issues of "potential damage to the software and copyright violations" (Paskoff, 1989, p. 309), if "libraries should consider circulating software, even when they don't have computers" (Polly, 1986a, p. 22), and how back-up copies will be treated (Talab, 1987, p. 37).

In examining issues related to the circulation of software, Intner (1988) observes that one decision will often affect another:

> Designating software collections as noncirculating avoids some tricky problems, particularly those involved in the logistics of circulation and concerns about compliance with copyright limitations (although clever patrons can contravene them right under your nose). Limiting the use of software to the library building, however, automatically requires that the library provide computers for public use. No matter how many computers you have, there are never enough....You will (also) have to purchase and maintain printers and other peripherals....It is a costly business. (pp. 7-8)

Libraries also need to be sensitive to external factors, such as proposed legislation, which can influence and potentially alter their local decisions. The Computer Software Rental Amendment Act of 1989, also known as Senate Bill 198, is a case in point. Although not targeted specifically to libraries, the original language of the bill threatened the ability of all types of libraries to freely circulate software. Because of library concerns, representatives from the American Library Association testified before the Senate Subcommittee on Patents, Copyrights, and Trademarks in April 1989 to

convince lawmakers to exempt libraries from this bill which would amend the United States Copyright Act to prohibit the rental, leasing, or lending of computer programs (Flagg, 1989, p. 482). Due to the active mobilization of the library community, the language of the bill was subsequently modified to grant an exemption to nonprofit libraries, with the proviso that each copy of a computer program lent by a library contain a warning label affixed to the package alerting users that the program is protected under the copyright law ("Computer...," 1990, pp. 7-8).

Hard Disk Technology

As noted, there are a number of questions and issues related to circulating software. One alternative is the use of hard disk technology, which is rapidly becoming more and more popular in libraries. Hard disk technology allows the librarian to place application software packages, such as word processors, spreadsheets, and database programs that require more disk space on a hard disk. Hard disks help to prevent damage to floppy disks by eliminating excess handling of disks by numerous users, many of them novices.

Another advantage of hard disk technology is that it is less complicated for the beginning computer users since they have access to a menu which will allow them to enter a given program easily, or move from one application to another with ease. The user does not need to worry about system disks or booting a program from a floppy disk. The computer can also be equipped, not only with a hard disk, but with a 5 1/4" or 3 1/2" floppy disk drive that will allow the user to save files to personal disks rather than to the library's hard drive.

Disadvantages of hard disks include: users manipulating files thereby causing system malfunctions; the time required to purge obsolete files or files that patrons have knowingly or unknowingly saved to the hard drive; having to provide security not only for the equipment, but also for the programs that are on the hard drive; maintenance; costly repairs; lost data; and time needed to teach novice users how to access software.

Nelson (1989) sums up the advantages of hard disk technology when she states in her definitive work:

> advantages to the use of hard disk systems greatly outweigh their inherent disadvantages. Hard disks are so superior to floppy disks in terms of manageability, data storage capacity, and speed and power of data manipulation that every microcomputer user must at some point consider adding these units to older hardware models. (p. 117)

Maintaining the hard drive for the novice manager can be simpler with the aid of a good diagnostic program such as *SpinRite* or *Disc Technician*. These software programs can detect and rectify many

drive problems, thereby prolonging the life of the hard disk.

The Local Area Network Option

Another option to circulating floppies and a way to capitalize on the use of software is the use of a local area network. A great deal has been written on LANs, and definitions range from the complex to the simple. Hensinger (1990) defines a LAN as "an integration of hardware, cabling, operating systems, and LAN software" (p. 27). Walton's (1990) definition states: "A LAN (local area network) is essentially a communications system for microcomputers. It allows all sizes of libraries to increase the usefulness of micros by sharing hard disks and printers and coordinating access to expensive software programs" (p. 54).

Breeding (1990) provides a clear definition of LANs as follows:

> Local Area Networks (LANs) allow groups of microcomputers to share resources. With a LAN, individual microcomputers have access to more resources than would be available if they did not participate in the network. LANs allow users of the network to share common databases, spreadsheets, and documents as well as communicate throughout the network with electronic mail....In many cases it is more economical to concentrate resources on a LAN server rather than purchase hard disks and printers for each microcomputer in an organization. (p. 16)

Advantages of a LAN are similar to that of a hard disk but more extensive. By providing online software, the network removes the need for physically circulating and handling floppy disks, it allows several patrons to use the same program simultaneously, and it eliminates the need to buy several copies of a program thus reducing costs. Librarians need to be aware that most software companies provide substantial discounts for network versions of computer programs over the cost of purchasing several single use copies. The use of a program on a LAN that is meant for single computer use is not only illegal, but could cause a patron to lose data since the non-networked software is not configured for network use.

For the librarian seeking a thorough analysis of LAN use, William Saffady (1990) provides an excellent explanation of local area networks as well as a tutorial survey of LAN concepts and technology, emphasizing information that the librarian responsible for the LAN will need in order to wisely plan and implement such a network. Part three of his article describes and discusses the characteristics of the most important types of local area networks. The report ends with a select list of resources for further study.

If Saffady's article seems a bit heavy to begin the study of LANs, Jackie Fox (1990) does a good job in introducing the neophyte librarian to local area networks in her "Introduction to Local-Area Networks." In addition to a very down-to-earth description of what

composes the LAN, such as the network's operating system, the cables, the network's interface card, the protocols, and topologies, Fox also gives a simplified version of just what takes place when a patron requests a file on the network (p. 20). For those who want to ease into LANs, Watson (1990) presents an overview of the LANtastic LAN from Artisoft, Inc. (p. 15).

The attributes of an ideal network have been outlined by Weidlein and Cross (1986) as follows:

> 1. *Simplicity.* The network should be simple to configure, connect and use. It should be reliable and secure. A minimal amount of technical expertise should be enough for a user to take advantage of the PC network's full range of capabilities.
> 2. *Flexibility....*Adding new devices, moving, and rearranging the network should cause minimal disruption...
> 3. *Compatibility....*Different equipment should be able to communicate and interact through the network.
> 4. *Optimum speed and bandwidth....*
> 5. *Security....*A network must provide an easy means of protecting existing information storage with backup and copy routines.
> 6. *Low cost per connection and maintenance.*
> 7. *Reliable and archival storage.*
> 8. *Interface support.* The network should support a method by which dissimilar networks can be interconnected.
> 9. *Broad range of applications....* (p. 68).

Network Management

No matter how willing a staff is to take on a computer network, there should be at least one person capable of managing the system. That person needs to be knowledgeable about troubleshooting the system, especially when a patron finds that they are unable to access the program they want, or someone has erased the "autoexec" file, or a cable has come loose, or when a myriad of other problems appear just when patrons seem to need the network most.

The same person responsible for keeping the network operational must also know how to install software upgrades of all types, and have the ability to modify the system's menus or convert data files.

LANs in the Real World

There are several examples of librarians using LANs. Philip Arny (1990), Bio-Medical Library, University of Minnesota, manages the biomedical library's microcomputer lab in the Learning Resources Center. The center has two networks—a Macintosh network and an IBM token ring network running PC-LAN. They still circulate program disks for their Apple IIs, but almost all of the other programs in their collection are loaded on the appropriate network and are available through a menu system. They circulate startup disks (just operating systems) for the Macs but no disks for the PCs. The startup disks for the Macs boot the Mac and load the appropriate program.

Dudee Chiang (1990), information specialist in the Norris Medical Library at the University of Southern California, reported that their IBM PCs are all connected by a LAN, and most software is loaded on the LAN. Access to software is controlled by a menu system. Kibirige (1987), in a nationwide survey of 600 libraries and information centers, found that "the number of libraries and information centers which are already using LANs is relatively small (18.6 percent).... However, 45.5 percent of the sample have definite plans to use LANs. A considerable number of institutions are in the middle of negotiations with vendors" (p. 10).

In order to stay abreast of innovations in hardware and software, librarians need to keep current with computer literature. Joining local computer groups and/or attending conferences and workshops dealing with the latest in computers, software, and networking is essential.

Security Issues

Making software available in the library whether by floppy disk, hard disk, or LAN creates a number of potential security issues. A great deal of literature has been written on security for microcomputer systems and software, but the majority of the writing has been aimed at the large systems, such as online catalogs, or use of CD-ROM stations. Until now, library literature, on the whole, has not really reflected on security issues for individual PC workstations where the patron has freedom of access to all the programs on the hard drive, nor on security for the individual computer program which a patron may check out for use elsewhere.

For information dealing with individual workstations, Koga (1990) writes a clear and concise article related to security and microcomputers made available to the public. In it, he discusses types of security problems, such as illegal copying of software, stolen or damaged microcomputers, corruption or deletion of files and directories from hard disks, and the storing of unwanted patron files to the hard drive. The greater part of the article covers common sense, low cost remedies for handling security problems such as the use of physical locks, boot protection, utility programs, and back-ups. As a bit of final advice, Koga suggests that: "A great deal of judgement must go into your security plans; one must weigh the possible risks with the resources available. Your plans for security may be a combination of healthy paranoia, common sense, and lessons learned the hard way" (p. 68). Another form of security is that related to regular maintenance and noted by Ives (1989). "Scheduled maintenance consists of those steps or tasks taken on a regular basis to ensure hardware, software, and data safety and integrity" (p. 30).

Ives includes not only a comprehensive maintenance plan in his article, but also a checklist of procedures to be followed when conducting a regular maintenance schedule. He provides copies of a microcomputer testing/evaluation maintenance form and a printer/maintenance/repair form that are used at The University of Missouri-Columbia Libraries. Ryland (1989) clearly articulates the need for security by noting: "We must continue what we have been doing all along in establishing (and regularly monitoring the effectiveness of) reasonable security measures. We must emphasize the importance of ethical conduct with regard to the use of computers and networks..." (p. 13).

Viruses

The *Brain, WDEF, Jerusalem, nVir,* and *Peace* appear to be the latest in video titles to hit the open market. Instead, they are a series of viruses that can cause minimal to severe damage to a user's data files or to a library's hard disk drive. A great deal of literature has been written in which users are warned against viruses, are offered remedies for fighting viruses, and are made to feel terrified that they may be the next victim of an unknown virus attack.

It is important to realize that computer viruses do abound; they can be very expensive to eliminate; anyone who uses a computer can acquire them (often without the person's knowledge); there are programs in existence which can both warn against virus attacks and help to repair some, if not all, the damage a virus can cause; and yes, in rare instances, even a commercial disk still in its shrink wrap can be contaminated when purchased from a dealer.

Good overviews of the virus problem are offered by Marmion (1990) and by Coffey (1990). Marmion presents a brief history of early viruses, discusses various virus-detection programs, and relates the interesting story behind the AIDS Trojan which caused computer problems for such noted institutions as the London Stock Exchange and the British Ministry of Defence. Coffey (1990) provides readers with a concise definition of a computer virus as "an agent of infection, insinuating itself into a program or disk and forcing its host to replicate the virus code" (p. 91). He defines worm as "a single program (or group of programs) that operates independently. Worms simply move through files, leaving trouble in their wake" (p. 91). A Trojan Horse is described as that which "is generally considered the program or programming code that carries the worm or virus to the unsuspecting recipient" (p. 91). Coffey offers tips on keeping a computer virus free. Trojan horses, worms, and computer viruses do not, as Coffey points out, all act in the same way to infect a computer.

Chess (1989) defines a Trojan horse as a program that does "things

that the program author intended, but the program user did not" and a worm as a "Trojan horse program that spreads by sending itself across networking connections without the knowledge or intent of the user or the system owner" (p. 142). As to the definition for a *computer virus,* Chess (1989) defines it as:

> another, related, type of integrity threat. A program which is infected by a computer virus contains Trojan horse instructions of a particularly insidious kind; when executed, the Trojan horse code locates one or more as-yet-uninfected programs to which the executing Trojan horse has write access, and inserts itself into those programs, in such a way that they are now also infected. (p. 143)

Pamela Kane (1989) offers readers some interesting ideas on the subject of viruses in her book, *V.I.R.U.S. Protection: Vital Information Resources under Siege.* It is an easy book to read with helpful information for the beginning, as well as the advanced, computer user. Roger F. Aucoin is also an author that librarians should be well acquainted with for help in handling viruses. He is the author of "Guarding Against Computer Viruses: Some General Precautions" (1989a) and "Computer Viruses: Checklist for Recovery" (1989b). In the first article, Aucoin offers a list of fifteen measures a computer user should follow to avoid a virus attack, and in his second article he offers a checklist of twenty-three steps that will guide the user "through an orderly recovery process" (p. 4). Stefanac (1988) offers a sensible overview on the history, identification, and elimination of viruses on the Macintosh. She also provides the reader with a clear definition of a Trojan horse, a worm, and of viruses.

There are a variety of programs that can defend against a virus. One of the more popular ones is *Disinfectant Version 2.5* released in 1991 and developed by John Norstad at Northwestern University. The program's main goal was to provide a workable solution to the Macintosh virus problem at no cost to the user. It provides the user with detection, repair, protection, and education. The author has given permission to make and distribute copies of this software free of charge as long as it is not for profit. *Disinfectant* is distributed electronically, and when new viruses are uncovered, the author can usually, within a few days, release an updated version of the program that will recognize the new virus. Since it is not a commercial product, there is no support for the user. However, it is suggested that a person join either a user group, a Macintosh electronic bulletin board, or subscribe to a commercial online service if they wish to continue to receive updates on the program. Those who do not have access to one of the above services can send a self-addressed stamped envelope and an 800K floppy disk to the author at Northwestern University, 2129 Sheridan Rd., Evanston, IL 60208.

Symantec AntiVirus for Macintosh (SAM), with its accompany-

ing program *Symantec Utilities for Macintosh (SUM II),* is another leader in the field of virus protection. SAM will scan and eject any infected floppy disk that may be inserted into a Macintosh computer as well as scan any file folder, volume, or file server to identify existing viruses. If a virus is identified, SAM will repair infected files. SUM II is for data recovery and disk management.

For use with IBM or IBM compatibles, *Viruscan,* a shareware product, comes highly recommended. The program indicates the specific files or system points that have been infected and identifies the virus strain which has caused the infection. Corporate site licenses are required for corporate, agency and organizational use. For site license information contact: McAfee Associates, 4423 Cheeney St., Santa Clara, CA 95054. *Viruscan* works only on stand-alone PCs. For Local Area Networks, *Netscan,* which is not a shareware product, is recommended.

The best protection for your files and hard drive is to be prepared should a virus invade your system, and the best way to be prepared is to constantly back up your files, and to perform regular maintenance. Be sure, however, that your backup files are free of all viruses, and that original master disks are kept in a safe place and used only for making working or backup copies.

Coping with Disasters

As decisions are formulated and policies established, it is also important to plan for the unexpected. Planning for the unexpected catastrophe can reduce wasted time should a liquid, chemical, smoke, or natural disaster threaten a library's software collection.

One of the first steps to take in the planning process is self education about the composition and characteristics of floppy disks (Osborne, 1989). Once familiarity with the use of disks has been obtained, policies for salvaging disks damaged by spilled substances, unexpected water leaks, or smoke damage can be written. It is beneficial to incorporate these plans into a library's overall disaster/recovery plan so that all staff members are aware of the appropriate procedures to follow.

One of the most common types of disasters to befall a software collection is water damage. Such was the case in the early morning hours of June 19, 1986 at the Mankato State University library in Minnesota when a water pipe burst in the ceiling above the technical services area. Waiting to be processed in open boxes were fifty-five issues of the microcomputer serial, "Softdisk." Water filled both the boxes and the plastic jackets of the disks. Because staff were knowledgeable about disk manufacturing and knew that disks have a cloth-like lining inside the black plastic sealed jacket which absorbs

moisture, staff members tried an experiment to save both the damp and dripping wet disks. Using a portable hair dryer on the air setting (no heat), the damp jacket linings were dried. Those disks which were dripping wet were peeled out of their plastic sleeves and wiped clean with lint-free rags and hung for further drying. Care was taken to keep the disks from touching each other or other materials. The dry disks were cut open, removed from their plastic covers, slipped into dry covers, run, and successfully copied. By using this method, the entire microcomputer collection was salvaged (Olson, 1986a, pp. 634, 635, 636; Olson, 1986b, p. 15).

Physical damage, other than that created by water, can often be the result of bent or dented disks. Again, the key to the salvage operation is an understanding of how disks are packaged, the careful removal of the disk from its protective plastic jacket (e.g., cotton gloves to eliminate fingerprint marks), and the insertion of the disk into an undamaged jacket so that it can freely rotate. Test the disk and, if working, make a back-up copy for everyday use (Cammarata, 1989, p. 8). "The twin threats of human and mechanical damage" often require that back-up copies "become a necessary adjunct to a [software] collection" with the back-up used for circulation purposes (Talab, 1987, p. 36). "As long as the original is stored (i.e., archived) and only one copy at a time is in use, there is little likelihood of an infringement action" (Stanek, 1986, p. 51).

Fire damage can also present special challenges for software collections. After suffering extensive fire damage to a disk collection, one library recommends the following precautionary steps (Riffel, 1990, p. 110):

1. Keep back-up copies and an inventory list (on disk and in hardcopy), in a fireproof vault away from the user site.
2. Make a videotape of the software collection to document losses for insurance purposes.

Damage caused by spilled food, beverages, and other substances can also affect the performance of floppy disks. As with water damage, disk jackets can be carefully sliced open and the substance washed off with lukewarm running water. For greasy substances, disks can be washed with mild soap and water, blotted with paper towels or air dried, reinserted (right side up) into their disk jackets, run, and copied (Osborne, 1989, pp. 9-10).

Preservation Issues

It is advisable to include general handling, security, and preservation issues in written software policies. Basic procedures such as securing disks with write protection tabs to prevent data alteration; including care and copyright labels to paper sleeves and packages;

installing a batch file on each disk informing users of proper use, ownership, and copyright regulations; requiring users to return disks to circulation desks, not to book drops; and requiring staff not to expose disks to theft detection or desensitization equipment are all useful steps.

Staff should also be made aware that the improper care of electronically produced data can lead to the active and passive destruction of data (Cribbs, 1987, pp. 15-16). Environmental settings for using and storing disks should be periodically reviewed since they can have daily and long-term effects (National Bureau of Standards, 1983). Lack of proper archival practices and exposure of disks to heat, sunlight, moisture, dryness, magnetism, and dust can all contribute to loss of data. Libraries have found it convenient to store disks both in their original packages (with documentation) on shelves or in drawers, or repackaged in hang-up bags or folders with minimal documentation (instruction cards, templates, etc.) and manuals stored separately (Madden, 1987, p. 89). Local conditions and loan periods will influence the best method to choose. Whatever the decision, it is wise to keep in mind preservation, safety, and protection factors.

Related Issues

In addition to the circulation, security, preservation, and other issues that have already been discussed, there are additional tangentially related matters that deserve consideration. These include the role of related computing centers and the organizational structure of that relationship, physical plant considerations, and budget considerations. In discussing software circulation issues it is important to note that there are certain situations and environments where the software may be accessed in settings outside the library. An early study done in 1984 by the R. R. Bowker company showed that two-thirds of the libraries surveyed made microcomputers available for their user clientele. The study also showed that 59 percent of the libraries loaned software primarily for on-site use (Mitchem, 1985, pp. 426-33).

One trend has emerged, particularly on college and university campuses, for academic computing operations to assume responsibility for operating microcomputer labs and lending software. In institutions of higher education, the library's role in providing its patrons with access to software and microcomputers is becoming limited. Preliminary results of a survey of over 150 libraries in four-year colleges reveals that only 11 percent have responsibilities for, or include within their facility, a microcomputer lab. The survey, however, did not address the question as to whether or not these

libraries circulated microcomputer software for use at other locations outside the library (Walch, 1990b).

Library and Computing Center Relationships

It should be understood that in the college campus environment there is normally a separate organizational structure that is responsible for computing activities. Such computing organizations are normally divided into two separate sections. One section generally focuses on meeting administrative computing needs and another on meeting the instructional or "academic" computing needs. It is this latter unit that most often is charged with the responsibility of making microcomputer software available for the college or university community. The way this is done varies according to campus tradition and structure. For example, the academic computing unit may take full responsibility for establishing microcomputer labs and circulating software for use within the labs; on other campuses the library may assume that responsibility. Frequently, however, there is a combination where the campus computing organization assumes responsibility for providing and maintaining hardware located within the library and the library assumes responsibility for circulating software. A variety of other cooperative type scenarios also exist.

In developing a working relationship with the campus computing organization, the library needs to exert some thought in determining the organizational structure and relationship that should exist between itself and the computer organization. During the mid to late 1980s substantial discussion occurred both in professional meetings and in the literature regarding the convergence of the library with the campus computing organization. Such discussion was based on, among other things, the interdependency of these two units as exemplified in access to microcomputer labs and software. Clearly this kind of rationale is thin and by itself does not merit sufficient cause for merging libraries with computing organizations. A number of individuals have written on this topic, most notably Richard Dougherty (1987), former president of the American Library Association. He stated:

> The prospect of mergers may make for fascinating cocktail conversation at conferences and will certainly keep electronic mailboxes full, but speculations about mergers and absorptions only cause us to continue focusing on the wrong issues.... The attention of librarians and computing center professionals should not be focused on the rhetoric of mergers and takeovers but on the roles their respective organizations can play as the principal providers of information to campus communications. (pp. 289-90)

In keeping with Dougherty's perspective, Woodsworth and Williams (1988) discussed the inherent tensions that exist between

the library and computer organizations. They stated:

> Notwithstanding sound agreements, tensions are inevitable in any partnership or working relationship between two units that are interdependent or in which one relies on another for service. At the operating level, this can result in poor system performance. At the management level, it can continue the clash of two cultures which... have had an approach-and-avoidance relationship for years. This is not easily overcome, because...the two have historically different service missions, staff with disparate foci and skills, differing paces and styles of adapting to change, and a lack of understanding of each others' missions and operations. (p. 88)

Suffice it to say that it will be critically important to establish a clear and appropriate working relationship between the library and the computer organization if there are to be shared responsibilities.

Physical Facilities

Space is nearly always at a premium in libraries. Though allocating space for software may not pose an insurmountable problem, the space it does take normally comes from high use, closed stack areas. That is, most libraries find it necessary to shelve software, with accompanying documentation, in a controlled stack area that is already in high demand for assorted needs. A related concern also deals with space requirements for hardware if the library chooses to make microcomputers available for their software collection. Unless one has the good fortune to plan and build a new library facility, space may have to be "made" within the current confines of the library. This may be at the expense of already limited seating or stack space.

Recommendations vary for the number of square feet required for microcomputer workstations, and frequently standards do not address space requirements for microcomputers. For example, the ULS (1989) "Standards for University Libraries" simply states that, "the library should provide...space for study and research..." (p. 683). There is no indication of a specific square footage recommendation. The ACRL (1986) "Standards for College Libraries" state that, "each study station shall be assumed to require 25 to 35 square feet of floor space, depending upon its functions" (p. 197). The document does not address microcomputer workstations per se. While the ACRL (1989) "Standards For Two-Year College Learning Resources Programs" elaborates on the need to consider space planning for computer workstations, they do not specify a square footage recommendation (p. 504). Similarly, *Information Power: Guidelines for School Library Media Programs* makes no recommendations regarding space for microcomputer workstations. Those that have addressed the matter more directly include Raymond M. Holt (1989)

who authored *Planning Library Buildings and Facilities.* He recommends allowing 25 to 35 square feet for "personal computer with printer on table or desk" (p. 210). The California State University (1990) has also provided very specific recommendations related to space requirements for microcomputer workstations. Their specifications state:

> The LTCW's (Library Telecommunications/Computer Workstations) are to be provided at the rate of 10% of the total Reader Stations permitted by library formula. For example if the library is permitted 2,000 reader stations then 10 percent, or 200, are to be designated LTCW's. These are calculated at 49 ASF [assignable square feet] per seat. These workstations require more space than other library reader stations because of the equipment and the work space needed to accommodate additional forms of information such as books and periodicals used in a library environment. The LTCW's contain an aggregate of electronic library equipment that permits the student to access and examine different formats of electronically accessed information. (p. 7)

In addition to space requirements, substantial thought must be given to making the space suitable and equipping it appropriately for microcomputers. Much has been written on this and it is not the intent to detail here the wealth of information available. A sampling, however, of the various considerations that need to be made would include the following:

1. Space should be provided "above the ceiling for pulling shielded data transmission cable" (Boss, 1987, p. 105).
2. "Finished columns should include a blank duct...for the pulling of data transmission cable." Avoid power poles as much as possible (Boss, 1987, p. 105).
3. Furniture should be placed close to columns to permit concealment of wiring (Boss, 1987, p. 105).
4. Lighting should be glare-free (Corbin, 1988, p. 89).
5. Microcomputers should be spaced at least three feet apart and so placed as to prevent lines of sight between them. In order to maximize the feeling of spaciousness equipment should be placed in parallel (Corbin, 1988, pp. 88, 90, 91).

A refreshing insight to basic facilities issues has been provided by those who worked to develop the Microcomputer Center at the Mann Library at Cornell University. In their conversion and renovation of space, they noted the importance of having diffused overhead light, of surge protectors (by means of a central electrical panel as opposed to each workstation), of carpet designed to prevent static buildup, of specially designed computer furniture that provides ample space for paper and books, and of wide aisles and "elbow room" (Curtis, 1987, p. 8).

As can be seen, planning for the physical facility requirements

can be complex and require the skills and assistance of those who may well be more familiar with space planning, electrical and data-transmission wiring, furnishings, and architectural intricacies than the typical librarian.

Physical Access by Type of Library

Academic Libraries

Piele (1982) authored one of the first articles on the circulation of microcomputer software, largely based upon her experiences at the University of Wisconsin at Parkside Library. Rather than circulate individual floppy disks, software at Parkside was installed on a 20 megabyte hard disk and accessed through a network arrangement in the library's microcomputer lab.

By the mid to late 1980s, as academic libraries began to add software to their collections, other articles began to appear. Noticeable were concerns about individual disk circulation from the perspective of both the library and the vendor, and any potential copyright infringements (Walch, 1984a. Reprinted in Walch, 1984b); overall implementation issues (Snelson, 1985); the importance of including K-12 and adult-level educational software collections to support curriculum and teacher education institutions (Rockman and Kemp, 1986); and strategies for research libraries to follow to best serve the microcomputer needs of their users within the context of relationships with campus computer center facilities and personnel (ARL, 1986).

The publication of the Association of Research Libraries' (ARL) Spec Kit 123, *Microcomputer Software Policies in ARL Libraries* (Nollan, 1986), clearly indicated that if large research libraries embraced computer software, then other academic libraries could no longer shy away from including software in their collections. With contributions from the Columbia University Libraries, the University of Texas at Austin, Virginia Polytechnic Institute and State University, Johns Hopkins University, the University of California at Riverside, and Catholic University, it was clear that both public and private and large and small research libraries from all parts of the country were wrestling with the same implementation and circulation questions. Of the 105 academic libraries surveyed in December 1985, 38 percent indicated that software circulated.

In late 1989, ARL Spec Kit 159, *Administration of Library-Owned Computer Files,* was distributed. Its intent was broader in scope than the previous spec kit, and included magnetic media formats such as CD-ROMs, bibliographic and numeric machine-readable data files, and computer programs, either accessible in the

library or through the campus network. The small sampling of respondents (twenty-eight of thirty-four libraries) indicates that these materials are not yet widely found in libraries. When owned, access is typically within the library only (Shaw, 1989, p. 11).

In addition to comparative use articles, individual case studies of library experiences also appeared during the latter part of the 1980s. The American Library Association commissioned the Mann Library at Cornell University to write the book, *Public Access Microcomputers in Academic Libraries* (Curtis, 1987), which was a collaborative effort of nine librarians from the library's Microcomputer Center which opened in 1984. The "Software Circulation and Patron Support" chapter indicates that software accounts for approximately 10 percent of the library's total circulation, with software on reserve raising this figure to 20 percent (Madden, 1987, pp. 89-91). High use software placed on reserve poses special challenges. As a result, staff have developed a separate software reserve policy and make every effort to see that professors include adequate documentation and tutorial materials with their reserve placements.

The experiences of the University of Florida Libraries were published in 1988 after the completion of a two-year study of local software use. Florida librarians developed policies useful to both branch libraries and to the main campus library. Florida librarians recommended that:

> Circulation policies for software should be much like that for other library materials, dependent on content, format, and anticipated use as well as hardware requirements and restrictions. Software may be used in the library if hardware is available, or checked out for use elsewhere. Circulation should be subject to contractual arrangements as well as existing library policies. (Beaubien et al., 1988, p. 665)

That same year, *Developing Microcomputer Work Areas in Academic Libraries* was published (Uppgard, 1988). It contained the diverse experiences of six academic libraries, large and small, some with branches and others as the single campus library. Of particular note is the excellent annotated bibliography pertinent to issues affecting academic libraries.

Public Libraries

In many ways, the experiences of public libraries parallel those of academic libraries. A 1984 survey of 900 public library systems conducted by the United States Office of Educational Research and Improvement (OERI) reports that nine out of ten libraries that provide computers also loan software for use in and out of the library building, with a typical loan period of one week (OERI, 1986, p. 1).

The experiences of a large urban library, the Minneapolis Public Library, and a small suburban library, the Liverpool (New York) Public Library, are typical of many others. Circulation policies may reflect two distinct categories of patron needs—short term for games and preschool programs, and long term for word processors, data management, and the like (Smisek, 1985, p. 108). Usage or overdue fees can conform to existing policies for other media materials. Core collections can be maintained at each branch in a multibranch system, or the software collection can be centralized at one location.

At the Minneapolis Public Library, software is circulated at two specific service points, the Science and Technology Desk or the Children's Room Desk. No borrowing fees are charged and the loan period is one week. Returned programs are inspected only in response to user complaints. Since the software lending program was established, only seven out of 1,100 disks were returned damaged, and the library absorbed the cost of replacement disks (Smisek, 1985, pp. 108-09).

In contrast, the Liverpool (New York) Public Library circulates software only from the main circulation desk. Due to collection growth, small amounts of damage, and limited staff time, the library no longer boots each piece of returned software (Polly, 1986b, p. 152) but does check to see that all items have been returned (Polly, 1986a, p. 22). Software returned without a disk or manual (all manuals are photocopied and the original circulates) is subject to a fine of one-half the program cost, and patrons who fail to return a program must pay the full replacement cost. Circulation periods are one week with a limit of three titles.

School Libraries

The challenges facing school libraries often involve stretching their budgets to include programs for both students and teachers in a single classroom or within a school's multi-use computer lab. The needs and practices of public school libraries, private school libraries, and school library systems can also influence how software is handled (Camerman, 1986, p. 1).

With only one librarian and no clerical staff or student assistants, the Northwestern High School library in rural Maple, Wisconsin, was able to serve its 450 students with up to eighty software titles by implementing a simplified approach (Murphy, 1988, p. 132). Materials are repackaged into hardcover notebooks with three-ring plastic disk inserts, and software is limited to use in the library for a one-hour period.

In contrast, once the Del Ray School library in wealthy Orinda, California, gained $10,000 worth of software through its grant

writing efforts, it enlisted the assistance of parents to staff the software lending library. It also made the software available outside the school to the community at large (a stipulation of the grant) without sustaining any theft or damage problems (Paskoff, 1989, p. 310).

Conclusion

The rapid proliferation of microcomputers and their accompanying software has made it necessary for libraries of all types to carefully and thoughtfully consider their role in making this relatively new format accessible. Though it is difficult to see how libraries can ignore or delay addressing issues related to such service, there are several matters that must be pondered—not the least of which is that of physical access. Such matters and the impact they have on library operations and services have been outlined in this article. As libraries have confronted and, for the most part, successfully addressed and accommodated the demands required by the microcomputer revolution, it will be important to realize that beyond the horizon lie even more challenges that will arise as new technologies are developed. These technologies will make an ever-increasing amount of information available and will present an ever-increasing number of challenges to libraries. It is clear that libraries will be in the forefront in providing their users with information of all types and in all formats. This was clarified many years ago in a prophetic statement made by Louis Shores (1973) who noted that:

> Long before Marshall McLuhan suggested the decline of the print medium, Georges Duhamel wrote, in *In Defense of Letters* (1939) that the defenseless book would be supplanted by "less laborious methods of information and recreation." Dissenting from the opinions of both Duhamel and McLuhan, I urged my librarian colleagues in colleges and universities, while I was chairman of the ACRL Audio-Visual Committee, to reject this defense complex and to recognize that all formats are part of the generic book. As such, they should be selected and acquired, as well as processed and disseminated, without condescension. (p. 93)

The recognition of computer software as part of the generic book as well as other evolving formats is important. Making them appropriately accessible to the library's clientele is an equally important issue.

References

ACRL. College Library Standards Committee. (1986). Standards for college libraries, 1986. *College & Research Libraries News, 47*(3), 189-200.

ACRL Joint Committee. (1989). Standards for two-year college learning resources programs: A draft. *College & Research Libraries News, 50*(6), 496-505.

Arny, P. (1990). *Public access computer systems forum.* [Electronic mail posting].

PACS-L@UHUPVM1.BITNET.
Aucoin, R. F. (1989a). Guarding against computer viruses: Some general precautions. *Computers in Libraries, 9*(11), 24-26.
Aucoin, R. F. (1989b). Computer viruses: Checklist for recovery. *Computers in Libraries, 9*(2), 4-7.
Beaubien, D. M.; Emerton, B.; Kesse, E.; Primack, A. L.; & Seale, C. (1988). Patron-use software in academic library collections. *College & Research Libraries News, 49*(10), 661-667.
Boss, R. W. (1987). *Information technologies and space planning for libraries and information centers.* Boston, MA: G. K. Hall.
Breeding, M. (1990). LANS: The basics. In N. M. Nelson (Ed.), *Computers in libraries '90* (Proceedings of the fifth annual Computers in Libraries Conference) (pp. 16-17). Westport, CT: Meckler.
California State University. Office of the Chancellor. Division of Library Affairs. (1990). *Justification and cost impact of the new CSU library policies and standards.* Seal Beach, CA: California State University.
Camerman, V. T. (1986). *A survey of 154 randomly selected libraries in the state of New York concerning their acquisition and treatment of computer software.* (ERIC Document Reproduction Service No. ED 286 506)
Cammarata, J. (1989). Salvaging damaged floppy disks. *SLO Bytes PC User's Group Newsletter, 5*(October), 7-8.
Chess, D. M. (1989). Computer viruses and related threats to computer and network integrity. *Computer Networks and ISDN Systems, 17*(2), 141-148.
Chiang, D. (1990). *Public access computer systems forum.*[Electronic mail posting] PACS-L@UHUPVM1.BITNET).
Chiang, K., & Curtis, H. (1987). The selection and acquisition of software and computerized data. In H. Curtis (Ed.), *Public access microcomputers in academic libraries: The Mann Library model at Cornell University* (pp. 49-58). Chicago, IL: American Library Association.
Coffey, M. A. (1990). Computer viruses: What they are, what they do, and how to protect your system from infection. *Apple Library Users Group Newsletter, 8*(3), 91-97.
Computer Software. (1990). *ALA Washington Newsletter, 42*(4), 7-8.
Corbin, J. (1988). *Implementing the automated library system.* Phoenix, AZ: Oryx Press.
Cribbs, M. A. (1987). The invisible drip...How data seeps away in various ways. *Online, 11*(3), 15-26.
Curtis, H. (1987). Planning, design, and staffing. In H. Curtis (Ed.), *Public access microcomputers in academic libraries: The Mann Library model at Cornell University* (pp. 3-17). Chicago, IL: American Library Association.
Demas, S. (1985). Microcomputer software collections. *Special Libraries, 76*(1), 17-23.
Dougherty, R. M. (1987). Libraries and computing centers: A blueprint for collaboration. *College & Research Libraries, 48*(4), 289-296.
Fox, J. (1990). Introduction to local-area networks. *PC Today, 4*(8), 14-24.
Geller, S. B. (1983). *Care and handling of computer magnetic storage media.* Washington, DC: National Bureau of Standards, Institute for Computer Sciences and Technology. (ERIC Document Reproduction Service No. ED 242 316)
Hensinger, J. S. (1990). LANs in the library, Part II. *OCLC Micro, 6*(2), 27-28.
Holt, R. M. (1989). *Planning library buildings and facilities: From concept to completion.* Metuchen, NJ: Scarecrow Press.
Intner, S. S. (1988). Developing Software Collections. In S. S. Intner & J. A. Hannigan (Eds.), *The library microcomputer environment: Management issues* (pp. 3-21). Phoenix, AZ: Oryx Press.
Ives, D. J. (1989). Design of a crisis and maintenance plan. *Computers in Libraries, 9*(3), 30-33.
Kane, P. (1989). *V.I.R.U.S. protection: Vital information resources under siege.* New York: Bantam Books.
Kibirige, H. M. (1987). Local area networks for information retrieval. Flushing, NY:

City University of New York, Queens College Graduate School of Library and Information Studies. (ERIC Document Reproduction Service No. ED 301 211)

Koga, J. S. (1990). Security and the PC-based public workstation. *Online, 14*(5), 68-70.

Library exemption for software rental act. (1989). *American Libraries, 20*(6), 482.

Madden, J. (1987). 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.

Marmion, D. (1990). Computer viruses: An overview. *Library Software Review, 9*(3), 139-144.

Mitchem, T. (1985). The Bowker National Library Microcomputer Usage Study, 1984. In J. Moore (Ed.), *The Bowker annual of library and book trade information* (pp. 426-434). New York: R. R. Bowker.

Murphy, G. (1988). Software circulation simplified. *School Library Journal, 35*(1), 132.

Nelson, N. M. (1989). Hard disk technology for libraries. *Library Technology Reports, 25*(1), 83-117.

Nollan, R. (1986a). *Microcomputer software policies in ARL libraries* (Spec Kit 123). Washington, DC: Association of Research Libraries, Office of Management Studies.

Nollan, R. (1986b). *Microcomputer software policies in ARL libraries.* Washington, DC: Association of Research Libraries, Office of Management Studies. (ERIC Document Reproduction Service No. ED 270 117)

Office of Educational Research and Improvement. (1986). *Patron Use of Computers in Public Libraries.* Washington, DC: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 272 181)

Olson, N. B. (1986a). Hanging up your software to dry. *College & Research Libraries News, 47*(10), 634-636.

Olson, N. B. (1986b). Salvaging wet disks. *Unabashed Librarian, 59*, 15.

Osborne, L. N. (1989). Those (in) destructible disks: Or another myth exploded. *Library Hi Tech, 7*(3), 7-10.

Paskoff, B. M. (1989). Microcomputer software in library collections. *Library Trends, 37*(3), 302-315.

Piele, L. J. (1982). Circulating microcomputer software. *Access: Microcomputers in Libraries, 2*(4), 7-8, 20-23.

Polly, J. A. (1986a). Circulating software: Some sensible groundrules. *Wilson Library Bulletin, 60*(10), 20-22.

Polly, J. A. (1986b). Circulation of microcomputer software: One library's experience. In N. J. Melin (Ed.), *SCIL 1986: Software/computer conference and exposition for information managers and librarians* (pp. 149-53). Westport, CT: Meckler.

Riffel, J. (1990). Disaster planning for libraries: Safeguards for software. *Apple Library Users Group Newsletter, 8*(April), 110.

Rockman, I. F.; Kemp, B.; & EBSS Ad Hoc Subcommittee on Microcomputer Issues in Education Libraries. (1986). Administrator's checklist of microcomputer concerns in education libraries. *College & Research Libraries News, 47*(1), 69-71.

Ryland, J. (1989). Security—A sleeper issue comes into its own. *Cause/Effect, 12*(4), 8-13.

Saffady, W. (1990). Local area networks: A survey of the technology. *Library Technology Reports, 26*(1), 5-125.

Shaw, S. J. (1989). *Administration of library-owned computer files* (Spec Kit 159). Washington, DC: Association of Research Libraries, Office of Management Studies.

Shores, L. (1973). *Audiovisual librarianship: The crusade for media unity* (1946-1969). Littleton, CO: Libraries Unlimited.

Smisek, T. (1985). Circulating software: A practical approach. *Library Computing* A special supplement to *Library Journal, 110*(8), 108-109.

Snelson, P. (1985a). Microcomputer centers in academic libraries—Part I. *Small Computers in Libraries, 5*(6), 6-9.

Snelson, P. (1985b). Microcomputer centers in academic libraries—Part II. *Small Computers in Libraries, 5*(7), 6-9.

Stanek, D. J. (1986). Videotapes, computer programs, and the library. *Information Technology and Libraries, 5*(1), 42-54.

Stefanac, S. (1988). Mad Macs, the scoop on Macintosh viruses: Their history, identification, and eradication. *Macworld, 5*(11), 93-101.

Strauss, D. (1986). A checklist of issues to be considered regarding the addition of microcomputer data disks to academic libraries. *Information Technology and Libraries, 5*(2), 129-132.

Talab, R. (1987). Back-ups: A controversial but necessary part of software collections. *Small Computers in Libraries, 7*(3), 36-39.

ULS University Library Standards Review Committeee. (1989). Standards for university libraries: Evaluation of performance. *College & Research Libraries News, 50*(8), 679-691.

Uppgard, J. (1988). *Developing microcomputer work areas in academic libraries.* Westport, CT: Meckler.

Walch, D. B. (1984a). The circulation of microcomputer software in academic libraries and copyright implications. In S. C. Dodson & G. L. Menges (Eds.), *Academic libraries: Myths and realities* (Proceedings of the third national conference of the Association of College and Research Libraries) (pp. 405-410). Chicago, IL: American Library Association.

Walch, D. B. (1984b). The circulation of microcomputer software in academic libraries and copyright implications. *Journal of Academic Librarianship, 10*(5), 262-266.

Walch, D. B. (1990). *Standards for college libraries survey.* Unpublished manuscript.

Walton, R. (1990). Learning more about LANs: Topologies. *Library Journal, 115*(11), 54-57.

Watson, B. (1990). Sidebar: For those who want to start small (an overview of the LANtastic LAN). *Library Hi Tech News, 70*(April), 15.

Weidlein, J. R., & Cross, T. B. (1986). *Networking personal computers in organizations.* Homewood, IL: Dow Jones-Irwin.

Woodsworth, A., & Williams, J. F. (1988). Computer centers and libraries: Working toward partnerships. *Library Administration and Management, 2*(2), 85-90.