Perspectives on Academic Health Sciences Libraries in the 1980s:

Indicators from a Delphi Study*

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ABSTRACT

A Delphi study was undertaken to identify the changes in library roles and functions that the directors of academic health sciences libraries believe will occur over the next decade. The methodology is described and the results are summarized. Two scenarios resulted: one, highly desirable; the other, highly probable. They overlap by 64%. Library directors expect moderate evolutionary changes in the next ten years. Users are perceived to be the force maintaining the status quo, while technology is the force advancing change. The adoption of technology is seen as desirable and within the libraries' span of control. Education and service roles of librarians will expand. Library and institutional priorities are seen as obstacles to change.

SINCE the close of World War II, the modern computer has brought about profound and rapid change in our society. Generations of computers succeed one another within three to five years. The microprocessor is now ubiquitous. Some predict that each home will possess one by 1990. In the past ten years bibliographic control by computers has advanced faster than expectations. Kemeny wrote in 1971, "So far computers have made virtually no impact on the dissemination of scientific information or on the storage of knowledge in libraries" [1]. By the next year the National Library of Medicine's MEDLARS system was accessible on-line, and by 1973, nearly all medical school libraries were established MEDLINE centers. Today, more than 500 data bases are accessible on-line. The American Chemical Society is making its journals available for on-line text searching. Within a few years the retrieval of much scientific information is likely to be through computers. Proponents of the "office of the future" foresee less dependence on paper storage as more businesses become computer based.

In the 1980s academic medical centers are likely to face declining enrollments, changing student expectations, higher tuition costs, tighter control of hospital costs, higher standards of accountability, increasing competition between health care providers, and greater use of high technology that will, in turn, cause rising patient care costs. Challoner and Perry [2] suggested that the majority of medical schools will need to reorient themselves to very different educational missions over the next decade. Medical knowledge has increased eightfold per generation in the past fifty years, causing information-handling problems for medical education yet to be dealt with adequately [3]. New discoveries in molecular biology have altered relationships between industry, education, and the practice of science. Educators are increasingly aware of the significance of effective information resource management to medicine [4].

What are the roles and functions of the academic health sciences library in this changing environment? What forces are shaping library programs and development? In what directions are they changing? Are these directions desirable? What are the desirable directions? What are the qualitative measures that should apply to libraries and guide policy formulation? These were some of the questions asked by the Association of American Medical Colleges (AAMC) staff in formulating a study of the changing roles of health sciences libraries in medical education over the next decade.

I was asked to assist in gathering information that would address some of these questions. While director of the Health Sciences Library at the George Washington University Medical Center, I developed the Delphi survey, and began collecting the data.

METHODOLOGY

Selection of the Delphi Technique

The Delphi method was selected as the technique for gathering the kind of data we wanted. A

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review of the library literature would confine insights to the views of a select, highly articulate segment of the population. With limited time and money available, extensive interviews were not practical. Moreover, open-ended interviews produce data that are difficult to organize and interpret. Formulating a structured questionnaire also reflects interviewer bias and could exclude valuable information. Furthermore, we sought a method that would stimulate the health sciences library community as well as involve it in a communication process. We were less interested in an accurate forecast of the future than a broad view of the forces that health sciences library administrators see confronting them as they deal with the evolving future.

The Delphi technique is well established and used widely in business and social sciences applications both for forecasting events and for policy and decision determination [5–7]. The technique allows a group to define the statements of opinion or fact to which the group as a whole reacts. Group responses are collated and returned to participants who can then compare their own responses to the group responses. Opinions can be altered if desired. Through this feedback mechanism a consensus of opinion can be formed. The anonymity of the process, which is conducted by mail, eliminates the undesirable effects of bias introduced by personalities and interpersonal relations. The process provides a unique way of sharing expert opinion, thus enhancing the probabilities of bringing about the changes seen as desirable by the group. To critics of the Delphi method, the self-fulfilling nature of the opinions is a deficiency since the object of the classic Delphi survey is predicting the occurrence of future events. In this study, however, we were less concerned with the classical Delphi outcome and more interested in the application as a policy and issue generator.

Procedure

All library directors of accredited medical schools in both the United States and Canada were invited to participate. In addition we included twenty-six teaching hospital library heads known to be interested in technological change, and fourteen library science educators and specialists. The letter of invitation explained the purpose of the study and the nature of the Delphi technique. It asked respondents to think about the state of health sciences libraries over the next decade and to name:

1. Three changes in health sciences library organization and operations that will or could occur as a result of changing information handling technologies;
2. Three changes in health sciences library roles, function, or mission in relation to academic medicine.

This was the first round of the process. The statements that were submitted were collated and categorized. The statements described changes in: (1) information technology, (2) library organization and function, (3) library management and operations, (4) library information services, (5) library educational roles, and (6) the library profession.

These statements were listed and returned to participants with a request that they estimate the probability and desirability of the occurrence of each statement. They were asked to use a scale ranging from one to seven, with seven indicating the greatest likelihood or desirability. They were invited to add statements. This constituted the second round.

The results of this request were calculated and returned to the participants as the third round. Each participant saw for each statement his response, the group median response, and the interquartile range. Participants were then invited to reconsider their responses. They were also asked to consider, for each statement, the forces that would help or hinder the change. They were asked to select one or more of the following forces: (1) federal action; (2) institutional planning; (3) user group demands; (4) licensure and continuing medical education requirements; (5) local or regional libraries' actions; (6) individual library policy, including priorities, practices, and operations; (7) technological advances; or (8) the library profession as a group.

Response Rate

Of the 160 invited participants, 79 (49%) responded to the first round with statements about expected changes in library roles, function, mission, organization, and operations. These 474 free-form answers, once sorted with redundant statements eliminated, yielded 47 statements. These were sent to all 160 invited participants as the second round with a request for estimates of probability and desirability of their occurrence. One hundred thirty-three (83%) responses were received. Six additional statements suggested by the participants were added to bring the total number of statements to 53. One hundred twelve responses (84%) were received in response to the third round.

Analyses

The means and standard deviations of the estimates of probability and desirability were calculated for the 112 respondents to the third round and for 21 respondents to the second round who did not return the third round. Percentages were calculated to identify the forces helping, and the forces hindering, change in each statement.

The responses were then sorted into three groups: hospital library directors (N = 27), academic medical school library directors (N = 95), and library educators and specialists (N = 11). The library science educators and specialists were not included in the final data analyses because they were such a small response group. The hospital library and medical school library director responses to desirability and probability were subjected to a T-test. Their identification of helping and hindering forces were analyzed using a chi-square test. Our hypothesis was that responses from hospital library directors would differ from those of academic library directors.

The medical school library director data file was augmented with additional institutional data. Eight variables were selected from the Association of Academic Health Science Library Directors' *Annual Statistics of Medical School Libraries in the United States and Canada, 1978–1979* [8]. These variables were collection size, staff size, total budget expenditures, number of users, exit counts, collection use counts, number of photocopies, and automation expenditures. The libraries were divided into quartiles on each variable. A one-way analysis of variance was performed on estimates of probability and desirability; a chi-square test was used on helping and hindering forces. The hypothesis was that responses from the directors of large libraries would differ from those of smaller libraries. No institutional variables were available for the hospital library group to perform a similar analysis.

Findings

The statements were highly skewed toward the highly probable and highly desirable. On a scale ranging from one to seven, 4.0 represented the midpoint. Of the fifty-three statements, only six ranked lower than 4.0 in probability; twelve ranked lower than 4.0 in desirability.

On the whole, respondents were more comfortable and positive projecting the desirability of statements than with identifying their probability. The means for desirability ranged from 6.63 to 1.16 with a high degree of consensus in the top fourteen statements. (The standard deviation for seven of the top fourteen statements was less than 1.00.) The means of probability ranged from 6.24 to 3.1, with a range in standard deviation from 1.00 to 1.73.

The tables show for each statement only the highest ranked force identified by the greatest percentage of respondents. There was considerable spread among the forces, and responses varied between as well as within the hospital and medical school library directors' groups.

Of 1,908 significance tests, 144 were significant at the .05 level. Ninety-two were the result of cross-tabulations of data from the medical school library directors using the eight operational variables of (1) collection size, (2) staff numbers, (3) total expenditures, (4) number of users, (5) exit counts, (6) collection use, (7) number of photocopies, and (8) automation expenditures. Fifty-two significant differences resulted when the responses of the hospital library directors were compared to those of the medical school library directors. Specific findings are discussed under each of the six topics.

Topics

Forms of Media and Methods of Communication

Five statements focused on changes in forms of media and methods of communication (Table 1). Electronic mail, facsimile transmission, and electronic texts for lease by libraries were rated highest in both desirability and probability (>60%). Less desirable and probable, in respective order, were on-demand printing of books and journals, personal information systems, and a shift to electronic forms of books and journals whose access is controlled by private industry. In all cases the major determining force was felt to be advances in technology. Forces hindering the two most highly desirable and probable changes were library policies. Human factors, user demands, and the library profession were judged to hinder the less desirable and probable changes.

When we analyzed responses by type of library, all directors agreed that technology is the prime mover. Academic librarians, however, saw user groups as more involved in stimulating use of electronic texts in libraries than did hospital librarians. The academic librarians agreed on the major hindering factors, as well, but tended to see hindering forces more broadly distributed.

When responses from medical school libraries

TABLE 1

FORMS OF MEDIA AND METHODS OF COMMUNICATION

Statements	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
1. Forms of "electronic mail" and facsimile transmission of text will become commonly used by the end of the 1980s.	88.0	6.39	.90	66.9	5.85	1.24	Technology 82%	Library policy 33%
2. By 1990, in addition to print on paper, electronic texts of books and journals will be available for lease and use in libraries in the form of videodiscs and other microformats.	67.7	5.81	1.16	63.2	5.75	1.15	Technology 83%	Library policy 37%
3. Electronic publishing and on-demand printing of any or all of a journal or book will cause a complete change in the way information is distributed.	35.0	5.02	1.23	40.0	5.01	1.33	Technology 89%	User demand 46%
4. Personal microcomputers and small stand-alone information systems will make a rapid appearance in all health care and teaching settings. These will be linked to remote information sources and bypass libraries as traditional information sources.	13.5	3.66	1.63	26.3	4.56	1.57	Technology 66%	Library profession 31%
5. A gradual but positive shift to electronic forms of full texts of books and journals will take place. Private industry will control access to these files and provide text on demand for fees.	11.3	3.44	1.64	30.0	4.57	1.52	Technology 55%	User demand 30%

*Percent of responses at the highest end of the ranking scale (responding 6 or 7) for each statement.

were analyzed by several operating variables no consistent patterns emerged. Libraries with the highest and lowest budget expenditures differed from others in finding that library policies are greater hindrances to leasing electronic texts. Those with the highest and lowest automation expenditures, the highest exit counts, and the highest photocopy volume agreed against all others to the greater desirability of growth in personal information systems. The libraries with higher automation expenditures found the probability greater as well. Libraries with lowest exit counts found electronic mail and facsimile transmission more desirable than all other libraries.

Comments volunteered by participants threw some light on these responses: electronic mail is not now convincing; leasing of electronic texts is objectionable, but purchase is not; the publishing industry will change very slowly; the appearance of personal information systems bypassing libraries is reminiscent of the fear that television would put movies out of business; the shift to electronic forms of full texts will exist side by side with print editions for works for which demand is great enough.

Library Functions and Operations

Ten statements described library functions and operations (Table 2). Three statements were concerned with continuation of the current functions and use of libraries: users will continue to need libraries for browsing and ready reference, the library's mission and roles will remain the same, and researchers will continue to use libraries in the traditional way. The first two statements were considered both highly desirable and probable (>60%). That researchers will continue to use libraries in the traditional way, on the other hand, was ranked as highly desirable and probable by only 34%. The interquartile range for this statement was from 3 to 6, suggesting considerable ambivalence. The majority agreed that users want to keep this so (>63%). Technology was seen as hindering the status quo except for the library's mission and roles. There, institutional priorities will be the primary factor.

When these statements were analyzed by type of library director, hospital library directors diverged considerably from their academic counterparts. Hospital librarians ranked higher the probability of the need for browsing and ready reference libraries and found fewer hindrances in any category. They ascribed to the library profession the greatest help in keeping the library's mission and role the same.

Within the medical school library directors, those with the smallest total expenditures ranked higher the probability and desirability of no change in the library's mission and roles. Libraries with the lowest photocopy activity saw researchers continuing traditional use of libraries as less desirable than others. Libraries with the largest staff believed library policy more than user demands will support researchers' traditional use.

The second group of statements reflected technical processing concerns. These were ranked high in desirability by more than 55% of respondents: by the mid-1980s most libraries will rely on regional or national bibliographic processing centers, card catalogs will be on-line and cross-institutional, stack storage needs will be drastically reduced due to facsimile transmission, and there will be total automation of library operations. Total automation and reduced stack needs were not ranked by many as high in probability (<28%). Technology was named as the driving force for all these changes and library policies and institutional priorities were thought to be prime hindering forces.

Hospital library directors were more inclined than medical school library directors to see technology stimulating the use of on-line catalogs. Academic librarians spread helping forces among many factors. Hospital librarians, further, saw the library profession to be a greater hindrance than any other factor in reliance on bibliographic processing centers. They also were more optimistic about the probability of reducing stack storage as a result of facsimile transmission.

Within the medical school libraries, responses on the stack space issue were divided. Libraries with the smallest collection size and those with the highest exit counts judged the probability higher for reduced stack space due to facsimile transmission.

Comments suggested that the second part of the on-line catalog statement made answering difficult. While card catalogs may go on-line, cross-institutional files seem unlikely. Several respondents found statements on the automation of libraries too categorical to be acceptable.

The least desirable and probable changes were that in-depth collection building will diminish, centralized storehouse libraries directly accessed by users will appear, and the use of libraries by clinicians will decline. Technology will affect these changes positively. Users will not want collections to diminish and will not use libraries less. Hospital

TABLE 2

LIBRARY FUNCTIONS AND OPERATIONS

Statements	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
1. Users will continue to need libraries for browsing and ready reference. The demand for immediate access to printed current texts and the most recent and important titles will not diminish.	84.9	6.25	1.15	84.2	6.24	1.00	User demand 88%	Technology 38%
2. By the mid 1980s, most academic libraries will rely on regional or national processing centers to create their bibliographic record.	84.8	6.30	.96	75.0	6.01	1.09	Technology 46%	Library policy 54%
3. Card catalogs will be replaced by on-line terminals that access multi-institutional bibliographic files, permitting cross-institutional use directly by faculty, students, and staff.	84.2	5.51	1.34	54.1	6.34	1.03	Technology 63%	Library policy 40%
4. Electronic information transfer will drastically reduce the need for library stack storage areas. Space will become available for other purposes.	60.9	5.48	1.56	28.5	4.49	1.62	Technology 89%	Library policy 46%
5. The library's mission and roles will remain essentially the same: general support of the education, research, and health care information needs of the medical center.	60.6	5.28	1.89	65.9	5.62	1.53	User demand 63%	Institutional priorities 31%

TABLE 2 Continued

Statements	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
6. Rapid advances in computer technology will lead to total automation in all phases of library operations in nearly all libraries by the end of the decade.	55.3	5.41	1.50	22.0	4.30	1.65	Technology 68%	Institutional priorities 56%
7. In-depth print collection building will diminish. A few libraries will become repositories of materials not commonly needed or readily accessible in electronic form.	39.8	4.94	1.58	39.8	5.06	1.34	Technology 37%	User demand 50%
8. Centralized storehouse libraries for books and retrospective collections of AVs and journals will appear and will be accessible directly by users through personal minicomputers and telefacsimile text transmission. Other libraries will fill roles of clearinghouses, brokers, billing agents, salesmen, referral agencies.	35.6	4.71	1.59	24.8	4.22	1.68	Technology 59%	Library policy 33%
9. Researchers will continue to rely on libraries and use the scholarly record in the traditional way.	34.8	4.45	1.85	34.8	4.56	1.69	User demand 74%	Technology 54%
10. With the advent of computer-based diagnostic information systems and knowledge data banks, the use of libraries by clinicians as sources of information will decline.	6.0	2.75	1.51	20.3	4.00	1.73	Technology 55%	User demand 30%

*Percent of responses at the highest end of the ranking scale (responding 6 or 7) for each statement.

librarians did not think that users will be as significant a force in hindering in-depth collection building. They also were less certain that the use of libraries by clinicians will decline and believed the forces encouraging the change to be more diffuse than the medical school library directors.

Library Administration and Management

Thirteen statements dealt with library administration and management issues (Table 3).

That libraries will receive more attention in accreditation reviews, that teaching hospital libraries will be more integrated, that linkages between all kinds and types of libraries will occur, that libraries with computers will become "centers of information affairs," and that libraries will assume major roles in coordinating the academic health center's total information delivery efforts were rated highest in desirability (>71%). However, only linkages between libraries was rated high (60%) in probability.

The forces that may help these events to occur were licensure bodies, institutional priorities, local and regional library interests, technology, and institutional priorities, in that order. The primary hindering force for all these changes, with one exception, was institutional priorities. The libraries' policies were thought to be the main hindrance to linkages among libraries.

In the mid-range of desirable events (48% to 52%), hospitals will form information services consortia and medical school libraries will become departments of biomedical communications with both research and service functions. Both statements were accorded only a mediocre level of probability. Institutional priorities may both help and hinder the development of hospital consortia. Although institutional priorities may help the development of biomedical communications departments, libraries' policies were seen as the retarding factor.

The least desirable, and overall least probable occurrences dealt with changes in management and funding. They were, in descending order: all institutional information handling units will be under one management, libraries will be funded on a cost-accounting basis, libraries will be primarily fee based, library funding will decline, more health sciences libraries will become parts of university library systems, and regional coordination of resources will be mandatory.

Institutional priorities may do most to encourage these developments in all cases except for mandatory coordination of regional resources. Here local and regional library interests will stimulate this change. Users were seen as hindering further fee-based services and any shift of control over the health sciences library from the medical school to the university library. Institutional priorities will prevent decline in funding. An individual library's priorities will hinder mandatory coordination of resources.

On none of these points did the hospital and medical school libraries differ. Within the medical school libraries, however, differences emerged. Libraries with large collections ranked significantly lower in desirability and probability that libraries will become the coordinators of an academic health center's total information delivery efforts, that hospital libraries will form services consortia, and that funding will be based on cost-accounting concepts. The probability of development of hospital consortia was ranked particularly low by libraries with large collections, large staff, high collection use, and high total expenditures. Libraries with high photocopy volume ranked linkages between libraries significantly lower in desirability and probability. Libraries with low collection use rates saw less desirability and probability of mandatory coordination of resources. Libraries with high automation expenditures found greater desirability in libraries operating on a fee basis.

Library Information Services

The four highest ranking (>68%) statements in both desirability and probability out of the eleven focusing on library information services (Table 4) showed hospital librarians with expanded roles, less on-line bibliographic searching and more data bank searching, an increase in the number of "information resource consultants," and increased responsibilities for consumer health information. The major helping forces will be user demands, except for shifting in focus of on-line searching which was seen to be technology dependent. Institutional and library priorities were seen to serve as retardants, except in the development of "information resource consultants." Here the library profession will hold back this occurrence.

The middle ranked statements in both desirability (45% to 54%) and probability (37% to 48%) were formalized quality controls of library services, increasing patient education services, and fee-based services to the public. User demand will encourage the two service developments although institutional and library priorities will hold them back. While local and regional library interests

TABLE 3

LIBRARY ADMINISTRATION AND MANAGEMENT

Statement	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
1. As the need to tap new knowledge and information systems becomes more important, libraries will become the focus of more critical attention in accreditation reviews.	91.1	6.47	.71	48.5	5.24	1.36	Licensure requirements 51%	Institutional priorities 55%
2. Increasingly, teaching hospital libraries will be recognized as integral to any academic health sciences library program.	88.8	6.39	.69	48.5	5.48	1.11	Institutional priorities 38%	Institutional priorities 46%
3. As the study of medicine becomes more interdisciplinary, links between all kinds and types of libraries (public, academic, industrial, etc.) will be needed to facilitate information and services transfer.	82.7	6.31	1.33	60.9	5.68	1.40	Regional library actions 46%	Library policy 46%
4. Libraries that have computers will become "centers of information affairs." They will employ subject and computer specialists. They will provide support services to medical center personnel as knowledge-bases and clinical information systems proliferate.	72.0	5.94	1.07	37.6	5.06	1.22	Technology 26%	Institutional priorities 59%
5. The library will assume the role of coordinator and manager of the academic health center's total information delivery efforts.	71.3	5.85	1.49	19.9	4.25	1.50	Institutional priorities 38%	Institutional priorities 54%
6. Hospitals will form information services consortia which will manage library services, patient data, and management information systems. Hospital librarians will serve	52.3	5.38	1.53	35.3	4.86	1.42	Institutional priorities 42%	Institutional priorities 36%

Statement	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
consortial groups rather than individual hospitals.								
7. Academic health sciences libraries will become organized as a department of biomedical communication with both research and service functions.	48.5	5.19	1.68	25.2	4.54	1.42	Institutional priorities 66%	Library policy 40%
8. All like units for educational resources, communications, information production, retrieval, and processing will be subsumed under one management as a total information delivery activity.	35.2	4.72	1.71	34.4	4.70	1.50	Institutional priorities 81%	Library policy 39%
9. Medical center funding of libraries will be based on cost accounting concepts. Costs will be accounted for according to use by departments and user groups.	36.4	4.45	1.92	46.5	4.96	1.71	Institutional priorities 85%	User demands 30%
10. Changes in access to information and increased costs of sophisticated information handling techniques will lead libraries to operate primarily on a fee basis.	24.1	3.66	1.95	41.3	4.83	1.54	Institutional priorities 53%	User demands 32%
11. Funding for resources in all health science libraries will steadily decline, leading to greater dependence on resource sharing networks between libraries.	17.4	3.71	1.81	46.6	5.07	1.65	Institutional priorities 40%	Institutional priorities 24%
12. In the face of increasing financial pressures and the increasingly interdisciplinary nature of health education, more and more medical schools will relinquish the control of health sciences libraries to the university library systems.	12.5	2.11	1.52	7.6	3.01	1.49	Institutional priorities 87%	User demands 34%
13. Regional coordination of acquisition and provision of materials will become mandatory. Individual libraries will have less autonomy.	7.5	3.21	1.63	12.9	3.83	1.63	Regional library actions 44%	Library policy 52%

*Percent of responses at the highest end of the ranking scale (responding 6 or 7) for each statement.

TABLE 4

LIBRARY INFORMATION SERVICES

Statements	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
1. Hospital librarians will assume greater and expanded roles in providing information support to health care teams and group practices, thereby playing a larger role in patient care.	88.7	6.42	.90	48.5	5.38	1.47	User demands 31%	Institutional priorities 53%
2. On-line bibliographic searches will give way to retrieval of information from a variety of linked data banks. Reformatting and synthesis of information from such sources will become common practice in libraries.	87.9	6.26	1.02	61.6	5.67	1.30	Technology 69%	Library policy 41%
3. Users of knowledge and information data bases will need "information resource consultants" to teach them efficient methods of data base access.	85.7	5.97	1.27	77.0	6.28	1.17	User demands 55%	Library profession 31%
4. Providing consumer health information and meeting needs of the consumer's "right to knowledge" will become a regular function in health science libraries.	68.4	5.54	1.37	57.9	5.72	1.59	User demands 60%	Institutional priorities 45%
5. Increasing interdependence of libraries will lead to formalized quality controls and standardization of services.	54.9	5.29	1.60	37.6	5.00	1.35	Regional library actions 44%	Library policy 64%
6. Offering formalized patient education services will become an increasingly important role for libraries.	54.6	5.21	1.21	44.5	5.46	1.39	User demands 59%	Institutional priorities 44%

TABLE 4 Continued

Statements	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
7. Libraries will offer fee-based services to the public, especially to noninstitutionally affiliated groups.	45.1	4.87	1.99	48.8	5.25	1.57	User demands 45%	Library policy 40%
8. Through the electronic medium, the library will transcend its physical boundaries by communicating directly with remote users and deliver information to them at their homes or work sites. The concept of a user always having to go to the library will disappear.	29.2	4.61	1.64	28.8	4.67	1.43	Technology 78%	Library policy 30%
9. Increasingly, other agencies and information entrepreneurs will perform services traditionally performed by libraries; e.g., document delivery, fact answering, on-line bibliographies, etc., at more cost efficient levels.	6.8	3.11	1.59	36.6	4.91	1.41	Technology 39%	Library profession 39%
10. Libraries will fail to initiate new education and clinic based information delivery programs. Other agencies will fill the vacuum, leaving libraries with the traditional roles of managing study halls and storage bins.	.8	1.16	.65	5.3	3.07	1.57	Library policy 40%	Library profession 35%
11. As the concept of fee-based services is commonly accepted, access to information will become increasingly limited to those with financial resources.	.8	1.31	1.56	34.9	4.85	1.45	Institutional priorities 67%	User demands 31%

*Percent of responses at the highest end of the ranking scale (responding 6 or 7) for each statement.

may encourage quality controls over services, the libraries' priorities will hinder the trend.

The least desirable and probable service changes were having the library offer facsimile transmission to users at remote sites, information entrepreneurs replacing library services, libraries failing to initiate new programs, and limitation of access by fee-based services.

Technology may encourage information entrepreneurs and library services to remote users, but the library profession and the libraries' priorities will not help. Library policies may cause libraries to fail to initiate new programs, but the library profession will not allow this to happen. Institutional priorities may stimulate more fee-based services restricting access to information, but users will hinder this development.

No significant differences in opinion occurred on any of these statements between hospital and medical school library directors. However, medical school libraries with large collections, high expenditures, and greater number of staff were more skeptical than others about the probabilities of formalized quality controls developing or hospital librarians assuming expanded roles.

Library Education Roles

Five statements depicted library education role changes (Table 5). Expanding library roles in continuing medical education programs, new relationships with instructional groups, and increasing use of libraries as a teaching resource ranked highest in desirability (>72%). While they also ranked highest in probability, the estimates were much lower (30% to 42%). The helping forces were licensure boards, institutional priorities, and technology, respectively. Library and institutional priorities will be hindering forces. Less desirable and far less probable were faculty delegating instructional roles to librarians and librarians teaching methods of computer-based information system access. In both these cases the users may encourage this change, but library policies will not help.

Hospital librarians believed faculty delegating roles to be more desirable than academic librarians and they saw the library profession as the stumbling block more than library priorities. They placed less emphasis on user demands and library planning as stimulating greater library involvement in continuing medical education programs. They also saw the library profession as the limiting factor in teaching computer-based information access techniques while the users will encourage it. Academic librarians, on the other hand, were more inclined to see the library profession and technological advances as driving forces.

Libraries with medium to low automation expenditures accepted the desirability of new relationships with instructional groups, but libraries with small staff numbers saw this as significantly less desirable. In the case of teaching methods of computer-based information system access, libraries with medium-to-large total expenditures saw greater desirability and probability. Libraries with high collection usage did not think faculty delegating instructional roles as probable as did others. The library's role in continuing education will be helped more by user demands according to libraries with medium-to-high automation expenditures. The largest spenders on automation saw the libraries' policies and the library profession having more of an impact.

Library Profession

The most desirable statement of all fifty-three was included in this group of nine statements regarding the library profession (Table 6). Of all respondents, 93.7% believed it is highly desirable that library schools gear admission requirements and educational programs to meet new demands. On the other hand, only 13% considered this highly likely. The library profession is considered to be both the facilitating and inhibiting force.

The next most desirable statements ranked by 55% to 83% of the respondents suggested greater specialization of librarians. In order of desirability, librarians will conduct research, serve as communications experts on research teams, and shift from technical to information services; librarians with computer technology background will be in demand, and many new information specialties will emerge. The shift from technical to information services and the greater demand for librarians with computer backgrounds were ranked more highly probable (63% to 66%) than the other changes. These two are the ones technology will advance and the library profession inhibit. The library profession was perceived to foster more research roles and greater specialization, although library priorities may dampen research activities.

The least desirable (<38%) and probable (<27%) events were the entry of other health sciences professionals into the library field, the majority of librarians in a medical center employed outside the library, and librarians being out-

TABLE 5

LIBRARY EDUCATIONAL ROLES

Statements	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
1. The library's role as a resource and agency for developing and offering continuing education programs to the health professional will gain increasing acceptance.	84.2	6.27	1.28	42.8	5.22	1.39	Licensure requirements 58%	Institutional priorities 44%
2. New forms of administrative relationships between the library and instructional development and curriculum design groups will develop.	83.9	6.27	.86	42.4	5.22	1.05	Institutional priorities 49%	Library policy 50%
3. With increasingly sophisticated systems and forms of learning tools will come increasing dependency on libraries as primary teaching resources for student learning.	72.2	5.94	1.32	30.1	4.81	1.35	Technology 35%	Library policy 36%
4. As access to information becomes more complex, faculty will delegate the role of selecting, abstracting and securing support materials for course work to subject specialists with librarian credentials.	45.1	5.03	1.78	18.0	3.86	1.60	User demands 51%	Library policy 31%
5. Teaching methods of accessing computer-based information systems to health students will become a paramount role and primary responsibility of academic librarians.	41.7	4.90	1.74	27.1	4.45	1.58	User demands 50%	Library policy 37%

*Percent of responses at the highest end of the ranking scale (responding 6 or 7) for each statement.

TABLE 6

LIBRARY PROFESSION

Statements	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
1. Library schools and other knowledge management faculties will gear admission requirements and educational programs to meet new demands.	93.7	6.63	.80	13.7	4.09	1.61	Library profession 64%	Library profession 49%
2. Librarians will be expected to conduct research to evaluate and assess information services and resources utility as a part of their normal activities.	83.4	6.37	.99	50.0	5.43	1.20	Library profession 39%	Library policy 40%
3. Academic research groups will increasingly employ librarians as communications experts on the research team to prepare information for data bank entry and mediate in the transition from the paper to electronic information medium.	70.7	5.86	1.38	32.4	4.75	1.44	User demands 35%	Institutional priorities 34%
4. Automation of library functions will change the role of librarians. Cataloging and technical library management tasks will be performed by support staff. Primary roles of professionals will be in information provision and management.	67.6	5.87	1.21	63.2	5.72	1.17	Technology 33%	Library profession 41%

TABLE 6 Continued

Statements	Desirability			Probability			Help	Hinder
	Percentage Ranking 6 or 7*	Mean	Standard Deviation	Percentage Ranking 6 or 7*	Mean	Standard Deviation		
5. The demand for personnel with both information/library sciences and computer technology background will increase dramatically.	61.9	5.71	1.26	66.3	5.87	1.28	Technology 42%	Library profession 40%
6. Librarians will specialize. Several major and independent specialties will emerge, including researchers in information utility, discipline based information specialists, communications teachers, and information center managers.	55.7	5.52	1.32	44.3	5.24	1.18	Library profession 44%	Library profession 45%
7. More specialists in health sciences (MDs, DVMs, etc.) will enter the library/information field, bridging the gap that often exists between librarians and health information consumers.	38.1	4.60	1.49	14.1	3.57	1.55	User demands 47%	Library profession 53%
8. By 1990, 75% of the librarians employed by a medical center will be working for research or clinical groups outside the library's organization.	10.6	3.55	1.66	9.1	3.52	1.49	User demands 56%	Institutional priorities 31%
9. The rapidity of development in clinical knowledge bases will outstrip the current capacity and training of health sciences librarians to participate in their development and implementation. Junior faculty, graduate students, and unemployed Ph.D.s will perform this function.	4.6	2.45	1.43	27.5	4.22	1.68	User demands 42%	Library profession 74%

*Percent of responses at the highest end of the ranking scale (responding 6 or 7) for each statement.

stripped in expertise by other health sciences professionals. Users' demands may assist in bringing these events about, but the library profession is not going to encourage its own demise and institutional priorities are unlikely to encourage employment of librarians outside the library.

Hospital librarians perceived the demand for librarians with computer background as more desirable and probable than their academic colleagues. They also saw the library profession as unequal to the challenge; academic librarians named library priorities to be a greater determining factor.

Medical school libraries with large staff thought research roles more desirable, and were more skeptical about the probability of other health specialists entering the library information field. The libraries with large staff, high user counts, and high photocopy volume were more doubtful about the probability of wide employment of librarians outside libraries in medical centers.

Scenarios

The study was undertaken primarily to identify the issues the health sciences library directors considered important in planning for anticipated change, not to develop a scenario of the future. Still, it is useful to examine the directors' perceptions of the shape of things to come.

Two scenarios emerged, one desirable and one probable, each comprised of fourteen statements (Table 7). The scenarios overlap by 64%. The fifty-three statements were arranged by their means in descending order. The degree of consensus on the top statements was determined by examining the standard error for the largest subgroup of the total population, academic librarians. In both the desirable and probable rankings, a sharp division occurred between the fourteenth and fifteenth statements. The statements in the desirable scenario have extremely high means and high consensus. Means ranged from 6.63 to 6.25. The standard errors ranged from .07 to .150 with only three above .11. Eighty-six percent of the participants rated these statements highly desirable.

The statements in the probable scenario illustrate that participants had considerably less optimism and less consensus regarding the likelihood of the change statements. The means for the top fourteen statements ranged from 6.24 to 5.43, and only 64% of the participants rated them highly likely. The standard errors fell between .112 and .151.

Comparison of the Two Scenarios

Five events from the desirable scenario, all related to expanding the roles and relationships of the library, were lost in the probable scenario. These were greater importance in accreditation reviews, expanding hospital librarian roles in patient care, increasing acceptance of library continuing medical education programs, different relationships to instructional groups, and, finally, improvement of library schools. Institutional plans and priorities were perceived to be the primary hindering factor for all these statements except for the last two.

The probable scenario includes five statements that were not deemed to be first order desirables. These were: the mission of the library will remain essentially the same, electronic texts of books and journals in the form of videodiscs and other microformats will be leased for use in libraries, automation of library functions will change the roles of librarians, the demand for personnel with background in both information/library sciences and computer technology will increase dramatically, and providing consumers with health information will become a regular function in health sciences libraries.

Least Desired Statements

Table 8 lists those statements considered least desirable. Most of these statements concern issues of autonomy and control: personal information systems will bypass libraries and information sources, electronic texts will be controlled by industry, knowledge systems will cause a decline in library use, and there will be mandatory regional coordination of materials acquisition. These were all positively labeled undesirable. Control of health sciences libraries by the university system was deemed very undesirable. So were fees that structure access to information.

Control of personnel and services was important. More than 57% thought it highly undesirable that agencies and information entrepreneurs other than libraries perform traditional library services and nearly 45% believed that having a majority of librarians employed in the medical center outside the library's organization is undesirable. It is understandable that the participants should reject, in no uncertain terms, the possibility that libraries will fail to initiate new programs, yet the identified possible new services were generally assigned low likelihood of initiation or second level desirability.

TABLE 7

SCENARIOS

Statements	Desirable Scenario	Probable Scenario
Forms of "electronic mail" and facsimile transmission of text will become commonly used by the end of the 1980s.	x	x
Users will continue to need libraries for browsing and ready reference. The demand for immediate access to printed current texts and the most recent and important titles will not diminish.	x	x
By the mid 1980s, most academic libraries will rely on regional or national processing centers to create their bibliographic records.	x	x
As the need to tap new knowledge and information systems becomes more important, libraries will become the focus of more critical attention in accreditation reviews.	x	
Hospital librarians will assume greater and expanded roles in providing information support to health care teams and group practices, thereby playing a larger role in patient care.	x	
On-line bibliographic searches will give way to retrieval of information from a variety of linked data banks. Reformatting and synthesis of information from such sources will become common practice in libraries.	x	x
Users of knowledge and information data bases will need "information resource consultants" to teach them efficient methods of data base access.	x	x
New forms of administrative relationships between the library and instructional development and curriculum design groups will develop.	x	
The library's role as a resource and agency for developing and offering continuing education programs to the health professional will gain increasing acceptance.	x	
Librarians will be expected to conduct research to evaluate and assess information services and resources utility as a part of their normal activities.	x	x
Library schools and other knowledge management faculties will gear admission requirements and educational programs to meet new demands.	x	
Increasingly, teaching hospital libraries will be recognized as integral to any academic health sciences library program.	x	x
Card catalogs will be replaced by on-line terminals that access multi-institutional bibliographic files, permitting cross-institutional use directly by faculty, students, and staff.	x	x
By 1990, in addition to print on paper, electronic texts of books and journals will be available for lease and use in libraries in the form of videodiscs and other microformats.		x
Automation of library functions will change the role of librarians. Cataloging and technical library management tasks will be performed by support staff. Primary roles of professionals will be in information provision and management.		x
The demand for personnel with both information/library sciences and computer technology background will increase dramatically.		x
Providing consumer health information and meeting needs of the consumer's "right to knowledge" will become a regular function in health sciences libraries.		x
As the study of medicine becomes more interdisciplinary, links between all kinds and types of libraries (public, academic, industrial, etc.) will be needed to facilitate information and services transfer.	x	x
The library's mission and roles will remain essentially the same: general support of the education, research, and health care information needs of the medical center.		x

TABLE 8
LEAST DESIRED STATEMENTS

Statements	Percentage Ranking 1, 2, 3*	Mean	Standard Deviation	Help	Hinder
By 1990, 75% of the librarians employed by a medical center will be working for research or clinical groups outside the library's organization.	44.7	3.55	1.66	User demand 56%	Institutional policies 31%
Personal microcomputers and small stand-alone information systems will make a rapid appearance in all health care and teaching settings. These will be linked to remote information sources and bypass libraries as traditional information sources.	46.6	3.66	1.63	Technology 66%	Library profession 31%
Changes in access to information and increased costs of sophisticated information handling techniques will lead libraries to operate primarily on a fee basis.	49.6	3.66	1.95	Institutional policies 53%	User demand 32%
A gradual but positive shift to electronic forms of full texts of books and journals will take place. Private industry will control access to these files and provide text on demand for fees.	54.1	3.44	1.64	Technology 85%	User demand 35%
Regional coordination of acquisition and provision of materials will become mandatory. Individual libraries will have less autonomy.	56.8	3.21	1.63	Local/regional libraries' actions 44%	Library policies 52%
Increasingly, other agencies and information entrepreneurs will perform services traditionally performed by libraries (e.g., document delivery, fact answering, on-line bibliographies) at more cost efficient levels.	57.1	3.11	1.59	Technology 39%	Library profession 39%
With the advent of computer-based diagnostic information systems and knowledge data banks, the use of libraries by clinicians as sources of information will decline.	74.2	2.75	1.51	Technology 55%	User demand 30%

TABLE 8 Continued

Statements	Percentage Ranking 1, 2, 3*	Mean	Standard Deviation	Help	Hinder
The rapidity of development in clinical knowledge bases will outstrip the current capacity and training of health sciences librarians to participate in their development and implementation. Junior faculty, graduate students, and unemployed Ph.D.s will perform this function.	78.5	2.45	1.43	User demand 42%	Library profession 74%
In the face of increasing financial pressures and the increasingly interdisciplinary nature of health education, more and more medical schools will relinquish control of health sciences libraries to the university library systems.	81.8	2.11	1.52	Institutional policies 87%	User demand 34%
As the concept of fee-based services is commonly accepted, access to information will become increasingly limited to those with financial resources.	95.5	1.56	.90	Institutional policies 67%	User demand 31%
Libraries will fail to initiate new education and clinic based information delivery programs. Other agencies will fill the vacuum, leaving libraries with the traditional roles of managing study halls and storage bins.	98.5	1.16	.65	Library policies 40%	Library profession 35%

*Percent of responses at the lowest end of the ranking scale (responding 1, 2, or 3) for each statement.

Effects of Negative Statements

We were concerned that the participants became less optimistic as they worked their way through the questionnaire—in other words, that people became less optimistic as they read down the list of the statements. We therefore performed a chi-square analysis to test the hypothesis that low probability or desirability means were related to high statement numbers. No significant relationship was determined, and we concluded that the respondents' optimism had not been affected toward the end of the questionnaire.

Differences in Responses Between Hospital and Medical School Librarians

We hypothesized that hospital library directors would differ in their responses from medical school library directors. They did in many respects. They ranked statements significantly higher in both desirability and probability in three topics. Under

library administration and management these were: linkages forged between all types and kinds of libraries, libraries coordinating a medical center's total information delivery efforts, and like information units coming under one management. Under information services, hospital librarians will expand their roles, and "information resource consultants" will develop under the library profession topics. There will be demand for more library personnel with computer background and more specialization.

They found more desirable that teaching hospitals become more integrated, that medical school libraries come under university library control, that consumer health information becomes a regular function, that faculty will delegate instructional roles, and librarians become communication experts on research teams. They also found more probable than their medical school counterparts that users will continue to need libraries for browsing, and that facsimile transmission will reduce the need for stack space. They found it less probable that clinician use of libraries will decline.

In terms of forces helping or hindering change, hospital librarians appeared to see the library profession hindering change more frequently. Academic librarians named library planning and priorities more frequently.

Differences Between Academic Librarians

The hypothesis that directors of larger libraries differed from those of smaller libraries was supported by the findings, but no patterns emerged.

Only a few variables seemed associated. There was no clustering within topics. Libraries with high exit counts, high automation expenditures, and high photocopy usage found the rapid appearance of personal microcomputers more desirable than others. Libraries with high photocopy usage and high overall expenditures agreed that linkages between all types of libraries are highly desirable. High photocopy usage coupled with large staff size and high user counts saw significantly less probability in librarians being widely employed outside libraries in medical centers. High budget expenditures, high collection usage, and large staff numbers agreed to low probability of hospital librarians forming consortia. Libraries with high exit counts and large staff numbers did not think one management for the educational resources very probable.

The differences of libraries at the low ends of the activity quartiles showed even more scatter. In only one case was there any coincidence. Libraries with low staff numbers agreed with libraries with low photocopy usage that there was a high probability that fee-based services would inhibit usage. The identification of helping and hindering factors exhibited the same scatter. No patterns emerged.

Conclusion

The data from this study provide a collection of the opinions of a large group of people. They provide a clearer picture of where we are today than where we will be tomorrow. Certainly the scenarios describe only a moderate evolutionary change over the near term. It is, in fact, difficult to distinguish the desirable scenario from the present reality except in degree. We apparently approve of where we are and where we are heading.

The data suggest that the library directors perceive the adoption of technology as desirable and within the libraries' decision span. Education and service roles of librarians will expand. Technology is most desired when it enhances present practices, and where the library as an autonomous, central information source is continued. Library and institutional priorities are perceived as obstacles to change. Librarians appear to lack necessary motivation and skills to assume different roles. Directors seem to seek to extend present services to other user groups (consumers, public, and patients) rather than to develop new services for primary users. Respondents appear to be saying that change will occur, but there will always be libraries as we know them.

Interpretation of the differences between the hospital and medical school library directors' perceptions of desirability and probability, particularly in the topics of administration and services, should be approached with caution. There is a bias in the hospital group. I selected this small group as representative of large active teaching hospitals. By contrast, all medical school library directors of United States and Canadian schools accredited by the Liaison Committee for Medical Education were invited to participate. We can speculate on the factors that contribute to these differences. Hospital libraries, being smaller, can respond to change more readily than larger, older libraries. Hospital library directors are frequently department heads and thus function at an administrative level where they can reasonably expect to affect institutional policy. Teaching hospitals are oriented toward high technology and are possibly more receptive to change.

The data raise more questions than they answer.

What are the priorities of the library and its institution that they are barriers to desired changes? What are the assumptions behind these priorities? What is their validity and their continuing relevance in the light of technological advances? How should these priorities change? Who should be involved in determining change? Why are libraries and the library profession not seen as the driving force for change?

We might speculate that "library policy" is the tag for the idea that limited resources inhibit change because they are insufficiently elastic or generous to accommodate different priorities and program shifts. It is possible, as well, that identifying the "library profession" as a hindering factor in many cases is a way of expressing doubts about whether librarians possess the necessary skills, techniques, or knowledge to bring about desired changes. But it is fruitless to speculate on the answers to these questions. Only further investigation can reveal useful information. The library profession is at a critical crossroad [9]. Many, including Heilprin, believe that to survive we must change. To change we must take an active part in shaping the environment in which we live. The data here are significant to the health sciences library profession. The data hold up a mirror to us and show us a profile we should study carefully.

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