
Faculty Response to Library Technology: Insights on Attitudes

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ABSTRACT

ACADEMIC LIBRARIES HAVE MADE A SIGNIFICANT investment in electronic information resources and associated computer-based technologies so that their users can gain access to those resources and services. The faculty response to the increase in these library technologies is not always known. Using an essential element from the theory of the diffusion of innovations (that individuals adopt innovations at different rates), the authors conducted a series of focus group sessions and personal interviews with university faculty to discover their attitudes regarding the computer-based information resources that academic libraries provide to meet their information needs. This article explores the differences between the level of adoption of information resources by selected faculty and their responses to these technologies, the impact of library technology on the way they use the library for research and teaching, and their interpretation of the role the library plays in this period of transition and change.

INTRODUCTION

One of the significant challenges facing academic libraries during times of dynamic change is the ability to understand the needs and perspectives of their users. Faculty response to, and use of, computer-based information technology is of particular interest given this technology's ubiquitous presence in academic libraries and given its potential to have an impact on the research and teaching being done by faculty. This ar-

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ticle reports on one library's use of focus groups and personal interviews with faculty to explore their responses to technology offered in and through the library. In particular, the authors wanted to identify any differences that might exist among faculty who appear to adopt technology at different rates. It also offers some insights into the varying levels of adoption of technological innovation by these faculty. The research is designed to contribute to a better appreciation of user reaction to the ever-increasing modes of electronic access to information. Additionally, it contributes to an understanding of how technology may actually be affecting overall use of the library by faculty, thus beginning to fill the void in this regard identified by Lancaster and Sandore (1997) in their extensive overview of technology and management issues in libraries (p. 172).

REVIEW OF PREVIOUS RESEARCH

The literature regarding the adoption or nonadoption of electronic resources and services by faculty identifies a number of factors that influence the use of computer-based resources. Typically, researchers have employed survey instruments to investigate and identify the factors related to the use of computers and network technologies. Unfortunately, these use studies provide little insight into the response faculty have, either to the introduction or subsequent use of these electronic resources. Drawing on the work of social psychology, a number of theoretical models have been proposed to understand the dynamics of human decision-making in the context of accepting or resisting technology. At the broadest level, the principal theoretical perspective on the acceptance of technology is the theory of the diffusion of innovations. The innovation diffusion theory provides a general framework in which to understand *why* some users adopt new technologies more quickly than others. It also provides the authors of this study with a context in which to examine *how* faculty respond to these technologies (innovations).

Use Studies

Adams and Bonk (1995) conducted a four-campus survey of faculty use of electronic information technologies and resources covering all academic disciplines. Lack of knowledge about electronic resources was the most commonly cited obstacle to use of computer-based information resources by faculty.

Abels, Liebscher, and Denman (1996) provide a concise review of the factors examined in use studies. They can be categorized as system factors such as proximity, ease of use, and prior experience; personal and professional factors such as academic discipline, task, or perceived utility; and institutional factors. The authors surveyed science and engineering faculty at six small universities and colleges in the southeastern United States to explore factors that influence adoption and use of electronic networks.

They report that faculty members appear to be unlikely to adopt or use electronic networks if they are not perceived to be accessible.

Interviews with humanist scholars elucidated four significant factors as determinants of use: content, connectivity, user-friendliness, and cost (Lehmann & Renfro, 1991). A study done by Vander Meer, Poole, and Van Valey (1997) provides evidence that levels and frequency of computer use by faculty are positively related to library use.¹ Conversely, it appears that faculty who do not use the library regularly are, for the most part, not using computers. Their study also looked at library use and attitudes toward computers. Frequent library users generally held stronger positive attitudes toward computers. Fiscella and Proctor (1995) also reported a clear relationship between faculty use of locally loaded databases and having a campus computer account.

Theoretical Models

Research in the theoretical approach to understanding the psychology of user acceptance "seeks to understand the dynamics of human decision making in the context of accepting or resisting technology" (Dillon & Morris, 1996, p. 8). Few researchers in library and information science have used such approaches as the Theory of Planned Behavior (TPB), the Technology Acceptance Model (TAM), and the more general Theory of Reasoned Action (TRA).² Klobas (1993) reviewed information resource and information technology use studies and proposes the application of Ajzen's Theory of Planned Behavior as a model that focuses on individual attitudes and beliefs and their relative influences on behavior. The author tested the application of this theory to examine the potential influences on the use of campus-wide information systems (Klobas, 1995). These and other theoretical approaches to understanding the psychology of user acceptance are thoroughly reviewed by Dillon and Morris (1996). The authors define user acceptance as "the demonstrable willingness within a user group to employ IT [information technology] for the tasks it is designed to support." They submit that the concept of user acceptance is part of the general framework of innovation diffusion theory.

Innovation Diffusion Theory

The seminal researcher in the field of the diffusion of innovations is Everett M. Rogers (1995). Although the diffusion of innovations is fundamentally a communication process, communication scholars represent only one of a dozen or more fields that are presently using this theory in areas as diverse as geography, marketing, education, and political science. Rogers defines *diffusion* as the process by which an innovation (often a technological innovation) is communicated through certain channels over time among members of a social system. An *innovation* is an idea, practice, or

object perceived as new by an individual or other unit of adoption. Rogers describes five attributes of innovations that affect an innovation's rate of adoption. The rate of adoption is the relative speed with which an innovation is adopted by members of a social system. These attributes are: (1) relative advantage (the degree to which an innovation is perceived as better than those currently in use), (2) compatibility (its perceived consistency with the existing values, past experiences, and needs of potential adopters), (3) complexity (its degree of difficulty to understand or to use), (4) trialability (the opportunity to experiment with it on a limited basis), and (5) observability (the extent to which the results of the innovation are visible to others) (pp. 250-51).

Innovation diffusion theory also suggests that factors specific to the individual come into play. Individuals in a social system (e.g., teaching faculty) do not adopt an innovation at the same time. Rather, they adopt an innovation over time. Rogers suggests that individuals can be classified into categories based upon how quickly they adopt an innovation. The adoption of an innovation usually follows a normal bell-shaped curve when plotted over time on a frequency basis. By using a standard deviation, Rogers identifies five adopter categories based on two characteristics of a normal distribution: the mean (or average time of adoption) and the standard deviation (see Figure 1). This set of five adopter categories is widely followed today. The categories of adopters are: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. These "ideal types" are based on abstractions from empirical investigations. Pronounced breaks in the innovativeness continuum do not occur between each of the five categories (see Appendix for the characteristics of each adopter category).

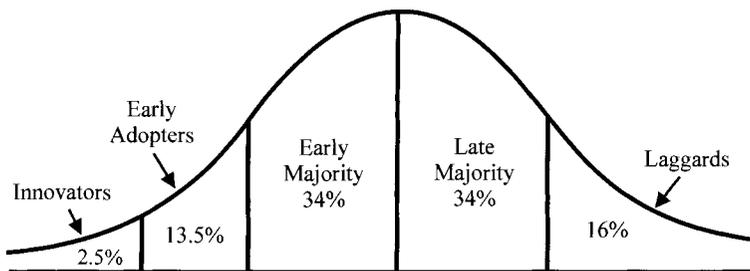


Figure 1. Adopter Categories on the Basis of Innovativeness.

With a few notable exceptions, little has been published using the innovation diffusion theory as it relates to the adoption of electronic information resources by library users.³ Dillon and Morris's (1996) comprehensive review of user acceptance of information technology identifies several articles that bring innovation diffusion theory into the context of information technology acceptance by individuals and in organizations. Hurd and Weller (1997) describe a research project that can be considered a diffusion study. Their study, now spanning four years, is an effort to document the adoption of computer-based information resources (a "technology cluster") by university faculty and the role of librarians as change agents in promoting the awareness of electronic resources and training faculty in their use of them.

The diffusion of innovations literature provides a basic understanding of the factors that influence the adoption of innovations (in this case, computer-based resources). Using the adopter categories described by Rogers, this study probes further into the responses of teaching faculty to their early experiences with these technologies, how they have adapted to these technological changes, and their view of the library in the electronic information age.

LOCAL SETTING

The University of Nevada, Las Vegas (UNLV), is a comprehensive, doctorate-granting institution established in 1957. It offers more than 140 graduate and undergraduate degree programs to over 21,000 students, including approximately 4,500 students enrolled in graduate coursework. Over 700 full-time faculty serve in the university's ten degree-granting colleges—business, education, engineering, extended studies, fine arts, health sciences, hotel administration, liberal arts, sciences, and urban affairs. In Fall 1998, UNLV opened a new law school.

While efforts have been underway for several years to connect every building to the campus network, the technological infrastructure of the campus has developed slowly and has only recently had the benefit of a full-time director dedicated to the academic computing needs of the campus. There are several electronic mail systems in use on campus and, at the time of the study, very few faculty and staff offices were not yet connected to the network. Many had modem lines that could give access to electronic mail but were not fast enough to support World Wide Web (WWW) searching.

Unlike academic computing, the UNLV Libraries have benefitted from several years of systematic development of information systems, and they currently offer access to various information resources and databases in electronic format. Since 1992, the libraries have provided IP (Internet Protocol) authenticated access to locally loaded periodical and government publications indexes. Access to CD-ROM databases is available only

to users in the library. The libraries' online catalog and an expanding number of full-text journals, online databases and indexes, and federal and selected state government publications have graphical Web-based interfaces.

The print collections of the UNLV Libraries comprise nearly 800,000 monographs; approximately 7,500 serials subscriptions; over 90,000 media resources; and more than 1.5 million items in microformat. The main library includes a large federal government depository collection that offers print and electronic access to government information resources.

The libraries consist of one central library and two branches serving education and architecture, with a third branch for music opening in the year 2000. Consisting of two interconnected buildings totaling 179,000 square feet, the library has outgrown its present central facility and is no longer able to provide space for collection growth or user seating nor can it support the technology required to meet current demand. Construction of a new 300,000 square foot, five-story main library began in March 1998 with occupancy planned for the year 2000. That library will have the capacity to store 1.8 million volumes. The building will feature 2,000 study spaces, more than half of them with full network connections; an Information Commons with nearly 100 microcomputer workstations supplemented by 130 additional workstations located throughout the library; a Collaborative Learning Center offering electronic instructional rooms; and an Automated Storage and Retrieval System (ASRS) capable of storing 1.2 million volumes.

METHODOLOGY

The authors used two qualitative research methods—focus groups and interviews—to explore the experiences and concerns of selected UNLV faculty who appeared to represent the adopter categories described by Rogers. As noted by Fidel (1993) in her thorough overview of qualitative methods and information retrieval research, the “qualitative approach offers the best methods for *exploring* human behavior” (author's emphasis) since it “aims at understanding people from their own point of view” in an effort to better understand why they do what they do (p. 222).⁴ Additionally, since one of the many attributes of qualitative research is that it facilitates the discovery process (p. 226), it appeared that the authors would have the opportunity to learn some of the subtleties and nuances associated with faculty use of the computer-based information resources found in the library.

Focus Groups and Personal Interviews

A review of the literature indicated that the focus group, a commonly used marketing tool, had long served as a valuable qualitative research tool in the social and health sciences.⁵ As a “carefully planned discussion

designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment conducted with approximately 7 to 10 people by a skilled interviewer" (Krueger, 1994, p. 6), the focus group's scale and purpose suited the research well. The interactive, sometimes synergistic, nature of focus groups—i.e., the fact that participants can respond to each other's comments and experiences and consider new ideas—was particularly attractive, as was the ability to probe responses in more depth than is typically possible in a more quantitative survey approach. Finally, the increasing use of focus groups by librarians to evaluate library services, identify the use of specific resources, and understand user behavior gave further support to their use for this study.⁶ The authors understood the limits of focus group research as well, most particularly the inability to generalize to a larger population.

Like focus groups, interviews have been used as a qualitative research tool in recent studies of academic faculty.⁷ The use of individual in-depth interviews in this study provided an opportunity to establish greater control over the inquiry process, to probe deeper, and to better understand each participant's opinion. It also enabled the interviewer to follow-up more consistently on questions.

Planning Phase

The authors secured the consulting services of a faculty colleague in the university's marketing department who had taught courses in focus group methodologies and who had conducted many focus groups. He provided invaluable guidance with respect to the feasibility of conducting exploratory research using focus groups and interviews, and he provided an experienced perspective on the questions developed for the research. In addition to securing the approval of the university human subjects committee for the project, he conducted one pre-test session, three focus group sessions, and six personal interviews. He also provided debriefing sessions for the authors at the end of each focus group and interview. His involvement as moderator minimized the bias factor sometimes associated with the researcher-as-moderator approach (Morgan & Krueger, 1998, vol. 4, pp. 38-39).

Focus group participants and interviewees were selected from a list of 136 faculty, 55 of whom had offered to serve on a focus group when they responded to a library survey conducted in 1996. The additional names were provided by subject bibliographers. In an effort to segment the participants to establish a level of homogeneity, the authors developed a set of screening questions to identify faculty from the list who reflected Rogers's adopter categories (refer to the Appendix for an expanded listing of these categories). The screening questions were asked of all contacted faculty, and schedule availability was determined.

Given the variations in population size represented by the adopter

categories (Figure 1), the authors combined categories in order to identify sufficient representatives from each. The innovator and early adopter categories were combined as were the early and late majority categories. The laggards represented the third category. Since the innovator/early adopter and the laggard categories were each too small to generate enough participants for multiple focus groups (each represented 16 percent of the user population), three faculty from each of these two groups were assigned to the personal interview sessions. A total of thirty-one faculty, identified as "early/late majority," were scheduled to participate in three focus groups.

The authors developed a standard set of fourteen questions for the focus groups with minor modifications for the individual interviews. The moderator was given the flexibility to follow up questions as needed and to manage the group dynamics as he deemed appropriate for the session.

Implementation Phase

All sessions were held during Spring 1998. Six faculty were interviewed and a total of twenty-six (eight or nine per session) participated in the three focus group sessions. These sessions were held in a conference room outside the library, food appropriate to the hour was provided, and the sessions lasted approximately ninety minutes. The interviews were conducted in the faculty member's office and lasted approximately one hour. The authors were not present nor did they observe any of the sessions. All of the sessions were audiotaped, and three of the six interviews were fully transcribed (the authors had intended to have transcripts of all sessions but financial resources were not sufficient). The authors sent letters of thanks to all participants followed by a \$25 check for use at the campus bookstore.

Analysis Phase

To achieve a systematic and objective approach to the analysis of the data, content analysis techniques were used.⁸ Categories of responses were generated in advance of the sessions. Concepts—as described by a single word or series of words, statements, or sentences—served as the unit of analysis. A single word—e.g., "yes" or "no"—could describe a concept if it affirmed or negated a previously articulated concept. The authors selected one tape from each participant group—the early adopters, the early/late majority, and the laggards—and independently listened to the tapes and matched the responses given by the participants to the author-generated categories. The authors compared their categorizations to verify the frequency with which they independently identified a participant's responses in the same way. With all three tapes, the reliability factor was 85 percent or better. Having achieved this reliability rating, the authors reviewed and coded the remaining six tapes, again representing the three different adopter groups, and completed the coding and concept

identification process, adding response categories when needed. The findings and key themes emerged from this analysis.

FINDINGS

Demographics of the Participants

The authors intended to interview three innovators and/or early adopters and three laggards. After listening carefully to the tapes, the authors determined that no true innovator had been identified, only three early adopters. The twenty-six focus group participants generally reflected characteristics of early majority adopters with a few late majority tendencies. Throughout the rest of this article, this group shall be referred to as the early majority. The third group of interviewees shared many characteristics of the late majority adopter category. They would not be characterized as what Rogers called "laggards." For this study, these three interviewees will be referred to as the late majority.

Due to the exploratory and qualitative nature of this study, no efforts were made to select a statistical sample of faculty to participate in the focus groups and personal interviews. The participants' ages, gender ratio, and academic ranks were not comparable to those of the faculty as a whole. Although the early adopters averaged the least number of years of college-level teaching experience while late majority faculty averaged the most, the thirty-two participating faculty had spent an average of ten to twelve years teaching at UNLV. Thus their comments regarding their experiences at that institution were generally referring to the same time period.

The questions used to initiate discussion in the focus groups and interviews with faculty focused on three main categories of research interest: (1) their past experiences with library computer-based technologies; (2) any changes in their attitudes, perceptions, and behaviors they may have exhibited in response to technology; and (3) their general information needs relating to technology.

Experiences, Expectations, and Barriers

Not surprisingly, most early experiences across all participant categories were with online catalogs. Several participants remembered those experiences as frustrating due primarily to the number of places they had to check to see if the library had an item. In one unique comment, an early adopter, whose experiences had been at UNLV, remembered being frustrated not with technology but with the library for constantly lagging behind him. He stated that he had set up and paid for his own accounts with database vendors to avoid frustration. He thought that eventually the library would "catch up" because they were "ten years behind what they could have been doing."

The convenience of online access was noted by some as a factor that contributed to their general satisfaction with initial automation efforts by

libraries. For others, the inconvenience associated with the multiplicity of catalogs led to their dissatisfaction.

Another aspect of the participants' early experiences related to factors or people who might have influenced a participant's use of information technologies. The early adopters and late majority more often mentioned colleagues than did the early majority participants, many of whom mentioned librarians as well as colleagues and graduate students. One of the early majority noted that it was the "environment" that influenced him—"you just had to use it."

When asked how their current expectations for library technologies may have been affected by their familiarity with other technological innovations (such as automated teller machines, commercial Internet services, debit/credit card systems, and so on), most early adopters and early majority faculty noted that it had "boosted" or "elevated" their expectations of what the library should provide—e.g., more full texts of journals and journal articles, expanded application of the integrated library system, and speech recognition software. A unique response from two other focus group participants was that use of the WWW has lowered their expectations of the library because they use it less and as a result they do not notice what is available in the library.

In response to this same question, the late majority faculty specifically noted that other technologies had little influence on their expectations for library technologies. In fact, they noted that their expectations regarding the library had more to do with the depth and breadth of the print collection rather than concerns about the electronic resources, with one even noting that the new technology "has speeded up access to printed indexes but has not improved on them in any way." A comment about the print collection was voiced again when the participants were asked if their expectations for services from the library were affected when the library's system (online catalog and links to other electronic resources) was down or unavailable. Two of the three noted that this had little or no impact on their expectations. For them, improved "access" to the print collection was achieved by the purchase of multiple or second copies of works.

Interestingly, both interviewees and focus group participants reported frustration and noted that they were inconvenienced when the library's system was down or unavailable, but the overall response was one of accommodation; some try again later while others visit the library and browse the shelves or talk with a library staff person. In general, these faculty did not blame the library per se for the system unavailability as most understood that it could be due to any number of factors. They noted that the experience had little impact on their expectations for service from the library. One late majority faculty member noted that he is "much more likely to get upset over the library not having material than at not having the online system working."

When asked which factors might limit their use of the library's computer-based information resources, most participants perceived that lack of time was a major factor or barrier for them. Additional comments included limited library hours, problems with network connections, unawareness of resources, and lack of instructions. One early adopter noted that the library is a synchronous environment, meaning that "you have to do things on their time, and not on yours, which is some of the problem."

Attitudes, Perceptions, and Behaviors

Technology's Effect. The capability to gain access to computer-based resources, whether supplied by the library or accessible through the Internet, greatly reduced the need for early adopters to use the library. "If I could get everything online, why would I go to the library?" one early adopter asked. Early majority faculty and the late majority interviewees also go to the library less often because they can search the online catalog and periodical indexes remotely. The online catalog, in particular, was viewed as very convenient since it reduced the number of trips made to the library to check for materials or to use library workstations for searching. One early adopter noted that he checks the availability of resources more often now that he can do so remotely.

A wide range of comments was elicited when faculty were asked whether the capability to gain access to electronic resources from home or elsewhere supplanted the library as a place to read, think, do research, or engage in the discovery process. It was suggested that access to these technologies could supplant the library as a place to go when the library is not a very inviting or comfortable place to be. "It's a warehouse of books, not a nice place to sit back and *be* there. If the library is not the kind of place to go to for several hours, then the technology allows you to find out exactly how much time you need to spend in the library and then you can go back to your office."

One focus group participant still sees the library as a place for discovery, but technology has provided another means for discovery. Another commented that increased access to electronic resources has not supplanted the library but has changed the role of the library. He sees the academic library redistributing its energies in certain ways and focusing on instruction and orientation for users so that they may do research from home. Information technologies were generally viewed as a way to save time thus enabling the faculty to browse, make serendipitous discoveries, and take part in the tactile or sensory experience of a library when they do visit. Browsing was seen as an important way to discover new information, and the participants generally would be concerned if their ability to do this was restricted (because of closed stacks or remote storage).

All but two participants noted that they do make use of computer-based information resources available to them through other information

suppliers such as Internet service providers or through a publisher's Web site. The services mentioned most frequently were alert services from publishers (availability of tables of contents of journal issues and books) and access to the full text of journals. The two exceptions were late majority faculty who expressed different reasons why they did not use these information resources. One commented that if he did use these services, he would probably not go back to visiting the library as he does now. He felt the library has value as a social place. The other knew she could have access to these resources if she wished.

Research and Class Preparation. Most participants in the three adopter categories replied that the library's computer-based information resources affected the way they conducted research. They saved time when searching electronic periodical indexes, they had increased confidence in their review of the literature by using electronic resources, and they could identify resources in remote libraries and archives. One focus group participant remarked that playing the "word association game" when conducting keyword searches in a database could yield information previously undiscovered. Other nonlibrary Internet-based resources have allowed faculty to find useful primary and secondary information and to monitor current research by taking advantage of electronic delivery of journal tables of contents from publishers.

The late majority faculty reported that nonlibrary electronic information resources had little effect on the way they conducted research or prepared for class. Comments from the remaining participants indicated that they have adapted or adjusted their curriculum by introducing students to useful sites on the Web; using other technologies, such as electronic mail, to communicate with students and to receive class assignments; and using CD-ROMs that come with textbooks. Early majority faculty emphasized that changes they have made in their courses include requiring or encouraging students to visit the library or speak with a librarian because they want their students to be aware of information resources available in the library. In some cases, faculty believed their students tend to rely too heavily on electronic resources and what they find on the Internet. One noted that he has to teach "book technology" in his research methods class because his students would miss a lot of information if they were to do a literature review by depending solely on electronic resources.

Electronic Media. A general question was asked about the pros and cons of print and computer-based information resources to uncover responses about changes in behavior due to the expansion of information available in electronic format. Advantages of electronic resources were voiced by all three categories of adopters. They observed that computer-based

resources provide broad dissemination of information, allow for asynchronous access, may solve some problems related to storage of information, provide increased access to information for students, and allow for manipulation of data across multiple years. They provide an easy way to see relevant terms within the text. Combined with the ability to print, one could reap the advantages of both formats. Electronic media allow for comments and input from fellow scholars when publishing journal-type information online, make it possible for immediate access to current materials, and save time for the researcher.

The participants noted that electronic information lacked the benefit of the tactile aspect found in print media. They said it was difficult and tiring to read from the computer screen and that it was problematic if they could not print the information. It was usually not possible to underline or annotate, and they felt limited if they could not print in color when it was needed to convey information, as with scientific works. In addition, they found it easy to lose track of where one was in the document and time consuming to go back and forth within the material. Finally, they noted that electronic resources were not portable unless one had a laptop, that they were transitory in nature, and that there was a risk of losing information as storage technologies become obsolete.

Relevance of the Library. While participating faculty acknowledged being influenced by the convenience of information access technologies such as an online catalog and other Web-based resources available to them outside the library, it was clear that most believed that the library remains relevant to them. They relied on the physical collection of books, though several make use of the WWW to access selected journals. One early adopter noted that he could not do without the library, but there were several services that he had access to that did a better job for him than the library. It would waste library resources, he said, to provide these to him.

Two focus group participants and several interviewees emphasized the importance of having their students go to the library for the experience of physically and visually interacting with the resources and the space. One spoke of its role as "a refuge, a hideaway" and the library being "kind of like a cathedral" where "there's a certain reverence" associated with it. One late majority faculty member spoke of the "social aspect" that is filled by the physical library. He further noted that conducting activities via a computer is tempting because it is convenient, but the activity is done alone in social isolation. This faculty member commented that this may contribute to the reason why he does not make extensive use of Internet resources.

Information Needs

Faculty participants suggested a number of ways that the library could make it easier for them, or that would encourage them, to use library

electronic resources. Workshops and classes were mentioned by several including a one-credit required course or one produced on video. Others suggested a Web-based guided tour, written instructions for using subject-specific resources, and an index of Web sites so they would not have to use a search engine (or information about which search engine would be best to use under different circumstances). One frequent comment was that the library should do a better job of informing faculty of what was available. Other responses suggested enhancing the computer-based information systems already in place including adding more public workstations and multimedia workstations in the library, increasing the number of specialized indexes available online (mentioned by several), converting standalone CD-ROM databases to online, providing access to more databases that were easy to use, and better integration between the original text-based library system and Web-based resources.

When asked to share their thoughts on the best method for the library to let them know what was available in the library, most participants favored brief periodic electronic mail announcements. A subscription-based electronic mail announcement list was suggested so those who were interested in getting updates about library resources and services could do so. The next two most frequently mentioned methods were: (1) to put brief announcements in the faculty/staff newsletter or in other campus mailings or flyers, and (2) to post announcements on the library's Web site or library system. Other comments included an online "guided tour," workshops or classes, and meetings between subject specialists and departments to discuss new discipline-specific resources. It was recommended that librarians speak with faculty when they visit the library and tell them what is new and of interest.

DISCUSSION

Several themes emerged from the discussions and interviews with each category of faculty that shed light on their overall attitudes toward computer-based library resources as well as on their adoption patterns.

Obstacles to Use

Faculty participating in this study identified a number of obstacles or barriers that interfered with their ability to make full use of the library's electronic resources. Other than the "lack of time," identified by many faculty as a barrier, most of the obstacles to the full use of such resources related specifically to the local environment. These included such things as printing problems, campus computing difficulties, inability to submit interlibrary loan (ILL) requests electronically, limited library hours especially on holidays, lack of study and use space, lack of access to some CD-ROMs, and lack of online citation indexes. One other frequently mentioned library-generated obstacle experienced by many participants was a

lack of information about the libraries' electronic resources. They simply wanted to know "how and where to get what." This is consistent with the findings of Adams and Bonk (1995) that the most common obstacle to the use of electronic resources by faculty is a lack of knowledge about what is available (p. 129). Communicating effectively with faculty on an ongoing basis can all but eliminate this obstacle to the use of electronic resources—and at relatively little expense to the library. Equally important is the need to collaborate with campus colleagues to resolve any technological difficulties that limit access to these resources.

Convenience and Portability

The concept of convenience was mentioned in many responses to a variety of questions across all adopter categories. Remarks regarding convenience were made when describing library technologies currently in place and when speculating on how technologies could be applied to other library services to make them more convenient. When discussing their responses to early library technologies, faculty found the online catalogs to be convenient, but the transition process itself was inconvenient. It was generally held that online access to catalogs and periodical indexes was very convenient and saved faculty time both by "speeding up" the research process and reducing trips to the library. This capability was also valuable because it allowed them to search library collections and verify references from their homes or offices and to search across multiple years of an index. One faculty member emphasized the value of being able to work in his office with students, assisting in their research efforts, and instructing in the effective use of the library's online resources. The convenience of searching online indexes on their own rather than having their searches mediated by librarians was noted by some faculty. Such responses suggest that academic librarians would serve their faculty well by implementing services (electronically based or otherwise) that saved their time and allowed for asynchronous transactions from remote locations (i.e., from the home or office). An added convenience could be achieved by working with the campus computing center so that the library could issue computer accounts, since remote access to electronic resources often requires a connection to, or an account on, a campus machine (Fiscella & Proctor, 1995).

Although the capability of gaining access to electronic resources remotely through technology was convenient, the portable nature of print material was also seen as convenient and desirable. When discussing the pros and cons of print versus electronic resources, faculty commented that they would regularly print material that they retrieved in electronic format. Print material—whether a book, photocopy, or printout—was often preferred since they could take it with them to read anywhere—e.g., the Student Union, in line at the post office, or in bed. This continued preference for portability and the ability to print electronically accessible ma-

terial reminds us that we should pay special attention to providing print capabilities from all public workstations in the library. We must also test the electronic resources and databases to ensure that print capabilities exist and work properly in the remote environment.

Relevance of the Library

As reported under Findings, the environment within the library building continues to play an important role on both an aesthetic and social level. When faculty spoke about the continued relevance of the library's physical collections, they consistently mentioned the importance of browsing the shelves and handling the material in a physical way. They want to have physical access to the collection without having to ask for something to be retrieved. A few noted that they will come to the library to browse if the online system is down when they need to get material.

The concept of browsing was mentioned most frequently when participants discussed the library as a place for discovery. Many believe that the physical shelves provide more opportunity for discovery and serendipity than do online indexes. Several focus group participants also noted they browse new book acquisitions, again as a means for discovery. One early adopter remarked he does not spend as much time as he used to browsing the shelves in the library since he can do this online. For him at least, browsing online was a useful surrogate for browsing the shelves. A late majority faculty member commented that his use of technology resulted in fewer visits to the library. This in turn had reduced his opportunities for "serendipitous discoveries."

For many of the participants in this study, computer-based resources have not fundamentally changed the important *process* of discovery that can, and does, happen in the physical library. It has, however, changed the *frequency* of that discovery because the opportunities for discovery by browsing are reduced when electronic resources are used that preclude a visit to the library. These observations serve to remind academic librarians of the importance of fostering and preserving browsing opportunities wherever possible for faculty when they do visit the library as "place" since these opportunities can contribute to its value or relevance to some faculty regardless of their adoption of library technology.

It was clear that the majority of faculty in the study, even the early adopters, believe that all of the libraries' information resources—print and electronic—are still relevant to them and to the university. Some see the library as relevant primarily on the basis of the physical collections. Others believe that the library will remain relevant as long as it provides more and faster access to full text online and to more databases and online citation indexes. The participants remarked that the availability of commercial information services marketed to the end-user has not reduced the relevance of the library to the university, but many recognized that

the library's role is changing and should change. Newly enrolled students at the university expect to use the information resource they need from their homes. As the accessibility of the library's materials and services increases, the library's role in the university is enhanced.

Validity of Information on the Internet and Equitable Access

While not directly related to the faculty's access to online resources, concern was expressed by members of each participant group that students often rely on material on the WWW without assessing its validity or its transitory nature. Several early majority faculty noted that they attempt to help students learn to discriminate and discern quality and to recognize that, in the words of one late majority faculty member, "chat rooms are not the equivalent of an article [that] has a real author." One faculty member limits the number of online sources that can be used, and one early adopter discourages online use by students since the number of online scholarly journals is still small. The authors were reassured that no mention was made that the library was a contributing factor in students' perception that computer-based information resources are the *only* method of access to information that is available on a topic. Nor was there a suggestion that the library's promotion of electronic resources downplayed the need for critical evaluation of those resources by the students who use them.

As faculty continue to adopt computer-based technologies, both for their own research and for their curricula, they are mindful of the possibility of inequity among students who may not have access to computers to use these technologies. A number of participants referred to the fact that many students do not have access to a computer at home and therefore rely on what the library or campus labs provide. The faculty see the library playing an important role for those students much as it has in the past to help those who "couldn't afford their own gear." One participant observed that course reserves on faculty-generated Web pages posed access problems for some students. These comments provide additional encouragement to academic librarians to pursue all avenues available to them to advocate adequate student computer labs, connectivity in dormitories, free or affordable computer accounts for graphical access to Internet-based resources, low cost loans for students to buy computer equipment and software, and the expanded availability of computers for student use within their facilities.

Change

The participants in this study had experienced the many initial frustrations associated with early changes in library automation but had adapted to them. Most were adapting to the current changes associated with the Internet and the WWW and were benefitting from the convenience this

new electronic environment afforded them. Many are anticipating more change. For example, an early majority participant imagined that someday he would “go to a cubicle . . . put on goggles, gloves, and reach out and touch a book, display the contents, then put it back.”

There were also concerns associated with future changes. These related to the presumed loss of the library as a social gathering place and the possible “dehumanization” of the library as things are “accessed electronically and interacted with electronically.” One faculty member gave an example of how electronic information and its associated technologies could change the way we teach because the artifact changes or is translated into electronic form:

Over the last ten or 15 years, there has been a concern about the skills within mathematics education that might be lost when we move to technology that we don't want to be lost. For example, moving from an analog clock to the digital clock. What will “quarter past” and “quarter to” mean when you don't have that visual image of a quarter of an hour? And how will that relate to the learning of fractions because so many teachers use a circular model for fractions? I think that a similar kind of thing might be [happening] with books and technology.

With the acceleration of specialization and the explosion of information, another faculty member commented that there was an effect on the “students' ability to think analytically and critically, because they think the more [information] they have, the better educated they are, even if they can't put it together in their heads.” Clearly, the study's participants acknowledge the influence of the pace and scope of technological change as well as its affect on faculty, students, and libraries.

Few Differences Between Focus Group Participants and Interviewees

Differences between early adopters and the late majority faculty in their response to library technology were far fewer than expected. The differences that did exist appeared to relate to the learning process associated with technology and to the expectations associated with its use. It was apparent that the three late majority faculty preferred to invest time learning to use computer-based technologies only when they had to or when they had an immediate need. They were not “awed” by it and they expressed no desire to learn it for its own sake. As one late majority faculty member commented:

With me, it's not a matter of accumulating knowledge about the computer just for knowledge's sake because I might be able to use it at some time or because it's particularly interesting to me how you do this particular thing. If it doesn't have a particular use that I can translate to in my class, chances are I probably won't ever learn how to use it.

One late majority faculty member noted how important it is that the people who teach the use of new technologies “understand the level and the degrees of our potential inhibition” with those technologies. This participant further observed that the “pressure” to learn how to use these technologies has the potential to make the learning experience a negative one for these faculty. In some cases, the pressure a faculty member might feel to become proficient in using software productivity tools or computer-based information resources leads to feelings of “guilt”—i.e., “I should know how to do this” or “I should be able to do this.” This late majority faculty member described an experience with an instructor at the campus computing center and her difficulty in working with this instructor:

I went to a class at the computing center on campus. And I was swearing and in tears by the time I left that one-hour session. And that’s quite an extreme—to be swearing and in tears at the same time. I was so frustrated. That kind of pressure makes me so nervous . . . with the mouse. I can’t even hit the right thing on [the screen] because I’m so nervous. And this guy’s just watching over my shoulder. That, I think, makes you hate the system. And I can see why some people would say, “I don’t want to go anywhere near it.” I don’t feel that way, but I’ve had a lot to overcome—’cause I didn’t grow up with computers.

This same participant valued the ability to contact various library staff members with whom she had built working relationships when she needed to get instructions on how to use a particular resource.⁹ As academic librarians are reminded of the primary mission to link the user and the information, it is important to remember that the tools required for this “linkage” may be intimidating and can serve as an obstacle to faculty that can keep them from fully realizing the electronic information resources available to them through the library. User education in the academic library environment should address the late majority faculty in addition to the students where computer-based technologies are concerned.

As for the early adopters, they made no mention of any difficulty they may have had learning to use computer-based technologies. Their learning appeared to be a given. Of note for this group was the reliance they placed on technology to provide convenient solutions to problems—e.g., providing users with the option to submit requests for interlibrary loan online, using the capabilities of the integrated library system for the check-out of reference materials, and using universal copy cards. Early adopters in particular expect the library to provide what they or their students cannot have access to on their own—e.g., links to primary data resources that might be available on campus; CD-ROM and multimedia publishing; and subscriptions to online resources that are cost prohibitive to individuals.

It is clear that the early adopters rely regularly on their access to

nonlibrary-based online resources, especially the Internet, for their research and teaching. One noted that "most of the major innovations that I've found teaching have actually come from either finding a Web page or through nonlibrary materials," and one spoke of using it to disseminate his research.

These differences in the learning styles of adopters were also noted in an online discussion of instructional technologists. One contributor commented that "our collective focus on the early adopters inadvertently established a model for support that ultimately failed the mainstream. The early adopters have accomplished and continue to accomplish wonderful things, and they need our support We must attend to both groups in a manner appropriate to their respective wants and needs" (in Gilbert, 1995, p. 39). Librarians, like instructional technologists, must become aware of the differences that exist between adopter categories and the implications of these differences on the enhancement of current services and the development of new ones.

LIMITATIONS OF THE STUDY

This study would have been strengthened by addressing specific techniques in two areas: during the planning and implementation phase and during the analysis and interpretation phase. More refined screening questions were needed to distinguish between late majority adopters and laggards. Too many questions were asked of participants that resulted in sessions that lasted too long and data that were difficult to analyze. The study would have benefitted from better-refined questions that were more specific. More "what" questions would have elicited more direct responses. The authors' attempts to avoid "leading" the respondents resulted in somewhat ambiguous questions and terminology. These were interpreted in a variety of ways by participants, which led to a number of responses that could not be used. Viewing or audiotaping the test focus group would have helped to identify some of the questions that were misinterpreted by individuals and to test concept categories. If the authors had taken better advantage of the debriefings with the moderator, unexpected themes could have been pursued in subsequent sessions/interviews. During the focus group sessions, the moderator should have consistently summarized the responses to the questions and verified with the group what was of most importance.

Full transcription of all sessions and interviews would have been tremendously valuable during the analysis and interpretation phase primarily as a time-saver but also to eliminate the need to verify researcher notes against the tapes. Initial results should have been compiled and sent to participants and interviewees for a "member check." Using this method, the authors would have presented their findings to the respondents for their review and comment. This is an important method for ensuring

validity in qualitative research (Fidel, 1993, p. 232). Triangulation, whereby a different method of data collection is used to study the same phenomenon, is also used in qualitative research to ensure validity. This research strongly suggests to the authors that a survey of the faculty at UNLV should be conducted to determine the prevalence of these responses to library technologies among the larger population.

CONCLUSION

The use of focus groups and personal interviews with faculty to explore their general adoption and use of libraries' computer-based technologies has yielded much useful data. For example, among the participating faculty there may be fewer differences overall between adopter categories in terms of actually using the information technologies offered by the library. Differences that do exist may relate more to the late majority's lack of "awe" toward new technology than to an expression of specific resistance or disenchantment. All three late majority faculty indicated that they preferred to learn about new technologies only when they actually needed them. Of note for the early adopters was their interest in having the library provide unusual or expensive resources that users cannot otherwise gain access to independently. By recognizing some of the unique differences between adopter categories that exist in the user population, the library can customize and refine its services and instruction. For example, if a library wishes to increase the use of its electronic collections and services by faculty, it should not overlook the late majority represented by fully one-third of its faculty. But when planning for change—i.e., for new services and the enhancement of current ones—librarians should listen to their innovators and early adopters.

Obstacles still exist that limit the effective use of library technology by faculty at UNLV as described by the participants in this study. In particular, the library failed to inform faculty of available resources and failed to use existing technologies, such as the electronic submission of interlibrary loan requests, for the convenience of faculty (this service was made available during the Fall 1998 semester). Despite these obstacles and those that may have existed during the libraries' early transition to computer-based information systems, the convenience of access to these resources has contributed to the wide adoption of the resources across adopter categories represented in this study. Indeed, it appears that there is an overall accommodation rather than a marked resistance to the information technologies being offered by the library. Library users are experiencing another transition period with regard to print journals and electronic journals with responses similar to the inconvenience and frustration they felt during the transition to the online catalog. On a larger scale, they are also experiencing the transition from print-based resources to the hypertext electronic resources found on the World Wide Web with the associated

challenges of searching for relevant reliable information. The suggestion by one interviewee for the academic library to more actively assume the "information and referral" role embraced for years by public libraries is one way to assist faculty and to continue to stay relevant to the early adopters and those who follow them.

The faculty participating in this study believe that the library and its resources remain relevant to them. In contrast to the Internet, the library still provides the bulk of the scholarly information resources needed for their research, and it responds to the needs of some for a social as well as physical space. Several spoke of the importance of the physical nature of the book, underscoring Himmelfarb's (1997) observation that:

The book is the reality; there is no Virtual Reality here. Moreover, each page of the book—in the case of a difficult work, each line of the page—has a distinctness, a hard reality of its own. Holding the book in hand, open at that page, it is easy to concentrate the mind upon it, to linger over it, mull over it, take as long as necessary to try to understand and appreciate it. (pp. 203-04)

Some faculty, especially among the early majority participants, recognized the inequities that exist for some students who have limited access to computers. Faculty across all categories expressed concerns regarding the quality of information on the WWW and their students' unquestioning acceptance of the material found there. If resistance to the new computer-based information technologies exists among the faculty, it appears to be most associated with their students' use of them.

As for future change, all faculty participants expect considerably more of it with most early adopters and early majority faculty expecting the library to be responsive to their requirements for increased access to more electronic resources. Late majority faculty, too, anticipate change and will likely accept it though at a pace that fits their learning style and specific needs.

Adoption of innovations and new technologies by library patrons does not mean that older "book technologies" will be abandoned. Rather, the viewpoints of the participants in this study suggest that it is not either one or the other but *both* and *all*. These comments support what Crawford and Gorman (1995) succinctly summarized as the change predicted in our libraries of the future: print *and* electronic communication, linear text *and* hypertext, mediation by librarians *and* organized access on behalf of our users, ownership *and* access to materials, the library as edifice *and* as an interface for remote users (pp. 180-81). The library that remains relevant to its users will provide a mix of resources and services so that its users can choose to adopt the innovations that they value.

DIRECTIONS FOR FURTHER RESEARCH

While a number of quantitative studies in the form of surveys of faculty

use of electronic resources exist, there is an apparent lack of qualitative research in this regard.¹⁰ It is intended that the findings gleaned from the qualitative nature of this investigation will suggest further research into faculty use of library-related technology.

Several questions about faculty's response to library technologies have been raised by this study. Are laggards disenchanting with all computer-based technologies or have they simply not adopted them yet? Are they also the same faculty who do not use the library at all? To what extent do innovators use library resources and services? How can librarians become more effective "change agents" in the diffusion process?¹¹ Do we assist late majority students in the same way we assist late majority faculty? On a more practical level, which technologies should we provide in libraries that students and faculty do not own or have access to as individuals? What expectations do they have of the library to use existing technologies to enhance service? How effective are the methods we are using to inform our faculty about our electronic resources and services? Do faculty want the library to organize links to useful electronic resources (located locally or off-campus) and other new technologies that are relevant for their curricular or research needs? To what extent do faculty want librarians to identify useful Internet resources for student use as a way to address the concern about the validity of information sources on the WWW? Understanding that the "trialability" or opportunity to experiment on a limited basis affects an innovation's rate of adoption, how can we move faculty instruction and orientation programs from "just in case" or "just in time" to "just for you"? Or will "just in time" be enough?

The expanded use of qualitative research techniques, most particularly focus groups and interviews, may yield answers to these questions. This study provided a structured opportunity for selected UNLV faculty to feel listened to and empowered as library users, important features of focus group research (Carey, 1994). It also provided the authors with valuable insight into a small segment of their library's user population. By routinely seeking such listening opportunities, librarians can continue to increase their awareness and sensitivity to the unique characteristics of faculty users (adopters). Such actions will also serve to inform our decisions regarding future electronic resources and services.

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APPENDIX

CHARACTERISTICS OF ADOPTER CATEGORIES

- | | |
|----------------|---|
| Innovators | <ul style="list-style-type: none"> • venturesome • able to understand and apply complex technical knowledge as necessary • able to cope with a high degree of uncertainty about an innovation at the time of adoption • willing to accept an occasional setback when a new idea proves unsuccessful • important in the diffusion process by introducing an innovation from outside the system's boundaries |
| Early Adopters | <ul style="list-style-type: none"> • have the greatest degree of opinion leadership in most social systems. Potential adopters look to early adopters for advice and information about an innovation • respected by their peers in part due to their successful, discrete use of new ideas • convey a subjective evaluation of the innovation to near-peers through interpersonal networks • generally sought by change agents as "local missionaries" for speeding the diffusion process |
| Early Majority | <ul style="list-style-type: none"> • adopt new ideas just before the average member of a system • interact frequently with peers but seldom hold positions of opinion leadership in a system • most numerous adopter category making up one-third of the members of a system • may deliberate for some time before completely adopting a new idea • follow with deliberate willingness in adopting innovations but seldom lead |
| Late Majority | <ul style="list-style-type: none"> • adopt new ideas just after the average member of a system • adoption may be an economic necessity and the result of increasing pressures from peers • approach innovations with skepticism and caution • do not adopt until most others in their system have done so • most of the uncertainty about a new idea must be removed before they feel it is safe to adopt |

Laggards

- last in a social system to adopt an innovation
- many are near isolates in the social networks of their system
- decisions are often made in terms of what has been done previously
- interact primarily with others who also have relatively traditional values
- tend to be suspicious of innovations and change agents
- resistance to innovations due in part to their requirement that they must be certain that the new idea will not fail

NOTES

- ¹ A related article by Vander Meer, Poole and Van Valey (1996) reports survey results that suggest that computer skills among university students are associated with high levels of library use.
- ² The Theory of Planned Behavior (TPB) holds that attitudes, subjective norms (or influences of other people), and perceived control over the performance of the behavior are direct determinants of intentions, which in turn influence behavior. It is a descendant of the Technology Acceptance Model (TAM). The goal of this model is to predict information system acceptance. The TAM predicts that user acceptance of any technology is determined by two factors: perceived usefulness and perceived ease of use. The Technology Acceptance Model is an information systems-specific model derived from the more general Theory of Reasoned Action (TRA). TRA comes from the social psychological literature and seeks to define relationships among beliefs, attitudes, norms, intentions, and behavior. In this model, one's behavior (e.g., use or nonadoption of technology) is determined by the person's intention to perform the behavior. This intention is influenced both by that individual's own attitude and the influence of other people, specifically those people who are important to the individual and whether they would or would not perform the behavior in question.
- ³ Research in library science based on the diffusion of innovations focuses on the adoption of technologies by library staff, librarians as change agents, organization theory and diffusion research, and librarians' reactions to organizational change, among others. See Musmann and Kennedy (1989) for a bibliography of publications on the diffusion of innovations dating back to 1974 in the library and information science literature (pp. 147-49). Musmann (1982) reviews the literature of organization theory and diffusion of innovations research while Fine (1986) presents a historical overview of librarians' reactions to technological change. Griffiths (1986) examines selected innovations over time and analyzes fifty-four case studies of the adoption and use of innovations at academic, public, and special libraries.
- ⁴ Fidel provides an excellent overview of qualitative research within a library and information science context, citing its increasing use in the field and describing its valuable characteristics—i.e., noncontrolling, holistic and case oriented, focused on process, flexible, methodologically diverse, humanistic, inductive, and scientific. Westbrook (1994) provides another useful review of qualitative methods including a discussion of data collection and data analysis procedures. Techniques for ensuring research integrity are also included. Both articles provide extensive references to related literature.
- ⁵ The works of Morgan (1996, 1997) and Krueger (1994) provide extensive descriptions of the value, purpose, and methodologies associated with focus groups. Their recent, six-volume publication (Morgan & Krueger, 1998) incorporates their work into useful guidebooks that provide a step-by-step approach to the planning, question preparation, moderating, participant recruitment, analysis, and reporting of focus group research. Stewart and Shamdasani (1990) offer a concise and very accessible review of the theory and methods associated with focus groups and include a valuable overview of the nature of group dynamics as it relates to focus group research.
- ⁶ Representative examples of such studies include: Widdows, Hensler and Wyncott (1991) provide an early and often cited overview of the focus group rationale and method and demonstrated their use to gauge student opinions of service quality; Valentine (1993) studied undergraduate information-seeking behavior using a combination of focus groups and interviews; Meltzer, Maughan, and Fry (1995) reported on the contributions to library strategic planning made by students participating in focus groups on two California campuses; Connaway, Johnson and Searing (1997) used this technique with faculty and students to understand the users' perspective of online catalogs; and Massey-Burzio (1998) assessed faculty and student perceptions of a variety of reference-related services. For a thorough description of the focus group methodology that incorporates references to selected library-related focus group studies, see Connaway (1996).
- ⁷ See Lester and Marshall (1998) for an assessment of faculty satisfaction with traditional library services based on interviews with them and Crist (1998) for a report of interviews with faculty on their needs and opinions about a variety of library services.

- ⁸ Used primarily in social science research, content analysis has been defined as "a method of studying and analyzing communications in a systematic, objective and quantitative way" (Kerlinger, 1973, p. 525). The technique uses a number of procedures, including the defining of a unit of analysis, the construction and coding of categories, and the establishment of reliability factors to ensure research replicability and validity. Krippendorff (1980) offers an extensive treatise on the technique. Wimmer and Dominick (1983) provide a clear and concise overview of content analysis in the mass media context. For both a review and an example of content analysis as it has been used in library and information science research, see Allen and Reser (1990).
- ⁹ As a faculty member, Stahl (1997) also comments that "personal connections" made with librarians allow her to move through her "humiliation and frustration" when seeking help in using new library resources.
- ¹⁰ Surveys include Adams and Bonk (1995) whose sponsored research focused on faculty use of electronic information technologies; Fiscella and Proctor (1995) examined use of various education and social science databases by faculty; Vander Meer, Poole, and Van Valey (1997) assessed the relationship of library use to computer use by surveyed faculty; Bancroft et al. (1998) asked faculty to rate and prioritize current and potential services and resources; Hurd and Weller (1997) identify adoption by academic chemists of electronic resources and explore roles of librarians as change agents.
- ¹¹ A change agent is a person or an organized group of persons who seek to influence the adoption of an innovation. Rogers (1995) describes technology clusters which consist of one or more distinguishable elements of technology that are perceived as being interrelated. A change agency may find it useful to promote a cluster or package of innovations to clients rather than introducing each innovation separately thus speeding their rate of adoption. Hurd and Weller (1997) identify "an array of electronic resources, local and Internet-based, and the workstations that support access to scientific information in both electronic and paper format" as a technology cluster (p. 153). This cluster was promoted to academic chemists by their librarians acting as change agents. Rogers explains that the rate of adoption of an innovation is affected by the extent of the change agents' promotion efforts.

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