

Digital Reference: What the Past Has Taught Us and What the Future Will Hold

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In his 1876 paper, “Personal Relations Between Librarians and Reader,” Samuel Green wrote that it is essential to provide reference assistance to help users locate information because the public is not trained to find information (Bopp & Smith, 2001). By the end of the nineteenth century, the role of the librarian had expanded to include reference service, and it has been part of the profession since then. In the interim, great advances have been made in the field of librarianship. New technologies change the way we search for information and what we expect from reference service. With the introduction of the computer and the Internet, libraries expanded the role of reference beyond the use of the mail, telephone, or the fax machine. However, Green’s point remains pertinent: having access to sophisticated technology and more information does not mean that users have better research skills.

In the past ten years, libraries have become both more sophisticated and more dependent on new technologies. For example, libraries migrated from card catalogs to online catalogs. With so many changes in the profession, reference service has also changed. Today, librarians not only help patrons at the reference desk but also in cyberspace. This new type of service, called digital or virtual reference, has emerged as the result of various factors, including the advent and wide use of the Internet and the development of software capable of providing synchronous and asynchronous service. Digital/virtual reference is quite new, but has quickly become popular because of demands by patrons to access information anytime, anywhere.

Digital/virtual reference service allows librarians to help patrons access information in a virtual environment, using various methods such as e-mail or chat. Each type of service has positive and negative features. Although digital reference lacks the face-to-face communication that is an integral part of reference service, the reference techniques used and the scope of the librarian’s role have remained the same.

This paper discusses issues related to the use of digital/virtual reference in academic libraries in the U.S. The first section clarifies the terms “digital reference” and

“virtual reference,” which are often used interchangeably, and explains the slight difference between the two. The second section provides a brief history of the evolution of digital reference. Section three explains how digital reference works, and section four discusses the implications for users and librarians. The last section offers speculations about the future potential for digital/virtual reference.

Digital or Virtual?

The interchangeability of the terms “digital reference” and “virtual reference” and their relative newness have caused some confusion for both the novice and the veteran in reference service. With the advent of the Internet, libraries began to offer online services to their users. One of the simplest types of digital/virtual reference service is online access to the library’s catalog. Digital/virtual reference service developed from the interest in using available technology to provide better access for users. Patrons can be assisted remotely and, in many cases, 24 hours every day of the week.

Digital/virtual reference is a new system, and many issues surround it. Some are being resolved, while others need more attention, including clarification of the terminology. Many dictionaries offer the same definitions for “virtual” and “digital”. According to the Merriam-Webster, “virtual” is something that it is not physical, but is made real with the aid of a computer, while “digital” involves the use of computer technology in capturing, storing, and providing information. Both virtual and digital reference make use of the computer to provide information. But do they mean the same things?

Lipow (2003) writes that at the present time there is not a clear use of the words “digital” and “virtual” in the context of reference service and that both are used with the same meaning. She and others in the field agree that digital reference includes a variety of electronic resources, like e-mail or chat, that provide reference service using the Internet. Lipow’s statement is consistent with the definitions that others give the terms.

Some professionals simply define the terms “digital reference” and “virtual reference” as similar in service and scope (Borchardt & Croud, n.d.). Others provide a more specific explanation. Kenney (2002) says that digital reference is also “called chat reference, virtual reference, online reference, and synchronous reference” (p. 46). Lankes and Shostack (2000) write that digital, virtual, and e-reference are the same type of service and that they all use librarians as intermediaries to assist users in finding information in a digital environment. Most authors provide examples of digital and virtual reference. For example, the National Information Standards Organization (NISO) (2001) defines digital reference, virtual reference, and online reference as using either synchronous technology, like chat, and/or asynchronous tools, such as e-mail, to provide and assist in the retrieval and use of information. The Washington State library (n.d.) defines virtual reference as a service that encompasses many electronic aids all having in common the use of the Internet. Some use e-mail, videoconferencing, mail lists, and chat rooms as examples of virtual reference

(Gray, 2000); however, many authors prefer to use only e-mail and chat as examples (Fritch & Mandernack, 2001; Francoeur, 2002).

Janes, Carter, and Memmott (1999) define digital reference as, “a mechanism by which people can submit their questions and have them answered by a library staff member through some electronic means (e-mail, chat, Web forms, etc.), not in person or over the phone” (para. 7). Kasowitz, Bennett and Lankes (2000), Wasik (1999), and White (2001) define digital reference as Internet-based services that use humans as mediators.

Throughout the literature, the terms digital and virtual are applied to the use of computer-based technology. Library professionals use both terms, and everyone agrees that digital/virtual reference is a new type of service based on the same question-and-answer type of assistance provided in traditional in-person reference.

Sloan (2002), who has been active in the field of digital reference for many years and has worked with the academic Ready for Reference project in the Alliance Library System in Illinois, writes:

online or virtual or digital reference services, i.e., the provision of reference services, [involves] collaboration between library user and librarian, in a computer-based medium. These services can utilize various media, including e-mail, Web forms, chat, video, Web customer call center software, Voice over Internet Protocol (VoIP), etc. (2002, para 1).

Sponsored by the Department of Education, the Virtual Reference Desk (VRD) is committed to the progress of digital reference and the development of Internet services. VRD provides this definition of digital reference:

Digital/virtual reference, or “AskA”, services are Internet-based question-and-answer services that connect users with experts and subject expertise. Digital reference services use the Internet to connect people with people who can answer questions and support the development of skills (2002, para. 2).

There is no consensus on which term to use. Digital or virtual reference provides the same type of service: it allows users to access information and assistance online, using e-mail, chat, video, voice software, or any other Internet technology. “Digital reference” will be used for the remainder of this paper.

History of Digital Reference

Reference service began in the late nineteenth century, and it defined the role of the librarian as a provider of information, assistance, and instruction (Bopp & Smith, 2001). These services have not changed. What has changed is how librarians provide these services. Today, librarians not only help patrons in-person but also virtually. It is

important to briefly discuss the development of the Internet while talking about the evolution of digital reference, since the latter would not exist without the former.

Online technology developed in the early 1960s, but did not receive much attention until the 1980s. Early computer systems, such as BOLD, designed by Harold Borko in 1964, provided a glimpse of the possibilities for the retrieval of information (Hahn, 1996). During this early period, libraries became interested in developing a system that would allow them to retrieve information faster and more accurately. To demonstrate the potential for the use of computers in libraries, the American Library Association (ALA), in collaboration with Joseph Becker and Robert Hayes, developed a system that allowed users to search a bibliographic database through a computer using a standard telephone line. The device was presented at the 1964 New York World's Fair in the Library/USA exhibit. The equipment allowed the librarians to provide answers to 800,000 questions in 18 months (Hahn, 1996). These first systems were difficult to use and costly to maintain, and did not provide enough incentive for companies to invest in something they believed was not going to be marketable. However, not everyone was skeptical about the potential of online systems.

In 1964, Roger Ken Summit, a researcher who worked for Lockheed Missiles and Space Company, was developing a system for NASA that used computer technology for the retrieval of information. Foreseeing the potential of the system in the private sector, Summit (1999) redefined the procedure and, by the 1970s, DIALOG, the first commercial database, was created.

At the same time that Summit was developing DIALOG, Vinton Cerf and Robert Kahn, in collaboration with the US Defense Department, developed the Advanced Research Projects Agency Network (ARPANET). The system connected three computers in California with one in Utah, creating a network in which data were shared. In order to allow the computers to share resources across a network, the system used the TCP/IP protocol. Three standard elements of the TCP/IP protocol are (1) the ability to do file transfer protocol (FTP), which allows any computer to get files from another computer, (2) to have network terminal protocol (TELNET), or remote login, which permits a user to log in and use any computer on the network, and (3) to have computer mail, which allows the user to send messages to other users on other computers (Newton, 1987). The purpose of this experimental project was to facilitate computer communication between people, and eventually, the system developed into what we know today as the Internet, a network of networks, which also allows libraries to provide online catalogs, access to full text material, e-mail communication, and chat capabilities (Bishop 1991).

The increased interest in providing digital reference, the advent of the Internet, and evolving technology led to a dramatic increase in web servers, from 130 in 1993 to 11,576 in just two years (Bournellis, 1995). By 1994, 77 percent of the libraries in the US provided their users with Internet access, and three years later, all of the libraries were using web-based systems (Tenopir & Ennis, 2002). The Internet has allowed users to become more independent in searching for information and at the same time provided librarians with a tool to reach out to users.

Following DIALOG, other databases were developed such as Information Bank, ORBIT, and BASIS. These systems allowed librarians to either limit or expand their queries, thus making their searches more exact. Most importantly, with this new technology the need for a computer programmer was eliminated because the new system supported command-driven searching. These types of searches were still limited, however. Librarians were the only ones who had the appropriate training and access to use the new systems. Reference service expanded from directing users to print material to retrieving information from databases. By 1980, online searching became a standard part of reference service, requiring all librarians to have more technical skills than in the past (Hahn, 1996). In time the Internet became widely used not only in libraries, academia, and government, but also in the private sector. The success of this service relied on the ease with which people could find information and connect with each other on a level never possible before (Hauben, n.d.).

Because of the new technology, communicate and sharing of information changed. The first type of digital reference was e-mail. E-mail was first used by librarians to communicate with one another and, soon, with users as well. In 1984, the University of Maryland Health Sciences Library and the Health Science Library at the University of Washington developed a service called Electronic Access to Reference Service (EARS), which provided reference assistance via e-mail (Still & Campbell, 1993). Three years later, the libraries at Indiana University developed an e-mail system called LIRN (Libraries Information and Reference Network), which was menu-driven and part of a network system (Still & Campbell, 1993).

Interest in digital reference increased steadily; the users wanted to have access anytime, and the librarians wanted to provide a better service, while companies were interested in developing new programs and tapping into a new field of service. ASKERIC, developed in 1992 as a project of the ERIC Clearinghouse on Information and Technology, began to offer digital reference services, and, according to its director David Lankes (2000), the usage has increased 20 percent annually since then. As of 2002, one thousand libraries offered digital reference in the form of either chat or e-mail (Dougherty, 2002).

Interest in digital reference spread among librarians. In 1999, the conference of the Virtual Reference Desk (VRD) drew 220 people. The following year attendance doubled (Oder, 2001; Borchardt & Croud, n.d.). Consequently, the use of digital reference service increased dramatically. By 1999, 75 of the 122 libraries of the Association of Research Libraries (ARL) offered digital reference via e-mail or used a web-based system (Fritch & Mandernack, 2001), and by mid-1999, 358 of 473 academic libraries provided digital reference (Janes, Carter & Memmot, 1999).

As users became aware that they could access librarians from the comfort of home, the number of requests increased. An ARL survey done in 1988 showed that 20.25 percent of the patrons used e-mail for help with reference questions (Still & Campbell, 1993). The Tompkins-McCaw Library at the Medical College in Virginia saw an increase in e-mail reference from 19 questions in 1990 to 38 the following year (Still & Campbell,

1993). A survey from ARL showed that in 1999, the average number of questions received by reference librarians was 67 per month (Horn, 2001). Christina Peterson (personal communication, March 12, 2003), distance librarian at San Jose State University, commented that between October and December 2002, the library received from 65 to 80 questions. Patrons use e-mail to ask a variety of reference questions. Librarians at the University of Illinois at Urbana-Champaign reported that nine percent of the questions received involve ready-reference, while 20 percent require research (Janes, 2002). Coincidentally, the increased use of digital reference has decreased the use of in-person reference services (Tenopir & Ennis, 2002; Montgomery, 2000; Coffman & McGlamery, 2000; Whitlatch, n.d.).

Digital reference evolved from basic e-mail correspondence to more sophisticated systems that allowed librarians to show search results to users. One of the first projects was "See You See a Librarian" developed in 1996 by Eric Lease Morgan. The purpose of this service was to investigate the possibility of providing chat communication between librarians and possibly between librarians and patrons. By the end of the 1990s, several companies began to develop software for reference applications. LSSI was one among the first pioneers in this field and presented the first digital reference service software at the ALA conference in 2000 (Oder, 2001). In 2002, the Library of Congress with OCLC developed Question Point service, a collaborative reference service (Question Point, 2002). Today, there are many digital reference systems. The only two that are non-profit are OCLC and 24/7 Reference (Hirko, 2002).

How Digital Reference Works

As we saw, digital reference uses the Internet to allow people to connect with a librarian. Libraries are using two types of digital reference services, e-mail and chat. In both cases, librarians must do an interview to understand what the user needs. This section discusses how the process of reference interview applies to digital reference and explains how e-mail and chat reference work.

When conducting in-person interviews, librarians rely on many clues from the users, including body language. With digital reference, neither the librarian nor the user have access to these important clues, thus doing a thorough reference interview is critical in helping the user. The service virtual users receive must be comparable to that of in-person users.

The Reference and User Services Association (RUSA) (RASD, 1996) has developed five steps to follow when helping in-person users: approachability, interest, listening/inquiring, searching, and follow-up. How can these points be used when doing digital reference? Many of RUSA suggestions are not feasible for a digital reference interview; however, they can be modified to fit this situation. For example, to demonstrate approachability, the librarian should acknowledge the user by sending a short message and indicate the possible wait time. Sending messages to the user and keeping him/her informed of what the librarian is doing are all-important elements to show interest. The listening/inquiring part is when the librarian should ask questions and,

at the same time, make sure that what she/he understands is what the patron needs. Questions, such as “What have you found so far?” and “What did you use in your research?” are commonly asked in a person-to-person interview, and should be used in a digital reference session as well. During the search the librarian should provide a variety of accessible information to the user and then ask the patron if his/her question was answered. The follow-up question allows the librarian to verify that the user is satisfied with the material provided, and possibly to refer the patron to a library subject specialist. A recent study on digital reference showed that 60 percent of reference queries are assigned to experts (Pomeratz, Nicholson, Belanger & Lankes, 2003). The reference interview will differ according to whether the librarian is using e-, mail or chat.

E-mail Reference

E-mail reference includes e-mail and web-based forms. E-mail service provides asynchronous service; that is, the user sends the message and receives an answer at a later time. The user can usually find a link for the e-mail service on the library’s web page, with a form to fill out. Some libraries and AskA services provide archives where the most commonly asked questions can be found. When a query is sent, the system automatically matches the question with the information in the archives. Although 63 percent of the questions can be matched, only 25 percent of the users find their requests properly answered (Pomeratz et al. 2003).

The questions that are sent are saved on a campus mail server, and librarians rotate the task of answering them. In general, e-mails are checked once or twice a day, and if a question requires complex information, it is forwarded to a library subject specialist (Peterson, personal communication, March 12, 2003). When providing digital reference, librarians must maintain a professional attitude. They should always include a greeting, identify themselves properly, make sure their messages are clear and free of errors, and avoid the use of abbreviations and emoticons.

The major problem in providing digital reference using e-mail is the inability to do a thorough interview. It takes several communication efforts between the librarian and the user to make sure that the information provided answered the user’s question. Ideally, the e-mail reference interview should consist of three e-mails, the first one sent by the user with the question, the second sent by the librarian with the information, and the last sent again by the user confirming that the information received satisfied his/her question (Viles, 1999; Archer & Cast, 1999).

In order to conduct an effective e-mail interview, Abels (cited in Archer & Cast, 1999) suggests using one of two methods. With the first method, the patron is required to fill out a form specifying any limitations they have such as language, due date, or amount of information. The second approach requires the librarian to respond to a question that is not clear with a list of questions that will help the librarian find the appropriate information. The second approach requires more time of the librarian’s time, and there is no guarantee that the user will want to answer the questions required to help them. In fact, according to Carter and Janes (cited in Pomerantz et al., 2003), 30 percent of users

who are asked to provide more explanation of their query never answer. Moreover, only 17 percent of librarians can establish if the communication is a follow-up or a new question because often the user fails to provide conclusive information (Pomerantz et al., 2003).

Chat Reference

In an academic library, students are the primary users of digital reference, and they tend to prefer chat reference service over e-mail because it involves a two-way conversation in real time, very much like talking to a reference librarian in person. Chat users can receive immediate feedback, thus they can use written language in the same manner used in a person-to-person conversation (Riva & Galimberti, 1997).

There are several chat systems libraries can choose from; the most widely known are 24/7 Reference, LSSI – Virtual Reference Toolkit, and QuestionPoint. Although these types of services are commonly associated with a 24-hour-a-day, seven-days-a-week service, they can also be modified to offer reference service at specific times. As with e-mail service, typically a link from the library's main page will direct the user to the service. Janes, Carter and Memmot (1999) report that half of the libraries they surveyed had a direct link from the library's homepage.

The first step in asking a question using a synchronous reference service is for the user to complete a login screen. Some libraries only allow users from their institution to use the service, thus identification is required. In all of the chat services currently in use, the users are cautioned not to use the refresh or forward buttons, as they will be disconnected from the chat session. After the question has been sent, the software notifies all of the librarians who are online and monitoring the queue, and the first available librarian answers the question.

In answering questions online, librarians use the same criteria used at the reference desk. Librarians who work with digital reference tend to prefer web-based or electronic sources because they are easier to access and to share with the user (McGlamery, personal communication, March 19, 2003), in fact, in 80 percent of the cases librarians are helping users without the use of print sources (McGlamery, cited in Kenney, 2002). Users want more online resources, including access to full text material and not just abstracts. Malinconico (1992) states that because of this new need, many academic libraries have begun to budget more money toward digital reference rather than print sources.

Chat differs from e-mail because it provides real-time help. Although there may be multiple communications between the user and the librarian, using chat they are completed in the same session. As with e-mail, if the librarian cannot satisfactorily answer the request of the user, he/she can forward the question to a specialist who will get back to the patron. In this case, the patron will need to provide an e-mail address or other form of contact. One important skill that a librarian working with this type of service must develop is to keep the interview short to prevent the users from becoming

bored or the system from logging off (Coon & Wojtowicz, 2002). This can be a challenge since the average time of an interview in a digital setting is ten minutes (Janes, 2002). That may not be long in a face-to-face setting, but online it seems an eternity.

With chat, librarians can use a variety of tools to facilitate communication with the patron. One of the most important features in chat reference is the use of software with the ability to co-browse. This feature allows the librarian and the user to communicate while viewing the same web pages. To respond quickly, the librarian can also use pre-written messages. These messages involve typical greetings and sign off texts and are used to reduce the time and typing involved in the reference interview. Other features include the ability to highlight text on the user's screen, as well as screen sharing, where the librarian can view the user's screen, and share forms, where the user has the capability to see what the librarian is typing while doing the search.

Implications of Digital Reference

Digital reference provides an unprecedented type of service. The academic community and libraries around the country welcome it; however, as with all innovation there are questions. Some important ones relate to staffing and training, policies, legal issues, and assessment of digital reference.

Digital reference has raised expectations about the availability of service. When libraries offer digital reference, they must consider the expectations of the users. Students, in particular, expect to be able to find help anytime. As with in-person reference service, librarians and libraries must strive not only to provide the best service to their users but also to teach patrons how to use resources available to them. In order to provide a service with such standards, adequate staffing and training must be taken into consideration.

Not everyone sees this new service as necessary. Some librarians are questioning the need for such service, if it provides the same quality as person-to-person reference, and they wonder how librarians can manage this added task in their workload (Stover, 2000; Coon & Wojtowicz, 2002; Tenopir & Ennis, 1998). Digital reference requires not only reference service but also assistance in using hardware and software (Tenopir, 1998). These demands can cause librarians to experience physical and psychological distress, more commonly referred to as "technostress," the inability to cope with greater demands of service and increased use of computer-based technology (Kupersmith, 1992). To foster knowledge, connect people with information, and promote the library, librarians must continue to evolve and learn. In order to promote information and access to information, librarians will constantly need to stay up to date with technology, because "[t]here will be no place... for librarians who are not willing to interact with technology" (Zink, 1991, p. 76).

To lighten some of the burden that digital reference may bring, some suggest using a system that will draw from a database of questions. However, this type of software has a relatively low rate of success because the computer is not able to "think"

like a human. Dilevko (2001) suggests creating call-centers that utilize paraprofessionals to answer general questions, but this creates two problems. First, it may decrease the use of professional librarians, and secondly, teaching information literacy skills is an important component of reference service, and most paraprofessionals are not trained to do this.

The main purpose of reference service is to help users find information. In a virtual environment, users need to be able to understand how digital reference works and, especially, how to use it. Librarians should experiment with the type of software they want to use, and make changes accordingly. For example, North Carolina State University had to modify its digital reference service because the system was too complicated for the patrons to use (Boyer, 2003).

Policies must be flexible enough to allow for the changing needs of the users and technological developments (Kasowitz, Bennett & Lankes, 2000). These policies, according to Sloan (1997), should include when the service is available, what the service provides, and who can access such service, for example the public or only the academic community.

Another consideration is the costs involved in establishing and maintaining the service, which include software, hardware, technical support, and staff training. Prices vary and libraries should shop around. For example, Susan McGlamery (personal communication, March 19, 2003) of 24/7 states that the cost of their software is \$4,000 per seat set-up, and \$3,600 per seat per year thereafter for support and maintenance, with a one-time charge of \$1,000 for training. The training, adds McGlamery, is for any number of librarians who want to participate, while the annual license fee depends on how many librarians are logged on simultaneously to answer questions. Although librarians can receive excellent training by vendors, Eisenberg and McClure (2000) emphasize that digital reference training must have some standard guidelines and that training needs to begin in library school. Not all librarians may be suited to work with computer-based services. Librarians may find it useful to develop aptitude tests to discern whether a reference librarian has the personality to work with this type of service (Abbas, 1997).

Digital reference also provides the opportunity to collect data for statistical purposes. It may also collect contact user information in case a librarian needs to provide more information to a user. However, collection of this type of information can lead to abuse or dissemination of private information. Access to personal information has become an important issue for librarians, especially after the enactment of the USA Patriot Act in 2001. Librarians may be asked by the federal government to supply information about users' library activities. To avoid potential problems, academic libraries should develop and post privacy policies, as some public libraries already do. One example of such policy is posted on the web page of [Internet Public Library](#) (2003). Kasowitz, Bennett and Lankes (2000) provide additional standards on how to develop such policies.

One of the most pressing issues surrounding digital reference is effectiveness. There is not enough data to ascertain how well digital reference works or whether it is as helpful as person-to-person reference. Eisenberg and McClure (2000) emphasize that librarians must develop a set of criteria for user satisfaction, because right now there is no way of knowing if the service is effective, if people like it, and if people return to use it. Without this information, it will be difficult to improve reference service.

The Future of Digital Reference

There are mixed feelings in the profession of librarianship about what the future of digital reference holds. Some librarians feel that it reference will fade away, while others think it is here to stay and will evolve. The general feeling is that digital and traditional reference services will coexist (Straiton, 1999). Oder (2001) points out that both services are needed because each provides a specific type of service. For example, questions that require more interaction and are detail-oriented are better handled in person, while ready-reference questions are better suited to chat, and questions that require longer research are best answered using e-mail. Providing this variety of reference services is important, since patrons process information in different ways. As technology becomes more sophisticated, libraries will use more and more digital reference. Users like to have access to the Internet. It is convenient and many students have practically grown up using online services. The move toward a more digital society is apparent in libraries. Straiton (1999) notes that as time goes by, the term “reference service” has mutated from “reference” to “reference and information service” and finally to “information systems and technology”. This interest in moving toward a more technological culture is also reflected in the increased number of computers available in academic libraries, which increased 14 percent between 1994 and 1997 (Tenopir & Ennis 1998). As technology continues to bring new tools into our lives, digital reference must keep up with the pace.

Because librarians will need to rely more and more on material found online rather than print sources, there is an urgency to convert information into digital format. Providing patrons with online resources will soon not be enough, librarians and users want more interactivity. One of the major requests made by reference librarians to vendors is to have the capability to scan material in print and send a PDF to the patron (Kenney, 2002).

Another trend that will become more common in the future is that academic libraries will become part of larger consortia in which information is shared among all participants (Malinconico, 1992; Kawositz, 2001). Beside providing around-the-clock service, libraries will be able to decrease their collections budgets and take advantage of special collections provided by other libraries. Because of the need to share information, new policies must be developed to address all aspects of digital reference, such as standard vocabulary for answering questions, copyright, privacy, charges, what materials can be used by each library, and so on.

Among the innovations that reference librarians want are the ability to conduct videoconferences (Oder, 2001; Eisenberg & McClure, 2000), to have wireless hand-held computers to allow movement around the library (Lipow, 2003), to provide Voice over Internet Protocol (VoIP), as well as to develop systems that are compatible with assistive technologies for those with disabilities, to allow them to access and receive the same level of service (McGlamery, personal communication, March 19, 2003). Will the reference librarian of the future be able to talk to and see the patrons, walk around the library showing resources, and scan and send information from in-print and online sources? Only time will tell. Digital reference is in its infancy and anything is possible.

Conclusion

With the arrival of the Internet, libraries are expanding into cyberspace and are reaching out to segments of the population that otherwise would not use a library. Even though librarians must adapt to new technologies, the notion of providing reference service, first mentioned in Green's paper in 1876, will not change: reference librarians will continue need to reach out to patrons and help them find and use information.

Digital reference service has introduced new opportunities as well as challenges for librarians, users, and vendors. Librarians should embrace this challenge and seek out new and improved methods to provide reference service.

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