

# Information Use Management and Policy Institute

## **Assessing Quality in Digital Reference Services: Overview of Key Literature on Digital Reference**

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**Melissa Gross** <mgross@lis.fsu.edu>  
Assistant Professor and Senior Research Associate

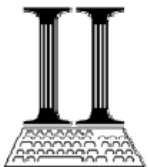
In association with  
**Charles R. McClure** <cmclure@lis.fsu.edu>  
Francis Eppes Professor, and Director

School of Information Studies  
Information Use Management and Policy Institute  
Florida State University  
Tallahassee, Florida 32306

and

**R. David Lankes** <rdlankes@ericir.syr.edu>  
Assistant Professor, and Director

Syracuse University  
Information Institute of Syracuse  
Syracuse, NY 13244



School of Information Studies  
Florida State University  
**Information Institute**  
<http://www.ii.fsu.edu>

This paper offers a preliminary review and discussion of the key literature available on the subject of digital reference service in libraries. Its objectives are:

- To determine the current status of digital reference in libraries.
- To identify current issues in the practice of digital reference.
- To identify areas in which research is needed to further advances in digital reference services in libraries.
- To inform the development of evaluation methods for digital reference services.

### **Procedure and Scope**

The literature review utilizes the work of Bernie Sloan (2000) and Joanne Wasik (2001) who have both compiled major bibliographies in this area. These bibliographies were collapsed, duplicates removed, and the resulting list augmented with searches of the ERIC, Lib Lit, LISA, and INSPECT databases to ensure that all publications on this topic have been identified and retrieved.

The scope of this literature review includes articles and conference presentations in both print-based and electronic media and technical reports on the subject of digital reference service in libraries. For the purposes of this work, “digital reference is defined as human-intermediated assistance offered to users through the Internet” (McClure and Lankes, 2001). While the provision of digital reference service can certainly be informed by research on traditional reference services, electronic resources and search procedures, expert systems, and the literature on digital libraries, literature on these topics is included only to augment discussion. Further, not all of the literature identified is quoted here. Rather many of the findings are summarized and key findings and issues are highlighted.

The task of reviewing the literature of digital reference will continue through the completion of the Assessing Quality in Digital Reference project and this document will continue to be revised and updated as needed to reflect the current state of the literature for the duration of the project.

### **OVERVIEW OF DIGITAL REFERENCE SERVICE IN LIBRARIES**

In assessing the state of the literature as a whole, it can be generally stated that the majority of what is available on the topic of digital reference service is anecdotal (of the “this is how we did it in our library” variety) or editorial in nature. Less of what has been written on this topic can be considered “research” in the formal sense. Discussion concerning the evaluation of digital reference services is also limited. While reference services are a well-established part of the traditional library environment, the provision of reference service in the digital realm is still very much in a formative stage. Peters (2000) makes an analogy between the evolution of traditional library services and the development of digital library services by observing that in both cases initial interest centered on the provision of collections. Once these were somewhat in place, the provision of document surrogates became the center of attention. Only after these issues began to be addressed did interest in services begin to move center field. In this vein, it appears that discussion and experimentation with library services in the digital realm has begun, but there are still many issues, both practical and theoretical, that must be addressed to understand what the issues and needs are and to create true state-of-the-art services that meet user needs and can be professionally planned for, managed, and evaluated.

#### **Digital Reference Service in Libraries**

It appears that academic libraries were the first to provide digital reference services and that these services began in the early 1980s. Weise and Borgendale (1986), Howard and

Jankowski (1986), and Bonham (1987) all report on the provision of email reference services and make observations and predictions that remain valid today, including the understanding that the proliferation of digital reference was dependent on the adoption of computer technology by users, and that movement toward a computer on every desk would likely feed demand.

Since that time, the number of academic and public libraries offering email reference continues to grow making email the most common vehicle for providing digital reference services.<sup>1</sup> However, experience has shown that there are several limitations inherent in trying to provide service this way. For instance, the idea that users would provide better formulated questions if they wrote them out has not generally turned out to be true, and the process of question negotiation via email is rather bulky and time consuming (Abels, 1996; Ryan, 1996; Schilling-Eccles and Harzbecker, 1998). This realization eventually led to a second standard of service in which a web form interface is typically used to solicit specific information about questions from users and to limit digital reference requests to ready reference questions (Abels, 1996; Haines, 1999; Sloan, 1998). Both of these measures appear to be effective in minimizing the email traffic required to answer a query. However, librarians do report that it takes longer to answer a user's query when it must be text based, than it does to respond to a similar query orally in a traditional reference desk setting (Ryan, 1996).

A lot of what is known about the provision of digital reference services comes from the experiences of those involved in the development, ongoing refinement, study, and assessments of the Internet Public Library (IPL). The IPL began in 1995 as a class project at the University of Michigan. The interested reader can find several useful overviews of its development in Ryan

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<sup>1</sup> The interested reader can find a list of libraries that provide email reference at <http://www.lis.uius.edu/~bsloan/e-mail.html>.

(1996), Janes (1998), and Janes et al. (1999). Articles pertaining to specific aspects of the IPL are included in the discussion points below.

### **Current Trends in Digital Reference Service**

Although email remains the main vehicle for digital reference services in libraries, libraries are currently experimenting with various applications that provide synchronous interaction between the user and the librarian.

Several libraries, including the University of Michigan; University of California, Irvine; and a joint project with University of California, Berkeley and North Carolina State University, report undertaking synchronous digital reference using video conferencing, but these experiments have not been largely successful (Folger, 1997; Lessick et. al, 1997; Morgan, 1996). Problems include low levels of utilization by users, the fact that most users and libraries do not own the equipment and software necessary to support this service and show little inclination to acquire it, problems with bandwidth when the videoconferencing is available, and self-consciousness on the part of users to being visible on screen.

However, interest in other forms of synchronous services continues. For instance the IPL reports on reference provided in a Multi User Object Oriented environment (MOO) and the use of various types of chat programs and software adapted from the commercial sector, such as Customer Relations Management (CRM) systems, are increasingly being described in the literature (Coffman, 2001a, 2001b; Eichler and Halperin, 2000; Gray, 2000; Horn, 2001; McGlamery and Coffman, 2000; Shaw, 1996; Stormont, 2001). It appears that libraries in increasing numbers are adopting chat reference. Francoeur (2001) reports that as of April 2001 272 libraries had a chat reference service in place. These chat services are not replacing email or

web form reference, they are supplements to it that tend to be offered a limited number of hours a week.

Another recent trend in academic, public, and government libraries is interest in the idea of collaborative relationships with other libraries to provide various types of digital reference services. Francoeur (ibid.) reports that 77 percent of the 272 libraries he identified as having chat reference provide the service as part of a consortium agreement. Libraries are also participating in these agreements in order to develop of 24/7 reference service. Representative projects in this vein include:

- The Virtual Reference Desk (VRD) project, which is a network of organizations that share expertise in providing human intermediated question and answer services on the web (VRD, 2000).
- The 24/7 Reference project currently under way at Metropolitan Cooperative Library System (MCLS) in California (McGlamery, 2000).
- The Collaborative Digital Reference Service (CDRS) project headed up by the Library of Congress (Kresh, 2000).
- The Ready for Reference Service under development by the Alliance Library System in Illinois (Sloan, 2001a, 2001b).

However, even as experiments in providing 24/7 reference are getting started, some are beginning to question the need for such extended service in every library environment. Sloan in his final report on the Ready for Reference project notes that, “the wee hours of the morning (1 AM to 6 AM) don’t generate much activity at all” and he questions the need for both 24 hour and seven days-a-week service for these libraries (2001b).

### **General Management of Digital Reference Service**

For the most part, libraries that provide digital reference services report they receive relatively few requests from users. This is in high contrast to the volume of questions received by non-library providers on the web. For instance, Carter and Janes (2000) report that the IPL receives over 1,000 questions a month, but this number is quite minimal compared to reports that Ask Jeeves receives 3 million queries each 24 hours and that WebHelp received 1.2 million queries on the day it opened (Tomaiuolo and Packer, 2000). Even the most successful digital reference services in libraries get nowhere near these numbers. Rather, libraries report numbers in the 26 to 56 *queries per month* range in academic libraries (Botts and Bauerschmidt, 1999; Bushallow-Wilbur, DeVinney, and Whitcomb, 1996; Folger, 1997; Hodges, unpublished manuscript). In public libraries the volume of digital reference questions is reported at “a mean of 5.6 email reference questions per week; the modal or most frequent response was 3 questions per week” (Garnsey and Powell, 2000).

Recent accounts of digital reference services indicate that libraries are becoming more in touch with the need to make services visible through continued promotion and publicity (Marsteller and Neuhaus, 2001; McLean, 1999; Wilson, 2000).

The volume of questions received by a library’s digital reference desk is an issue that is worth keeping in mind in assessing the literature. For instance, a lot of what is written about

digital reference service is editorial in nature or written with the goal of sharing anecdotal experience with other information providing organizations interested in starting a digital reference service. Most of these “case studies” fail to address issues like incorporating the development of digital reference services into the library’s formal planning, user needs and/or community needs analysis, staffing and training issues, service efficiency, institutional benefits from providing this service, or how to properly measure or assess digital reference services. This may be the result of the minimal impact digital reference service has on these environments. The addition of an extra 50 questions a month is unlikely to tax any reference desk, even a desk in a small library. Perhaps the absence of strong demand on the systems within the organization that provide digital reference works against furthering study and consideration of many of the questions the profession has about how to best plan for, process, and evaluate digital reference services.

### **The Economics of Digital Reference**

There is a major gap in the literature on digital reference services in the area of economic models and accounting. This may follow largely from the fact that the economic and costing models have not been fully developed in the traditional reference realm. This means that effective measures of cost need to be developed for all types of reference so that each can be assessed and compared in terms of efficiency and benefit.

In the literature of traditional reference services some approaches are offered toward the problem of determining what reference service costs. For instance, the Input/Output Model (Sayre and Thielen, 1989) focuses on measuring inputs and service utilization in small libraries. Functional Cost Analysis (Abels, Kantor, and Saracevic, 1996), a process explored in a variety of reference service environments, seeks to define the various costs of providing a service and then



allocates these costs to that service. Hayes (1996) reports on the intricacies of assessing the costs related to the provision of electronic resources in support of reference within the framework of the Library Costing Model (LCM), but does not solve the problem for digital reference services.

Murfin and Bunge (1989) offer four methods for assessing cost effectiveness in academic libraries. They are:

- Method One: Formula for Determining the Full Cost of the Reference Transaction.
- Method Two: A Reference Service Cost Effectiveness Index Based on Success, Helpfulness, Accessibility and Time/Cost.
- Method Three: Cost (time taken) per Successful Question.
- Method Four: A Cost Benefit Formula. (p. 17-35)

These formulas were tested in academic libraries in a project funded by the Council on Library for research purposes and used in the Wisconsin-Ohio Reference Evaluation Program. There may be value in using this work as a starting point for addressing the current issue of how to evaluate digital reference services from a cost standpoint.

Cost issues also exist in the development and practical management of collaborative arrangements for providing digital reference services. As collaboration models form, the question of how to share the costs of providing 24/7 digital reference services, in what will inevitably be a global forum, has already come to light as an issue that will soon need resolution. In this regard the library of Congress CDRS project will be interesting to watch as it learns how to share the cost of service among its members and finds its place in the information market.

## **Staffing the Digital Reference Service**

Staffing for digital reference and the distribution of the digital reference workload are being handled in a variety of ways. At the IPL, reference questions are classified by subject and then staff members claim the questions they want to tackle (Ryan, 1996). At Rutgers University and the University of California, Irvine they use a team model in which designated staff handle digital reference queries (Borisovets, 1998/1999; UCI Libraries 1999). At both Rutgers and at the IPL, staff members are encouraged to read the questions received by the service (and the answers) but to select only questions in their area of expertise to respond to. In these and other libraries there is a separate or select staff that provides digital reference services, but with the exception of the IPL, which is mainly staffed by volunteers, the digital reference staff is normally part of the general reference staff. They do not perform digital reference on a full time basis. At other libraries staff performs both traditional and digital reference while at the reference desk (Botts, 1999). In a study involving video conferencing the staff treated digital reference requests like telephone calls, giving preference to the face-face user at the desk (Folger, 1997).

The variety of approaches to staffing reflects the experimental nature of the digital reference services reported in the literature and also the minimal demand placed on these services in terms of the volume of questions received. However, the move from asynchronous to synchronous reference, with the spreading adoption of chat reference in libraries is changing this. New staffing issues are erupting based on the special demands of this mode of service; even though chat reference tends to be offered only a few hours a day and does not necessarily attract a huge volume of users.

The literature appears to be moving toward a consensus that chat reference needs to be performed in a space away from the physical reference desk, even if this means hiring additional personnel (Boyer, 2001; Coffman, 2001b; Marsteller and Neuhaus, 2001; Stormont, 2001).

Librarians are reaching this conclusion because they find chat reference service more demanding to provide. Not only does chat lack the physical clues of expression and body language, but because of its real time nature, librarians worry about being able to respond quickly and concisely enough in type and about being away from a user too long as they research a question.

There are also many technology issues that librarians grapple with in using chat. They complain of users getting bumped off or leaving before the session is completed (Marsteller and Neuhaus, 2001). Librarians also complain about incompatibility between the software and proprietary databases, the high need for multi-tasking skills to handle multiple questions and resources at a time. Coffman (2001a, 2001b) and Francoeur (2001) provide excellent discussions of the various chat software products being used in libraries describing their functionality, strengths, and weaknesses.

Another development is the appearance of “outsourcing” in digital reference. One of the solutions to the problem of staffing for 24/7 reference is to pay someone else to do it. Sloan (2001b) provides an example of such an arrangement in which Library Systems and Services Inc. (LSSI) is used to provide reference services during time slots when regular library staff are not available. The potential outsourcing of services has also been discussed by others who predict the development of subscription services libraries might use to extend service hours or provide service during the graveyard shift (Francoeur, 2001). Another approach to this problem is to share the expertise of library staff through consortium and networking arrangements where librarians in different time zones can pick up off-hours requests for service or provide needed

subject specialty expertise for an otherwise difficult to answer question. This can almost be viewed as a kind of “interlibrary loan” where instead of materials; it is the librarian’s skill and expertise that is shared.

### **Staff Training for Digital Reference**

It appears that librarian’s reference skills are readily transferable to the needs of digital reference work, and some authors make the point that indeed, traditional reference must form the basis for the provision of reference in the electronic realm (Frank, 1999; Kasowitz et al., 2000; Wasik, 1999). However, digital reference is also shown to require additional procedures, skills, and training. For instance, Abels (1996) offers a new model for reference service performed via email, suggesting the use of a search request form and a minimum level of interaction between user and librarian to ensure the successful transaction of the email reference query. Further, the VRD network requires, as one of its quality standards, that information specialists receive training in how to respond to user queries and in the organization’s policies and procedures for providing digital reference services (Kasowitz et al., 2000). It is important to note that these reports on problems and successes in providing digital reference refer mainly to questions received via email and web form submissions.

The emergence of chat brings with it new demands and calls for an increased skill base that email did not generate. Specific skills librarians need to perform chat reference as outlined in the literature include:

- **Keyboarding skills.** Chat requires librarians to be fast and accurate on the keyboard (Stormont, 2001).
- **Ability to multitask.** In a chat session a librarian may have multiple windows open that he/she is actively using, may need to deal with more than one

question/user at a time, and may be responsible for telephone and walk-in reference as well. Strategies are needed to prepare librarians to cope with this reference environment (Boyer, 2001; Francoeur, 2001; Horn, 2001).

- **Better than average searching skills.** Librarians tend to find chat reference stressful. The work is fast-paced and librarians need to be able to locate responses quickly (Boyer, 2001; Horn, 2001).
- **Writing concise messages.** The medium is not conducive to long messages, nor does it allow the librarian to take a lot of time to compose a response. The use of scripts or other pre-formulated text can help, but cannot do the job completely (Boyer, 2001; Stormont, 2001).
- **Ability to deal with stress and demanding users.** The synchronous quality of chat reference may have the effect of increasing expectations about service on the part of both librarians and users. The medium is instantaneous and at the same time somewhat bulky and slow leading to a reference interaction that is more intense than traditional reference typically is (Coffman, 2001b; Francoeur, 2001; Horn, 2001; Stormont, 2001).

### **The Digital Reference Model.**

While digital reference service has its roots in the traditional reference desk model, when reference is placed in the electronic realm one effect is that some aspects of reference service that previously received little attention become more visible. For instance, the fact that both the user's question and the librarian's response can now be recorded and stored allows for service enhancements that have the potential to make reference more efficient. One of the innovations of the CDRS project is the incorporation of question/answer sets resulting from digital reference

transaction to develop a knowledge base that will be searchable and may shorten response time or allow for the automation of responses to redundant questions posed to the system (Kresh, 2000). The potential for automating responses, providing canned responses, developing frequently asked question (FAQs) pages, and using this data in the development of expert systems and intelligent agents has yet to be fully explored, but will likely impact how reference services are delivered in the future.

The Digital Reference Model developed by Lankes (unpublished paper) adds efficiency to the process by including a triage step in which questions are sorted and sent to the appropriate expert for handling as they are received, expediting the handling of questions and saving staff time that might otherwise be spent redirecting requests to the appropriate station. Concern about the efficient routing of questions in traditional reference service in staffing models is sometimes referred to as a tiered approach (Mardikian and Kesselman, 1995). Under this model non-professional staff is utilized to respond to directional questions and questions about the library's operation and may also answer simple or commonly asked questions. Lower level staff is responsible for identifying which questions require the librarian's expertise and for directing users to the librarian when their expertise is needed. This allows for more efficient use of the librarian's time, which can then be focused on patrons who need more help defining their information needs, locating information that is difficult to find, providing instruction, and working on the development of systems and resources. A version of the triage idea is incorporated into the CRDS Request Manager software, which matches incoming questions with the appropriate member institution (Kresh, 2000).

Lankes' Digital Reference Model is also important because it emphasizes the usefulness of the intellectual products produced by librarians in the process of providing reference.

Traditionally these products have included the development of bibliographies, pathfinders, instructional materials, and note cards indicating sources for particularly difficult or often asked questions. These products can now be captured and made more easily accessible to users and other information professionals. It may be that in the future reference librarians will spend more time developing these and other intellectual products that enhance access.

### **Digital Reference and the User**

A major gap in this literature is the inclusion of the user in the design and development of digital reference services. While benefits to users, such as convenience (Garnsey and Powell, 2000) and the extension of service to users that are homebound or otherwise unable to visit the physical library, are discussed (Abels and Liebscher, 1994), there is little evidence that users have been consulted in the design and development of digital reference services. Rather, the understandings supplied about digital reference users come mainly from analysis of question logs and a few small surveys of current digital reference users asking about satisfaction with the digital reference services provided by the library.

This oversight is hard to reconcile. In a review of the user studies literature published in 1986, Dervin and Nilan heralded a change of paradigm in the field from a system orientation to a user orientation, documenting dissatisfaction with design, development, and evaluation techniques that are system based and that result in a reification of services the library provides that are uninformed by user needs and preferences. Likewise, the program and service development literature in the field has long promoted planning processes that include user needs and community analysis as an important step in determining the services a library will provide (Bolt and Stephan, 1998; Himmel and Wilson, 1998; McClure, 1980; McClure et al., 1987).

However, the developments reported in the digital reference literature largely ignore these views. Rather, the development of digital reference services appears to be largely system driven and based on the interests and vision of the service providers. Gray (2000) points out the need for libraries to re-evaluate who is included in their community, now that the Internet has made geographic service areas less relevant. This further emphasizes questions like, whom the user is that digital reference services are being designed for and how the needs of this user are being determined?

Digital reference service does have the potential to expand the way libraries think about their service areas, but most academic and public libraries are funded locally and have missions that direct them to serve a defined community. Market place demand for digital reference services must be established first within these communities and user input solicited to help libraries establish what services are desired, what modes of delivery user prefer, and how to make the service visible to potential users.

### **Evaluating Digital Reference**

The evaluation of digital reference is another underdeveloped area in the literature. While a variety of viewpoints are available in the literature concerning how evaluation should be approached from a conceptual point of view, there are few people actually undertaking this task. The points of view offered on how the evaluation of digital reference services might be conceived run the range of those who feel that evaluation techniques can be borrowed from traditional reference (Kasowitz, Bennett, Lankes, 2000), to those who feel that digital reference requires a new approach to be properly evaluated (Saracevic and Covi, 2000), to the view that meta-assessment is needed now, before this service has totally evolved, to allow for the creation of a service that is not tied to traditional conceptions of what reference service is (Peters, 2000).



There are also pragmatists that have laid the groundwork for structured and well thought out approaches to the question of assessment. White (1999), at the University of Maryland, has developed a scheme for analyzing question and answer services, including digital reference services, which is quite comprehensive in scope. The VRD has created a set of standards called “Facets of Quality” that clearly define what quality service means for participating organizations, and further, defines levels of participation that not only maintain a bottom line of quality service but also provide clear cut goals for service improvement (Kasowitz et al., 2000). The CRDS has adopted the Facets of Quality for Digital Reference Services Standards as the criteria its members will use for their quality review (Kresh, 2001).

An important element of digital reference services that is not yet explicitly recognized in the general literature on digital reference is that in moving to the digital realm reference service losing much of its ephemeral quality. Lankes, in his general reference model, acknowledges that the intellectual products of reference (finding aids, resources notes, etc.) can be captured and more widely shared in the digital environment (1998). However, many have noted, almost as an aside that when the digital reference transaction is complete a record of the email question and response remains, or there is a chat transcript, or that log analysis can be used to retrace and analyze the steps taken during the electronic transaction, and some reference software packages produce reports on the reference service. Coffman (2001b, p. 152) notes in a discussion of knowledge base development that “up until now there has been no easy way to preserve our work.” The presence of these records also point the way to evaluations of reference service and the librarian’s reference skills that were not previously feasible.

## **Evaluations of Digital Reference.**

The majority of the evaluation attempts reported are anecdotal, suffer from weak methods, and provide only a limited analysis of the service. The main strategies used are the analysis of question logs (Borisovets, 1999; Bushallow-Wilbur 1996; Carter and Janes, 2000; UCI, 1999) and user surveys (Bushallow-Wilbur 1996; Garnsey and Powell, 2000; UCI, 1999). These reports depend on small samples sizes and in the case of survey efforts, often have low response rates. The data provided in these evaluations and in the “this is how we did it in our library” literature are highly redundant. Findings from these studies are summarized as follows:

- Turnaround time tends to be shorter than organizational policy dictates.
- Users of the service are mainly the target audience for the service. For instance, the users of the academic library’s digital reference service are, for the most part, the faculty, students, and staff at that university.
- The majority of questions received are the type of query sought by the service, i.e. ready reference questions.
- The volume of questions received is minimal.
- The users who respond to questions about satisfaction with the service say they like it, though repeat use of these services appears to be minimal.

Sloan (2001b) recently reported a final analysis of the Ready for Reference collaborative 24/7 service provided by a group of academic libraries in Illinois. This work is descriptive in nature and focuses on understanding service utilization and workload issues and does not inform readers about the issues of quality of service, cost of service, or the impact of participating in this collaboration on other organizational activities.

There is much more that needs to be known about the provision of digital reference service in both stand-alone and collaborative efforts and how to properly evaluate it than the literature currently addresses. Issues of the accuracy of responses, appropriateness to user audience, the impacts of the digital reference process, the cost effectiveness of the service, and the overall efficiency and effectiveness of digital reference remain open questions. A common definition of what success and quality in digital reference is has not been achieved. Metrics and data are sorely needed that are practical in nature and designed specifically for libraries. In recent work on performance measures for networked services Bertot, McClure, and Ryan (2000) found evaluation in the digital environment to require the employment of multiple methods. The data such methods would yield are essential to support further service improvements and to substantiate resource allocation for digital reference services.

Fortunately, awareness of the need to develop strategies for formal evaluation and to collect this data is acute. This interest has found voice not only in the strategies shared above, but is also heard among the attendees at the VRD Annual Conference (McClure and Lankes, 2001), workshop attendees at the National Information Standard Organization (NISO, 2001), and in the efforts of the Assessing Quality in Digital Reference Services project.

### **KEY ISSUES IN THE CURRENT STATE OF DIGITAL REFERENCE**

Overall, developments in digital reference work have sprung from practice environments and tend to replicate traditional reference models in the electronic realm. These services have provided the field with some insights, but mainly in an anecdotal way. This review of the literature indicates that while interest in digital reference is strong, progress is hampered by a lack of economic models, strong evaluative research, and a lack of user input.

## **New Models of Reference Needed**

Clearly new service models are needed. No one is sure what “state of the art” reference service should look like or what quality in digital reference service means. It is most likely reference service will need to be provided through a variety of media and modes that include both face-to-face and remote services that are available in both synchronous and asynchronous forms. To achieve this there are many questions research needs to address and ideas concerning what digital reference service is need to be explored.

McGlamery and Coffman (2000) provide a rule of thumb from commercial sites that information on a company’s website should be able to answer 80 percent of the user’s questions. Can library web sites achieve this? Certainly the use of FAQs on websites, providing access to the intellectual by-products of the reference process, and increased use of intelligent agents and expert systems may provide a tiered effect that saves the librarian’s expertise for questions that truly require the training and expertise of a master’s level professional. But what is the right mix of these approaches and how are they best organized to provide optimal service?

Clearly, research is needed to inform the profession about what kinds of questions are best suited to what media and what questions can be handled adequately without human intermediation. The literature indicates that email reference works best for ready reference or simple factual questions that require few resources and can be stated in an unambiguous way. Instant messaging, video conferencing, chat programs, and applications from the commercial sector are all currently under investigation by libraries and will need to be fully evaluated for their utility in responding to the full range of user questions.

It is unlikely that these questions and many issues concerning system design can be fully resolved without input from the user. Opportunities have already been lost by not involving the

user in the process at the front end, before the system and service are designed. User input concerning how they see reference, what they want from reference, how they want reference delivered, what an acceptable turnaround time is, how to best market these services, and many other questions will provide invaluable insight and save a lot of time and expense.

### **New Economic Models Needed**

The economics of reference is an area that has long been neglected. Assigning costs to reference service is a complicated task but one that must be faced in order to realistically assess the true costs of doing business, to make assessments about the most efficient ways to provide services, and to determine how to share the costs of this service in setting up and participating in collaborative service models.

Understanding what it costs to provide reference, the various funding models (and cost recovery models) under which reference can be provided and what the effect of supporting digital reference is on other library expenditures, is important for planning, monitoring, and evaluating these services, as well for performing cost benefit analysis and measuring the cost effectiveness of service.

### **Management Issues**

Because of the ad hoc and experimental way digital reference has developed, there is little in the literature that informs practice on the management issues of planning, providing, and evaluating service. While there is evidence that some digital reference services are the product of committees or project teams, these efforts, as reported, do not appear to be part of the library's overall plan. Guidance is needed on how to incorporate the provision of digital reference into the library's planning process and to identify and include all the stakeholders needed to ensure its success. Data is needed to inform management on how digital reference fits into the array of

reference services the library offers, as well as in the development of policy and procedures to support the service. Managers need to know how to budget for the cost of developing and maintaining digital service under multiple service models and how to develop models of future costs. The question of how to train staff to support the digital reference service and how to evaluate personnel providing the service has not been fully addressed. Managers also need to know how to determine the benefits of service to users and to the library and how to anticipate future needs.

### **Issues in Evaluation**

As stated above, evaluations of digital reference suffer from a lack of adequate and innovative methods. It is unknown to what extent methods used to assess traditional reference will be effective in the digital reference environment. New techniques need to be explored to evolve our approach to evaluating digital reference and to permit comparisons between various reference service modes. McClure and Lankes (2001) propose four main types of measurement needed to understand and set benchmarks for digital reference services. These are:

1. **Outcome measures** (quality of answers): accuracy of responses, appropriateness to user audience, opportunities for interactivity, instructiveness, and impacts resulting from the digital reference process.
2. **Process measures** (effectiveness and efficiency of process): service accessibility, timeliness of response, clarity of service procedures, service extensiveness (percentage of questions answered), staff training and review, service review and evaluation, privacy of user information, user awareness (publicity).
3. **Economic measures** (costing and cost effectiveness of digital reference): the cost to conduct a digital reference session, infrastructure needed to support quality digital reference services, and impact of these costs on other library expenditures.
4. **User satisfaction** (degree to which users engaged in digital reference services are satisfied with the process and the results): satisfaction

indicators can include accuracy, timeliness, behavior of the staff, technical considerations, physical facilities, and others.

With the exceptions of timeliness (in terms of actual question turnaround as compared to organizational policy), some technical considerations, and some interest in user satisfaction, little is known in a formal way about the other measures they propose. Evaluations of digital reference service that provide usable measures and benchmark data in these categories and for the various forms of service delivery are sorely needed.

### **Affective Considerations**

Reference service is clearly in the midst of a transition fueled mainly by the proliferation of technology and communication formats. One feature of the literature that stands out is a sense of apprehension in the profession concerning the future and the perceived need to compete with commercial services. Falling statistics at traditional reference desks and fear of replacement through advances in technology also work as motivators for moving reference into the electronic realm.

But what can be interpreted as mixed feelings about service provision may also have roots in the economic models within which libraries exist. Kaufman (1995) and Abels, Kantor, and Saracevic (1996) point out that libraries generally manage zero sum budgets where an increase in reference costs means a decrease in some other area of the budget. McGlamery and Coffman (2000) project that if the County of Los Angeles Public library could provide a digital reference service that appealed to users and that was actively marketed, “it would more than double the reference load...and require double the staff, double the resources, and double the money.”

It appears that fear of the potential demand for digital reference and the new professional demands this technology brings are also professional issues that the field needs to deal with. The

experience of a low volume of traffic in digital reference is coupled with descriptions of services that are not widely publicized, not very visible on the library's web page, developed without user involvement, and only minimally evaluated. This review points out the strong need for libraries to be more proactive in planning, developing, marketing, managing, accounting for, and evaluating digital reference services if they truly wish to grow this service and compete with non-library providers on the Internet.

### **Directions for Research**

This preliminary review of the digital reference service literature shows how great the challenges are that face libraries that wish to extend their presence into the electronic realm. It reveals that there are many rich areas of research that need to be addressed and that will advance both the theoretical and the practice concerns of the field. In summary, research is needed that:

- **Defines digital reference service.** Is reference about providing answers, or giving advice on resources, or is it about teaching users to be independent in solving their information needs? Is it all of these things? Does it include every type of question? Do all questions posed to a service actually require human intermediation?
- **Provides definitions of service quality.** Quality criteria are needed for various library environments (academic, public, etc.), for various approaches (email, instant messaging, chat, CRM, etc.), and for assessing reference service as a whole within organizations.
- **Introduces the user's (and non user's) voice into the design and provision of digital reference.** What do people want from digital reference? What should digital reference services look like in terms of the technology required, services provided, and policies adopted if it is to meet real information needs? How can user satisfaction with digital reference services be meaningfully measured?



- **Provides appropriate economic models for digital reference services.** Answers questions like: What are the costs of doing business? What are the benefits and drawbacks? What reference models are most efficient economically? What is the level of demand for these services? How do libraries share the cost of services when engaged in collaborative agreements?
- **Helps libraries incorporate digital reference service into their overall organizational plan.** Provides data that facilitates library efforts to design, deliver, and budget for quality digital reference service. Informs management on staffing models as well as on how digital reference staff should be trained and evaluated. Provides insight on what policies need to be in place to support the provision of this service. Provides input on how to market, promote, and publicize electronic based services.
- **Demonstrates how digital reference services can be meaningfully evaluated,** providing multiple approaches, easily used methods, and related quality standards that address all aspects of service provision.

This future work is critical to supporting digital reference efforts, not only toward the design of better digital reference services and systems, but also to determine the means for their continuous improvement.

### **Resources Cited**

Abels, Eileen G. (1996). "The E-mail Reference Interview." *RQ* 35, no. 3: 345-358.

Abels, Eileen G., Kantor, Paul. B., and Saracevic, Tefko. (1996). "Studying the Cost and Value of Library and Information Services: Applying Functional Cost Analysis." *Journal of the American Society for Information Science*, 47: 217-227.

Abels, Eileen G., and Liebscher, Peter. (1994). "New Challenge for Intermediary-Client Communication: The Electronic Network." *The Reference Librarian* 41/42: 185-196.

Bertot, John C. McClure, Charles R., and Ryan, Joseph. (2000). *Statistics and Performance Measures for Public Library Networked Services*. Chicago: American Library Association.

Bolt, Nancy, and Stephan, Sandy. (1998). *Strategic Planning for Multitype Library Cooperatives: A Planning Process*. Chicago: American Library Association.

Bonham, Miriam. (1987). "Library Services through Electronic Mail." *College & Research Libraries News* 48, no. 9: 537-538.

Borisovets, Natalie. "Ask a librarian: Annual report 1998/1999." (1999). Available at:  
<http://newark.rutgers.edu/%7Enatalieb/ask9899.htm>

Botts, Carroll, and Bauerschmidt, Rebecca. "Reference issues exploration: Electronic mail reference service." (1999). Available at: [www.unm.edu/~rebs/emailref/paper.htm](http://www.unm.edu/~rebs/emailref/paper.htm)

Boyer, Joshua. (2001). "Virtual Reference at North Carolina State: The First One Hundred Days." *Information Technology and Libraries* 20, no.3: 122-129.

Bushallow-Wilbur, Lara, DeVinney, Gemma S., and Whitcomb, Fritz. (1996). "Electronic Mail Reference Service: A Study". *RQ* 35, no. 3: 359-63, 366-71.

Carter, David, and Janes, Joseph. (2001). "Unobtrusive Data Analysis of Digital Reference Questions and Service at the Internet Public Library: An Exploratory Study." *Library Trends* 49, no. 2: 251-265.

Coffman, Steve. (2001a). "So You Want to Do Virtual Reference?" *Public Libraries Supplement*: 14-20.

\_\_\_\_\_. (2001b). "We'll take it From Here: Further Developments We'd Like to See in Virtual Reference Software." *Information Technology and Libraries* 20, no.3: 149-153.

Dervin, Brenda, and Nilan, Michael. (1986). "Information Needs and Uses." *Annual Review of Information Science and Technology* 21: 3-33.

Eichler, Linda, and Halperin, Michael. "LivePerson: Keeping Reference Alive and Clicking." *Econtent*. (2000). Available at: [www.ecmag.net/awards/award13.html](http://www.ecmag.net/awards/award13.html)

Folger, Kathleen M. "Virtual librarian: Using desktop videoconferencing to provide interactive reference assistance." *ACRL 1997 National Conference Papers*. (1997). Available at: [www.ala.org/acrl/paperhtm/a09.html](http://www.ala.org/acrl/paperhtm/a09.html)

Francoeur, Stephen. (2001). "An Analytical Survey of Chat Reference Services." *Reference Services Review* 29, no. 3: 189-203.

Frank, Donald G., Calhoun, Katherine L., Henson, W. Bruce, Madden, M. Leslie, and Raschke, Gregory K. (1999). "The Changing Nature of Reference and Information Services: Predictions and Realities." *Reference & User Services Quarterly* 39, no. 2: 151-157.

Garnsey, Beth A., and Powell, Ronald R. (2000). "Electronic Mail Reference Services in the Public Library". *Reference & User Services Quarterly* 39, no. 3: 245-

Gray, Suzanne M. (2000). "Virtual Reference Services: Directions and Agendas." *Reference & User Services Quarterly* 39, no.4: 365-375.

Haines, Annette, and Grodzinski, Alison. (1999). "Web forms: Improving, Expanding, and Promoting Remote Reference Services." *College & Research Libraries* 60, no.4: 271-272.

Hayes, Robert M. (1996). "Cost of Electronic Reference Resources and LCM: The Library Costing Model." *Journal of the American Society for Information Science*, 47, 228-234.

Himmel, Ethel E., and Wilson, William. J. (1998). *Planning for Results: A Public Library Transformation Process*. Chicago: American Library Association.

Hodges, Ruth. (Unpublished manuscript). "Needs Assessment of Digital Reference Services at FSU."

Horn, Judy. (2001). "The Future is Now: Reference Service for the Electronic Era." In *Crossing the Divide: Proceedings of the Tenth National Conference of the Association of College and Research Libraries*, March 15-18, 2001, Denver, Colorado.

Howard, Ellen H., and Jankowski, Terry A. (1986). "Reference Services via Electronic Mail." *Bulletin of the Medical Library Association*, 74, 41-44.

Janes, Joseph. (1998). "The Internet Public Library: An Intellectual History". *Library Hi Tech* 16, no. 2: 55-68.

Janes, Joseph, Carter, David, Lagace, Nettie, McLennen, Michael, and Simcox, Schelle. (1999). *Establishing Online Reference Services: The Internet Public Library Handbook*. New York: Neil-Schuman Publishers.

Kasowitz, Abby, Bennett, Blythe A. and Lankes, R. David. (2000). "Quality Standards for Digital Reference Consortia." *Reference & User Services Quarterly* 39 no. 4: 355-63.

Kresh, Diane. (2001). Email correspondence with the author.

Kresh, Diane. "Offering high quality reference service on the web: The Collaborative Digital Reference Service (CDRS)." *D-Lib magazine*. (2000). Available at:  
[www.dlib.org/dlib/june00/kresh/06kresh.html](http://www.dlib.org/dlib/june00/kresh/06kresh.html)

Kulhman, James R. (1995). "On the Economics of Reference Service: Toward a Heuristic Model for an Uncertain World." In *Library Users and Reference Services*, edited by J. B. Whitlatch, NY: The Haworth Press, Inc., 25-43.

Lankes, R. David. (Unpublished manuscript). "Integrating Expertise into the NSDL: Putting a Human Face on the Digital Library."

\_\_\_\_\_. (1998). "Building and Maintaining Internet Information Services: K-12 Digital Reference Services." *ERIC Clearinghouse on Information & Technology*; Syracuse, NY.

Lagace, Nettie, and McClennen, Michael. (1998). "Managing An Internet-Based Distributed Reference Service." *Computers in Libraries* 18, no.2: 24-27.

Lessick, Susan, Kjaer, Kathryn, and Clancy, Steve. "Interactive Reference Service (IRS) at UC Irvine: Expanding Reference Service Beyond the Reference Desk." (1997). Available at:  
[www.ala.org/acrl/paperhtm/a10.html](http://www.ala.org/acrl/paperhtm/a10.html)

McLean, Michelle. (1999). "Expanding Library Service Beyond the Walls." *Australasian Public Libraries and Information Services* 12, no.3: 97.

- McClure, Charles R. (1980). "A Planning Primer for Online Reference Service in a Public Library." *Online* 4, no. 2: 57-65.
- McClure, Charles R., and Lankes, R. David. "Assessing Quality in Digital Reference Services: A Research Prospectus." (2001). Available at: <http://quartz.syr.edu/quality/Overview.htm>
- McClure, Charles R., Lynch, Mary J., Zweizig, Douglas L., Owen, Amy E., Van House, Nancy A. (1987). *Planning and Role Setting for Public Libraries: A Manual of Options and Procedures*. Chicago: American Library Association.
- McGlamery, Susan. (2000). "'Pushing' Reference." *Proceedings of the 15th Integrated Online Library Systems Meeting*, 111-117.
- McGlamery, Susan and Coffman, Steve. (2000). "Moving Reference to the Web." *Reference & User services Quarterly* 39, no. 4: 380-386.
- Mardikian, Jackie, and Kesselman, Martin A. (1995). "Beyond the Desk: Enhanced Reference Staffing for the Electronic Library." *Reference Services Review* 23, no. 1: 21-28.
- Marsteller, Matt, and Neuhaus, Paul. "The Chat Reference Experience at Carnegie Mellon University." (2001). Available at:  
[http://www.contrib.andrew.cmu.edu/~matthewm/ALA\\_2001\\_chat.html](http://www.contrib.andrew.cmu.edu/~matthewm/ALA_2001_chat.html)

Morgan, Eric L. "See You a Librarian Final Report." (1996). Available at:

<http://sunsite.berkeley.edu/~emorgan/see-a-librarian>

Murfin, Marjorie E., and Bunge, Charles A. (1989). "A Cost Effectiveness Formula for Reference Service in Academic Libraries." Grant No. CLR-4044. Washington, D.C.: Council on Library Resources.

National Information Standards Organization. "Report on the NISO Workshop on Networked Digital Reference Services." (2001). Available at: [www.niso.org/netref-report.html](http://www.niso.org/netref-report.html)

Peters, Thomas A. (2000). "Current Opportunities for the Effective Meta-Assessment of Online Reference Services." *Library Trends* 49, no.2: 334-349.

Ryan, Sara. (1996). "Reference Service for the Internet Community: A Case Study of the Internet Public Library Reference Division." *Library and Information Science Research* 18, no.3: 241-59.

Saracevic, Tefko, and Covi, Lisa. (2000). "Challenges for Digital Library Evaluation." *Proceedings of the American Society for Information Science annual meeting*, 37, 341-350.

Sayre, Ed, and Thielen, Lee. (1989). "Cost Accounting: A Model for the Small Public Library." *The Bottom Line*, 3: 15-19.



Schilling-Eccles, Katherine, and Harzbecker, Joseph. J. (1998). "The Use of Electronic Mail at the Reference Desk: Impact of a Computer-Mediated Communication Technology on Librarian-Client Interactions." *Medical Reference Services Quarterly* 17, no.4: 17-27.

Shaw, Elizabeth. "Real Time Reference in a MOO: Promise and Problems."(1996). Available at:  
[www.personal.si.umich.edu/~ejshaw/research2.html](http://www.personal.si.umich.edu/~ejshaw/research2.html)

Sloan, Bernie. "Ready for Reference: Academic Libraries Offer Web-Based Reference."(2001a).  
Available at: [www.lis.uiuc.edu/~b-sloan/ready4ref.htm](http://www.lis.uiuc.edu/~b-sloan/ready4ref.htm)

\_\_\_\_\_. "Ready for Reference: Academic Libraries Offer Web-Based Reference."(2001b).  
Available at: [www.lis.uiuc.edu/~b-sloan/r4r.final.htm](http://www.lis.uiuc.edu/~b-sloan/r4r.final.htm)

\_\_\_\_\_. "Digital Reference Services: A Bibliography." (2000). Available at:  
[www.lis.uiuc.edu/~b-sloan/digiref.html](http://www.lis.uiuc.edu/~b-sloan/digiref.html)

Sloan, Bernie. (1998). "Service Perspectives for the Digital Library Remote Reference Services."  
*Library Trends* 47, no.1: 117-143.

Stacy-Bates, Kristine. (2000). "Ready Reference Resources and E-Mail Reference on Academic ARL Web Sites." *Reference & User Services Quarterly* 40: 61-73.

Stormont, Sam. (2001). "Going Where the Users Are: Live Digital Reference." *Information Technology and Libraries* 20, no. 3: 129-134.

Tenopir, Carol, and Ennis, Lisa. "The Impact of Digital Reference on Librarians and Library Users." *Online*. (1998). Available at:  
[www.onlineinc.com/onlinemag/OL1998/tenopir11.html](http://www.onlineinc.com/onlinemag/OL1998/tenopir11.html)

Tomaiuolo, Nicholas. G., and Packer, Joan G. (2000). "Aska Do's, Don'ts and How To's: Lessons Learned in a Library." *Searcher* 8, no.3: 32-35.

UCI libraries. "R & I Division. Electronic Reference Services Team Report and Recommendations." (1999).

Virtual Reference Desk. "Facets of Quality for Digital Reference Services." (2000). Available at:  
[www.vrd.org/training/facets-10-00.html](http://www.vrd.org/training/facets-10-00.html)

Wasik, Joan M. "Digital Reference Resources." (2001). Available at:  
[www.vrd.org/pubinfo/proceedings99\\_bib.shtml](http://www.vrd.org/pubinfo/proceedings99_bib.shtml)

Weise, Freida O. and Borgendale, Marilyn (1986). "EARS: Electronic Access to Reference Service." *Bulletin of the Medical Library Association* 74: 300-304.

White, Marilyn D. (1999). "Analyzing Electronic Question/Answer Services: Framework and Evaluations of Selected Services." *CLIS Technical Report no. 99-02*. College Park, MD: College of Library and Information Services, University of Maryland.

Wilson, Marion. (2000). "Understanding the Needs of Tomorrow's Library User: Rethinking Library Services for the New Age." 13, no. 2: 81-86.