Rebecca B. Carlson. Virtual Reference at U.S. Academic Libraries: A Website Analysis. A Master's Paper for the M.S. in L.S. degree. April, 2012. 48 pages. Advisor: Chad Haefele

This study describes a website content analysis of virtual reference services at all U.S. academic libraries in the Association of Research Libraries (ARL). The study was conducted to determine the technology, terminology, visibility, accessibility, and design elements of virtual reference programs currently provided by academic libraries to their patrons. Analysis revealed that virtual reference is a widely popular service at ARL member libraries, though its application varies from institution to institution.

Headings:

Library reference services

Academic libraries -- Reference services

Electronic reference services (Libraries)

VIRTUAL REFERENCE AT U.S. ACADEMIC LIBRARIES: A WEBSITE ANALYSIS

By
Rebecca B. Carlson

A Master's paper submitted to the faculty
of the School of Information and Library Science
of the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements
for the degree of Master of Science in
Library Science.

Chapel Hill, North Carolina

April, 2012

Approved by

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Chad Haefele

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Introduction

Rapid changes in information technology over the last twenty years revolutionized academic library resources and services. As library users increasingly turned to the Internet for information retrieval, academic libraries responded by making more of their resources and services available electronically. This process is ongoing, but libraries have evolved into virtual as well as physical information centers. Their websites now link to full-text databases, online catalogs of books and multimedia resources, digitized materials, and other diverse electronic collections of information. As reference sources and research information moved online, libraries continued to try to provide point-of-need assistance, developing virtual reference services to offer real time research help to their online patrons. These virtual reference services have expanded in the last twenty years to become a popular emerging technology. This is particularly true at academic libraries, where a large portion of the patron population is students who prefer internet-based research to traditional library resources. Today, an academic library's website plays a key role in meeting patrons' information needs. Many librarians have recognized this and provide these numerous online patrons with instantaneous, virtual help.

Academic libraries' virtual reference programs differ widely in their features. Some libraries require users to log in to access a virtual reference program, others have patrons use their existing instant messaging accounts, and still others require no information or previous registration for virtual reference assistance. An examination of

the web presence of virtual reference services at academic research libraries in the United States will show the number of libraries that offer virtual reference and how libraries promote their virtual services via their web pages. The study will take into consideration the technology, terminology, visibility, accessibility, and design used by each library as methods of understanding the state of virtual reference today. Understanding how these libraries are incorporating virtual reference into their services will be beneficial for current information professionals, in order to understand the trends across academic libraries and see how the services can still be improved.

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Literature Review

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This analysis is guided by previous studies on website effectiveness, Web 2.0 tools, and virtual reference. Examining the arguments and outcomes of these studies will provide a strong background to this examination of the current state of virtual reference.

Website Effectiveness

More than ever before, it is essential for service-oriented businesses to have effective and efficient websites which allow them to successfully market their services, provide products, and communicate directly with their customers. Inés López and Salvador Ruiz, in their 2011 study on website effectiveness, state that "corporate websites are the most important tool in the communication process" because so much of modern communication takes place online (p. 49). Younghwa Lee and Kenneth A. Kozar (2012) argue that "developing usable websites is pivotal for e-business success," as without an effective website a business cannot conduct any online transactions or attract potential customers through the internet (p. 450).

Effective websites are not only necessary for commercial enterprises; they are also important for academic institutions as the face the school presents to the world. Kate Peterson (2006) wrote about the history of academic websites and how in the last twenty years they "have become a vital part of postsecondary institutions" (p. 217). The indispensability of academic websites stems from the young, online-oriented audience that higher education attracts, a group of students who have mainly grown up with computers and the internet and prefer to access information online (Granfield and Robertson, 2008). Because of this, colleges are placing as much material as possible online "to allow both prospective and current students to do what they need to do twenty-four hours a day" (Peterson, p. 220).

The purpose of academic websites, according to Peterson, is to "communicate the brand and mission of an institution," just as corporate websites wish to convey their trademark products (p. 217). As a central part of any academic institution's mission is to increase learning and conduct research, academic libraries are traditionally a large part of any college's physical or virtual presence. All studies of academic library websites highlight how "academic library Web sites are gateways to information that supports faculty and student research and educational needs" (Lui, 2008, p. 6). Academic librarians provide essential services to their institutions; consequently, libraries and librarians have been at the heart of campus since the establishment of modern universities. That status continues into the internet age at almost all institutions; Peterson found that academic libraries have "the most visited Web pages on a university's Web site" (p. 217).

Patrons have come to expect that they will be able to access their academic library's collections online and find information quickly and easily; Peterson reports, "More than 90 percent of students access the library from their home computers and 78 percent prefer this form of access" (p. 217). With such a high number of visitors to their webpages, the nature of an academic library's virtual presence is crucial. Even as a school's website presents the virtual face of their institution, "academic library Web sites are libraries' virtual presentation to the world" and should effectively market their resources and services (Lui, 2008, p. 6).

However, academic librarians cannot expect patrons to find their way to and through a complicated, unorganized library website. Lee and Kozar present this point from a business point of view: "consumers are turning away from unusable sites. The 'build it and they will come' attitude has led to the demise of several e-commerce sites which are too slow, too buggy, or too complex for ease of use" (p. 450). As Lee and Kozar aptly put it, "the usability of a website is a fundamental component of the entire user experience" (p. 459). If a website is not user-friendly it negatively affects both the user's attitude toward the website and the likelihood of that user returning to the website in the future (Lee and Kozar). López and Ruiz argue that not only do patrons want a website that is fast and simple to use, they also want the library's website to be enjoyable to use. Accessing a website is a subjective experience because "more than information, websites offer experiences that favor fun and entertainment, that is, the generation of positive emotions which, in turn, can affect attitudes and behaviors" (López and Ruiz, p. 49). Library websites can and should be fun and entertaining as well as informative and educational.

Academic librarians need to apply what the business community has learned and use it to shape their development of their websites. In short, "Librarians must be knowledgeable about Web site usability and trends in Web site design in order to communicate effectively" with their patrons (Peterson, p. 220). Peterson goes on to say that the primary reason for creating a well-designed, usable library website is so academic librarians can "advocate for library users and continue to help students and faculty access…the fantastic world of information available in today's academic libraries" (p. 220).

The question found across library literature is how to develop and maintain an effective website (Lee and Kozar, 2012; López and Ruiz, 2011; Peterson, 2006). What does an effective academic library website look like? There is no one answer that will work for all academic libraries, and in general there is "a lack of consensus" among theories of what components make websites usable (Lee and Kozar, p. 450). Lee and Kozar provide lists of usability constructs proposed by other researchers (p. 451) plus suggestions of their own including consistency, navigability, supportability, learnability, simplicity, interactivity, readability, content relevance, and credibility (p. 460-61). An exhaustive study of academic library website usability is beyond the scope of this paper, but usability needs to be mentioned as the way librarians measure whether their websites are meeting patrons' needs.

Future of the Academic Library Website

In recent years, academic librarians have continued to adapt and revise their websites to maintain website usability standards and keep up with constant internet technology developments. Academic librarians can see the direct challenge they face over

user preferences; there is "stiff competition" between library websites and databases and internet resources and searching tools, "despite the fact that academic library Web sites provide considerably higher quality and better scholarly information" (Lui, p. 6). In order to keep patrons interested in and knowledgeable about library resources, academic librarians need to provide for the changing needs of their constituency; Lui states the case this way: "the opportunity to be responsive to the changing information environment and rejuvenate academic library Web sites is now in our hands… It is time to rejuvenate the 'Library' brand" (Lui p. 6, 14).

One way that academic librarians are doing this is by incorporating Web 2.0 tools into their organizations' websites. Web 2.0 applications are online, interactive multimedia tools that are designed to allow users to easily engage with and create information (Chua and Goh, 2010). As Jack Maness (2006) describes it, the model of Web 2.0 stems from the evolution of the internet from a textual publication tool to a web of multi-sensory communication. As the internet becomes more and more interactive and multi-media driven, "personal web-pages are evolving into blogs, encyclopedias into Wikipedia, text-based tutorials into streaming media applications…and question-answer/email customer support infrastructures into instant messaging (IM) services" (Maness). This evolution of the web is especially relevant to academic librarians who are adjusting their resources and services to meet the Web 2.0 expectations of their patrons.

After acknowledging this fundamental shift in the nature of web content, Maness proposes a theory of "Library 2.0," wherein the thinking and technologies of the "user-centered Web" are applied to online library services and collections. Because Web 2.0 is primarily an "organic information environment" that encourages the value-adding

contributions of users, Web 2.0 tools fit nicely with the user engagement principles that academic libraries have always had (Lui, p. 10). Maness defines "Library 2.0" as "the application of interactive, collaborative, and multi-media web-based technologies to web-based library services and collections" and Lui echoes this thought, with the recognition that "each library implements technology and services in ways appropriate to its community" (p. 14).

Web 2.0 technologies are being widely implemented at academic libraries as librarians welcome these new information tools as ways to reach out to online, technologically savvy patrons. Chua and Goh organized a survey of 120 academic and public library websites across North America, Europe, and Asia and found that "libraries all over the world are striving to offer high-quality online experiences on their websites" in order to keep up with the "rapidly expanding universe of digital information resources" (p. 203). Harinarayana and Raju (2010) studied the websites of 100 prominent university libraries around the world and found that 57 were offering one or more Web 2.0 services. Of particular note, 37 of the libraries had implemented some form of instant messaging service. In general, Web 2.0 applications are prevalent on North American library websites, as it is not sufficient anymore "for libraries to post static Web pages… Rather, libraries are expected to support multilateral flows of information among users and librarians" (Chua and Goh, p. 210).

At the 120 libraries that Chua and Goh surveyed, the popularity of individual Web 2.0 application implementation was as follows: "blogs, RSS, instant messaging, social networking services, wikis, and social tagging applications," with blogs being the most popular application and social tagging the least (p. 210). A 2011 survey of 100 US

academic library websites shows that instant messaging is the second most popular Web 2.0 application, slightly less popular than RSS but more popular than social networking or blogs (Mahmood and Richardson, p. 269). Another study by Tripathi and Kumar (2010) looked at university library websites in the United Kingdom, Australia, Canada, and the United States. Of the 277 library websites they studied, instant messaging services were the most widespread Web 2.0 tool, being used at 43.7 percent of libraries. The extensive implementation of Web 2.0 services at academic libraries, particularly instant messaging, means that libraries are well positioned to adopt future related technologies. For example, "much as a patron in a physical library is almost by definition never far from a librarian, [instant messaging] becoming more pervasive could provide a similar circumstance in the world of the Web" (Maness).

Virtual Reference

As academic librarians have adopted instant messaging into their proffered services, they have renamed it to suit their institutional branding and to reflect the unique aspects of their program. Consequently, library online messaging programs are called by many terms in the literature, with no clear consensus as to the best terminology. Articles term this service virtual reference, chat reference, instant messaging (IM), electronic reference, digital reference, live reference, etc. Titles abound, and while it will be interesting to compare the terminology that libraries use, this paper will refer to all such services by the term virtual reference. As far as a comprehensive definition of virtual reference services, Matteson, Salamon, and Brewster (2011) provide the best one: "a synchronous, computer-based question answering service where users of the service ask question(s) which are answered by library employees" (p. 172).

There has been much written recently on virtual reference's parameters, its role in the library, question answering processes at different libraries, user satisfaction, and best practices for implementation and ongoing integration into reference services (Anderson, 2009; Bedwell, 2009; Brietbach and DeMars, 2009; Cummings et. al, 2007; Mathews, 2007; Mounce, 2010; Rourke, 2010; Strothmann, 2009; Ward, 2010). These articles describe the growing popularity of virtual reference among academic librarians and library patrons. Virtual reference as a means of librarian-patron communication was developed not too long ago, and already there is a deep body of literature on how librarians can use it to better serve their constituencies.

Virtual reference was first implemented as an academic library service approximately fifteen years ago (Matteson, Salamon, and Brewster). The first libraries to experiment with virtual reference were North Carolina State University and the University of Michigan in 1996, SUNY-Morrisville and Temple University in 1998, and the University of North Texas in 1999 (Matteson, Salamon, and Brewster). Virtual reference was seen as a logical extension of reference services that librarians in the late 1990s and early 2000s already provided in person and by phone and email; virtual reference was implemented to meet the information needs of patrons outside of the physical library (Stormont, 2001). Long before such technology existed, reference librarians have defined their professional role around meeting the research, education, career, and social information needs of their patrons. The history of reference services in libraries is a long one; in America it dates back to the 1870s (Duncan and Gerrard, 2011). At the first American Library Association conference in 1876, Samuel Swett Green gave a talk on "The Desirableness of Establishing Personal Relations Between Librarians and

Readers in Popular Libraries" that was "quite revolutionary and controversial for the time" (Duncan and Gerrard, p. 284). Green argued that librarians should not only be "the keepers of books and organizers of information," but that librarians needed to include reference services in their responsibilities; this was the first time that reference was "clearly identified as an important component of librarianship" (Duncan and Gerrard, p. 284).

Today, reference services are found at every library and in 2008 over 72 percent of all American academic libraries offered reference service by email or the web (Phan et. al, 2009). After a comprehensive look at user satisfaction studies, Bergman and Holden (2010) found that the approval rating for all forms of virtual reference is high across library patron communities, regardless of the methodologies employed by individual researchers. Overall, virtual reference is "a satisfactory experience regardless of the questions asked" (Bergman and Holden, p. 506). This explains why so many libraries have implemented virtual reference and other Web 2.0 tools, but does not mean that librarians should not conduct usability tests to continue to improve their reference services.

Past usability studies of library virtual reference services in academic libraries have focused on issues such as terminology of virtual reference programs (Duncan and Fichter, 2004), placement of IM request buttons (Wells, 2003; Rod-Welch, 2011), and providing effective chat widgets (Bedwell, 2009). Overall, the literature emphasizes the importance of website design in contributing to virtual reference visibility, from basic design principles such as "important items should be placed at the top center of the page, since that is where people look first," the idea that librarians should "make it absolutely

clear what is 'clickable,' and provide a button to click" when providing links to services such as virtual reference (Duncan and Fichter, p. 219).

When it comes to the names used for virtual library services, Mark Aaron Polger (2011) argues that librarians should always choose "language that can be understood" by patrons instead of library jargon. Others agree, stating that library jargon and acronyms "present major obstacles to users" (Duncan and Fichter, p. 219) and "acts as a barrier to communication," preventing patrons from accessing services such as virtual reference (Schneider, 2010, p. 4; Boyer, 2001). Joshua Boyer recommends that natural language be used to name online library services whenever possible, especially on top-level pages, with library jargon being used sparingly and consistently across webpages. This is part of making the academic library website user-centered and relevant to patrons who are not necessarily familiar with library terminology such as "virtual reference" (Polger).

The literature also offers suggestions for the placement of virtual reference request buttons. Catherine Wells conducted a one year study in 2003 on the location of virtual reference buttons on library webpages and how that affected the number of questions asked. Her conclusion was that "the chat request button needs to be on all the heavily used Web pages, and the more the better," since it is counterproductive to ask patrons who need help to remember that immediate help is available on another library webpage and then navigate to that page (p. 136). Instead, as academic librarians "We must be where they need us when they need us," which for her study was primarily the library home page, the catalog, and database pages (p. 136). Boyer (2001) and Bedwell (2009) agree, both pointing out that patrons' time should not be wasted by making it difficult for them to contact librarians for answers; instead, "strategic and ubiquitous

placement of chat widgets is crucial…anywhere your patrons could realize they need some library help" is crucial" (Bedwell, p. 23).

For chat widgets used in academic library reference services, Bedwell offers suggestions from a study conducted at Dalhousie University. She points out that while virtual reference software can offer many "librarian-valued features" such as reporting statistics and automatically creating transcripts of reference transactions, at the same time the software can create barriers for patrons, like "slow-responding messaging systems, patron login forms, and required browser settings" (Bedwell, p. 20). Because of these findings, Bedwell supports "employing ready-to-use chat widgets," boxes embedded in library webpages that allow clearly indicate to patrons that librarians are online and available to help them and enable librarians and patrons to communicate with fewer technological barriers (p. 20-22).

Association of Research Libraries SPEC Kits

Beyond usability studies, past research on virtual reference includes two surveys on its adoption by research-oriented libraries and information centers in North America. The Association of Research Libraries, or ARL, conducted two studies in 1999 and 2002 on virtual reference at its member institutions. The results of these studies were compiled in ARL SPEC Kits, which are periodically produced by the Association. The SPEC Kits summarize surveys conducted of ARL member institutions and act as resource guides to "help libraries learn about current practice in research libraries, implement new practices and technologies, manage change, and improve performance" (ARL, 2011).

In 1999, SPEC Kit 251's topic was electronic reference service, and 96% of the 75 member libraries who responded reported offering some sort of online question-

answering service through email, web form, or the brand new option- virtual reference (Goetsch, Sowers, and Todd, p. 7). Three years later in 2002, ARL produced another SPEC Kit on electronic reference service, this one entirely concerned with what Ronan and Turner titled "chat reference." The survey results in Kit 273 were that virtual reference was available at 54% of the 66 respondents. Almost all of these services had been implemented less than two years ago, and libraries were adding virtual reference services while the survey was being distributed and the results collated. The survey also reported that the libraries were "using a variety of software packages and services" that ranged from free or inexpensive to very sophisticated, expensive software (Ronan and Turner, p. 9). When the librarians were asked their reasons for choosing a particular software program, 81% replied that "easy access for users" was of "prime importance" in their decision (p. 10).

Both of these ARL surveys were able to gather in-depth data on a large percentage of their member libraries by asking librarians at each institution to self-report their virtual reference services. However, the data is now ten or more years old and much has changed with virtual reference since then as the technology has improved and become more widespread. This study is intended as a follow-up to these two ARL SPEC Kits since it studies almost exactly the same population and asks the same main questions as in 1999 and 2002: what number of libraries offer virtual reference and how is the service available to users.

Methodology

The usability testing studies that have already been done at academic libraries showcase the importance of evaluating virtual reference services according to user needs

and preferences. While most of the existing studies were completed by one or more librarians of their home institution, it is helpful to take a broader view of virtual reference as a growing Web 2.0 technology and study its implementation and presentation at academic libraries across the United States. While such a study cannot be as in-depth as a study of one institution, there is much information to be gathered from a comprehensive survey.

For the purpose of assessing virtual reference at academic libraries it is helpful to identify institutions with similar characteristics, aspirations, and achievements. This makes the 126 institutional members of the Association of Research Libraries an ideal subset to study. The Association of Research Libraries, or ARL, is made up of libraries at research-oriented institutions in the US and Canada that share common values, goals, interests, and needs. These libraries are at the forefront of the North American library community and are often known for their innovative programs and services. To provide a focused examination of virtual reference, it is desirable to sample from this subset and only study academic libraries in the United States. This will remove all Canadian member libraries, research-oriented public libraries in the United States, and other non-academic research centers, leaving a set of 99 libraries with presumably comparable parent institutions, patron populations, and similar priorities and resources dedicated to their public services.

The library websites were identified via the membership page of the ARL website (http://www.arl.org/arl/membership/members.shtml), which provides an alphabetical list of all member libraries and links to the homepage of their websites. A list of the libraries studied and the URLs provided by the ARL website are available in Appendix A. The

presence of virtual reference at these libraries was assessed according to five factors:
Technology, Terminology, Visibility, Accessibility, and Design.

1. The Technology factor is a measure of what Web 2.0 tools are being utilized for
online, synchronous reference assistance requests at academic libraries. Each library's
website was evaluated on the technology it used for virtual patron-librarian
interactions and the presence or absence of any type of virtual reference program was
noted. For the libraries that offered virtual reference, the programs were additionally
evaluated by the companies whose software was used.

2. The Terminology factor is an assessment of the jargon being employed on
academic library websites. The terms used within the profession of librarianship for
virtual reference programs are varied, but almost all are librarian-specific jargon
without meaning for most patrons. The library websites were analyzed according to
the names each institution used for its virtual reference service, and whether those
names were different on top-level and lower-level webpages.

3. The Visibility factor is used to evaluate how virtual reference is promoted on
academic library websites. The successful marketing of virtual reference is a key
component in its popularity with patrons, so it is important to know how librarians are
making the service visible to library users. Each website was assessed according to
where the service was available: on (or directly linked from) the library's homepage,
on a library contacts webpage, and/or in (or linked from) the library online catalog.

4. The Accessibility factor refers to two usability elements of libraries' virtual
reference services. First, the library websites were assessed on whether patrons had to
log in or provide some sort of personal information before using the virtual reference

program. Second, the websites were also analyzed on the window of availability of the service to see the range of hours and days that patrons were able to obtain virtual reference assistance.

5. The Design factor is a subjective rating of the visibility, simplicity, and intuitive nature of each library's virtual reference service. After an objective look at the other factors important to evaluating virtual reference, this is a chance to employ a patron's perspective on the service after seeing it for the first time. Is it easy to learn about or locate? Is it simple to access? Does it seem intuitive to use? These are all questions that it is hard to answer objectively, but whose answers are important to both patrons and librarians.

These factors do not stand alone; together they allow for a comprehensive evaluation of virtual reference on academic libraries' websites that will allow librarians to better understand the state of virtual reference today and draw conclusions about the future of virtual reference services.

Results

Analysis revealed that virtual reference is a widely popular service at ARL member libraries, though the terminology, visibility, accessibility, and design varies from institution to institution.

Technology

Each of the ARL member library websites was analyzed in March 2012 for virtual reference programs. Of the 99 total libraries, 92 (92.92%) offered virtual reference, either on their own or through a library consortium. Only 7 (7.07%) out of all the libraries did not have a virtual reference service (see Figure 1). These 7 libraries promoted other

reference options on their websites instead: help in-person; on the phone; through email; and with online frequently-asked-question lists.

The 92 libraries that offered virtual reference did so through many different companies' software products. Eleven companies were identified through branding, website descriptions, and links to company webpages (Figure 2).
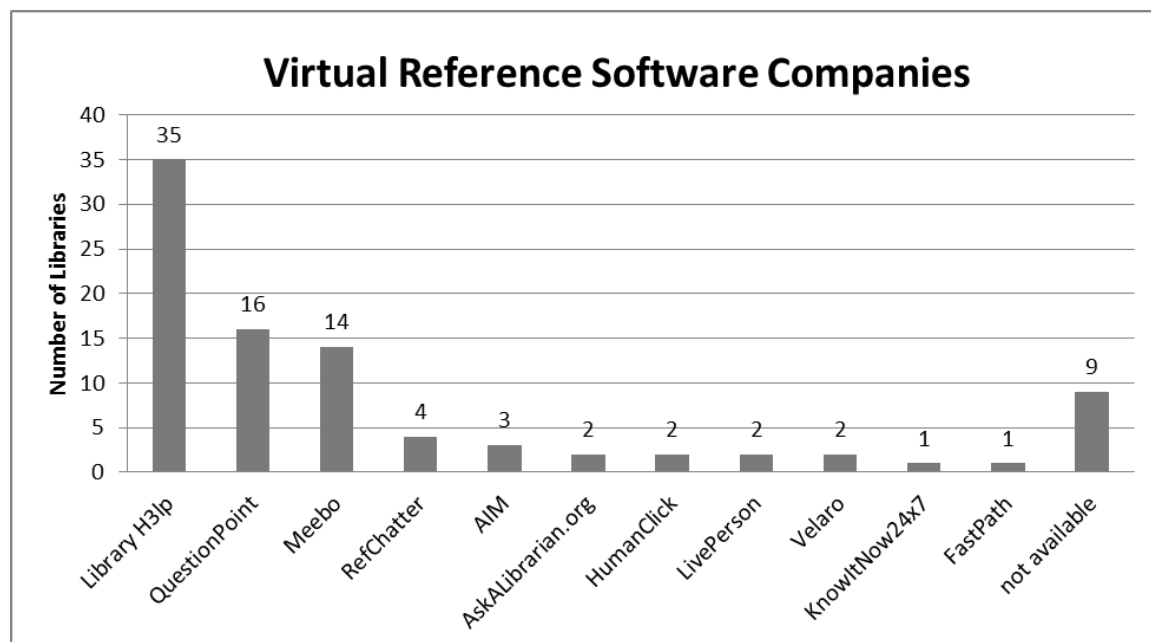

Figure 2: The Virtual Reference Software Companies Used by ARL Member Libraries

For the 92 libraries, there were three programs that together accounted for over 70% of the total. Library H3lp was the most widely used, being utilized by 35 libraries, 38.04% of the total; this is more than twice the number of libraries than those who used the next most popular virtual reference software. QuestionPoint, the second most popular, was used by 16 libraries and had 17.39% of the total. Meebo was close behind, being used by 14 libraries to make up 15.21% of the total. The other companies were each used by only a few libraries at the most, accounting for very small percentages of the total. RefChatter was used by 4 libraries (4.34%), AIM by 3 (3.26%), and AskALibrarian.org,

HumanClick, LivePerson, and Velaro were each used by 2 libraries, accounting for 2.17% each. KnowItNow24x7 and FastPath were both used by one library, or 1.08% of the total. For nine libraries it was impossible to discover what company they used for virtual reference, so 9.78% of the total is unaccounted for.

Terminology

Library literature does not have one term that is consistently used when referring to virtual reference and this was reflected in the study sample; the ARL member libraries used many different titles for their virtual reference services. This was compounded by the fact that 17 of the institutions, 18.47% of all those with virtual reference, used two or more names for their virtual reference programs, varying the titles on top-level and lower-level library webpages.

Overall, the institutions preferred "Ask" or "Chat" and "Librarian" or "Us" in their titles, as these terms were found in numerous variations (see Figure 3). The most common title was "Ask a Librarian," or some personalized version thereof, such as "Ask a UC Librarian" or "Ask a Penn State Librarian." This title was used at 46 of the 92 libraries, exactly 50% of the total. Another term used at many libraries was "Chat;" 27 libraries, 29.34 % of the total, used the term "Chat" as the basis for their title, including programs called "Chat Now," "Chat with Us," "Chat 24/7," and "Live Chat." A large subset of this group was 10 libraries whose virtual reference services were titled "Chat with a Librarian" or "Chat Live with a Librarian." Other libraries, 10 (10.86 %) in total, titled their virtual reference program around the term "Ask Us;" examples of this are "Ask Us Now!" and "Ask Us: Chat with a Librarian." The final large group of libraries with common names chose a variant on the term Instant Message (IM), with 6 libraries

(6.52%) having services titled "IM with a Librarian," "IM Reference," "IM Us," etc. The remaining six libraries each used a different name for their virtual reference service, one not found at any other library.

Visibility

As a judge of how visible virtual reference services are, each website was analyzed based on where virtual reference was available. Almost all of the libraries with virtual reference provided the service on (or linked it from) the webpage that listed their contact information; 87 (94.56%) of the libraries had their virtual reference on one or more contact pages, only five libraries did not. The library's homepage was the next most popular page for virtual reference; 66 libraries (71.73%) provided an embedded widget or a direct link to a widget on their main webpage. Other libraries mentioned virtual reference on the homepage but did not have a direct link to the service. Over half of all libraries also linked to their virtual reference program in the library online catalog, with 56 (60.86%) libraries offering this point-of-need service. In total, 38 libraries (41.30%) offered virtual reference assistance to patrons on their contact page, from their online catalog, and on (or through a direct link on) the homepage. 76 libraries (82.60%) had virtual reference available in two or more of these places (see Figure 4).

Accessibility

All 92 library websites were also analyzed according to their virtual reference availability, assessing whether patrons had to provide personal information before using the service and what amount of time a librarian was online to answer questions. 30 libraries (32.60%) required patrons to give some identifying information, such as their name, school identification number, email address, etc. before asking a virtual question

while 62 of the libraries (67.39%) did not require any information at all (see Figure 5).

Some libraries gave patrons the option of using their real name for personalization or

providing an email address to receive a session transcript, but kept such information

optional. These libraries were included in the 67% that did not require contact

information.

The amount of time that virtual reference was available to patrons varied

significantly amongst the study population from those that offered virtual reference

continually to those that only offered it for limited hours each day. The breakdown of

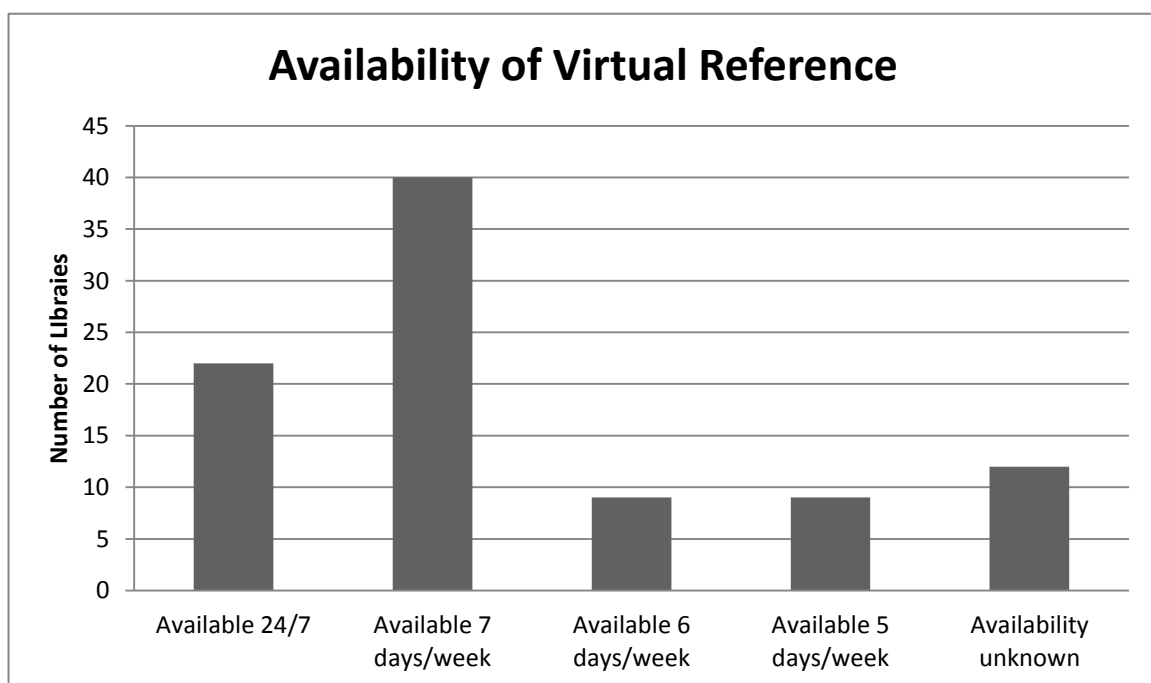virtual reference availability is shown in Figure 6:

Figure 6: Approximate Availability of Virtual Reference
Services at ARL Member Libraries

A large percentage of libraries, 40 in total (43.47%), made their virtual reference

programs available to patrons for at least some hours every day. Common among these

libraries was day and evening hours Monday to Thursday, day hours Friday and

Saturday, and evening hours on Sunday. At 22 libraries (23.91%), virtual reference was available 24 hours a day, seven days a week. Some of these libraries offered continuous hours through a cooperative library consortium while others had their own library staff available around the clock. Nine libraries (9.78%) hosted virtual reference five or six days a week; the most common pattern was availability on four or five weekdays and Saturday or Sunday. Another nine libraries had virtual reference available from Monday to Friday, but not at all over the weekend. Finally, there were twelve libraries (13.04%) that did not state anywhere on their websites what their virtual reference availability was, even though they offered the service.

Design

The previous factors were all objective assessments of virtual reference on academic library websites, but this factor is a subjective evaluation designed to represent the user's experience. Each library's virtual reference service was assigned a rating from 1-5 after accessing it on the website and examining its visibility, ease of access, and any user-oriented features it offered (see Figure 7). Six libraries (6.52%) were assigned the top rating of 5 for excellent features such as high visibility on the website, an embedded widget in the online catalog, a pop up chat window that appears when the virtual reference link is clicked, or a virtual reference sidebar that appears on all library pages during a chat session. 26 libraries (28.26%) were assigned a high rating of 4 for user-friendly features such as selecting virtual reference programs by library branch, high visibility on the library homepage, or a prominent link to the service on all library webpages. A majority of libraries, 48 (52.17%), were given a middle rating of 3 for their virtual reference programs lacking visibility or having other user problems that countered

their helpful features. Eleven libraries (11.95%) were assigned a low rating of 2 for lacking key usability features present at other libraries or for presenting potentially large problems to users such as having to scroll down a webpage to see the virtual reference service or having to link through several webpages before reaching the actual widget. Only one library (1.08%) received the lowest rating of 1 for not having a user-oriented virtual reference program.

Discussion

The analysis of 99 ARL member libraries' websites provided information on five factors of virtual reference: technology; terminology; visibility; accessibility; and design. A discussion of these trends will show how they are of practical importance to academic librarians. This study's limitations are also provided.

Technology

A surprisingly high percentage of the libraries surveyed offered virtual reference as a service. Almost 93% of the libraries studied had a virtual reference program, which is a high number compared to similar previous studies. In 2010, Harinarayana and Raju examined the websites of 100 international university research libraries, but only found 37% with virtual reference services. Another international study of university websites found virtual reference at approximately 44% of the libraries (Tripathi and Kumar, 2010). These international studies supposedly chose institutions comparable to their counterparts in the United States, but their slower adoption of virtual reference is a striking difference. This does not mean that these academic libraries are far behind those in the US though, as virtual reference has grown exponentially in popularity here in the last five years.

In 2007, a study of approximately 1,100 academic libraries in the United States found 60% of them offered virtual reference (Dehart and Viles). In 2011, a study of all 125 ARL member libraries found 80% with "live chat" services, a number roughly twice the previous percentages of Harinarayana and Raju, Tripathi and Kumar, and Rod-Welch, and 20% greater than the figures reported by DeHart and Viles three years earlier. This number is again less than the percentage found in this analysis, which studies almost exactly the same population. Overall, the literature shows that virtual reference is growing in popularity as a service offered by academic libraries. While virtual reference was recently considered an emerging technology for academic libraries to experiment with, it is becoming a standard online reference tool offered by most academic institutions. As library patrons have moved online, librarians at academic research institutions have responded by offering virtual, synchronous reference help and advice.

Terminology

In library and information science literature, virtual reference is referred to by almost as many names as there are articles, with researchers calling it chat reference, instant messaging (IM), electronic reference, digital reference, live reference... The terms used, while similar, reflect different conceptions of the service. These are also reflected in the title choices made by librarians at the academic libraries studied, which can be divided into two groups.

Half of the study population used a variation on the phrase "Ask a Librarian," and even those that chose a different name for their virtual reference service often used that phrase on their contact page. "Ask a Librarian" has become a popular phrase because it combines the purpose of the service (a place to ask information-related questions) and the

nature of the providers (information professionals; librarians). A smaller group of libraries took the same idea and focused more on the community aspect of the library as a unit, titling their service "Ask Us" or "Ask Us Now," sometimes even with an enthusiastic exclamation mark. The second group focused less on who was providing the service ("a librarian" or "us") or why to use the service (to "ask" a question) and more on the nature of the service. The titles for these virtual reference programs emphasize the type of technology being utilized with names such as "Chat Now," "Chat 24/7" or "IM Reference." Some combine the focus on instant messaging technology with the same recognition of the librarian as an essential part of the service with names like "Chat with a Librarian" and "IM Us." All of these titles have their own merits, and so it is each library's decision on what title will best represent their own service to their unique community of patrons.

Almost 20% of the libraries could not decide on one title, and their websites revealed a lack of continuity for their virtual reference program. A service referred to on a top level page as "24/7 Chat Reference" might be called "Ask a Librarian" on a lower level page. Or the page heading might refer to the service as "Ask a Librarian" while the widget is titled "Chat Live Now." These inconsistencies will make the service difficult for users to find, since they may not recognize an unfamiliar title as referring to the service they are looking for. It is disorienting for patrons to be forced to understand one use of unfamiliar library jargon, asking them to interpret multiple technical terms and recognize that these refer to the same program is too much. Academic libraries should choose one term that accurately represents the service they are offering to their patrons,

and then market that service using only the one title in order to increase name recognition and usage satisfaction among users.

Visibility

Another way that academic librarians can successfully market their virtual reference services is through online visibility. Where virtual reference widgets, or links to the widgets, are located is of crucial importance. Access from the library's homepage is important for users who are specifically accessing the website to ask a virtual reference question or have a question about main library services on the homepage after viewing it. For these patrons, direct access to a librarian who can address their information need is crucial. Patrons who must click through several webpages before even seeing a virtual reference widget may give up before reaching it. At ARL member libraries, this means 36.95% of the libraries may not be attracting as many users to their virtual reference program as they could by linking it directly from the homepage. If, as Lui (2008) argues, "the core value of libraries is the service they provide to their users," then academic libraries should optimize their virtual reference through effective web design, making it quicker and simpler for users to access their virtual librarians (p. 11).

This means also improving access beyond the library homepage and contact page. Most ARL members already promote virtual reference through the homepage (71.73%) or contact page (94.56%), but a lesser percent (60.86%) offer virtual reference as a part of their online catalog. While it can be challenging to embed or link to a widget in the OPAC depending on the integrated library system involved, it is there that users are actively searching for library resources and commonly have reference questions arise. Meeting users at their point of need is the purpose for implementing virtual reference

programs, so logically the programs should be conspicuous within the catalog as well.
The natural extension from this is to provide virtual reference to users of other online
library services, such as article databases, electronic book collections, and course guides.
It was beyond the scope of this study to evaluate the potential availability of virtual
reference in these arenas at all ARL member libraries, making this an opportunity for
future research into virtual reference as an embedded tool in all online library resources.

Accessibility

This study looked at virtual reference accessibility according to requirements for
contact information and the service's hours of availability. Because of time constraints
the accessibility of virtual reference for disabled library users was not studied.

For online library patrons to use virtual reference, it is important that they are not
only able to easily get to the service, but also can quickly and simply access it. This is
where the issue of logging in to a system or providing personal information before being
able to use a widget comes in, balancing ease of access with customer service goals and
individual needs with those of the community. Individual users are more likely to use a
service that does not require them to provide personally identifiable information, thus
preserving their ability to ask potentially embarrassing questions. Thus, virtual reference
that does not require information from users, as is available through 67.39% of ARL
member libraries, protects the privacy of library patrons.

From the other direction, librarians are able to provide better customer service
through virtual reference when they have access to information on who they are chatting
with. The 32.60% of ARL members who require some contact information before giving
access to virtual reference value this, and also are guarding their service capacity by

restricting access to their primary service community. By not giving access to those unconnected with the university community. the librarians prevent the potential demands of non-affiliates from outstripping available resources. It is not a straightforward question of whether librarians value their virtual users' privacy or not, or whether they value customer service or not; instead, it is an issue that should involve input from the user community, assessment of current virtual reference statistics and practices, and a thoughtful decision that takes into account the benefits and disadvantages of both positions.

Another issue for academic librarians regarding the accessibility of virtual reference is its hours of availability. As libraries are facing tighter budgets and potentially shortened staff, it is hard to provide extended or expanded hours for a time-intensive new program such as virtual reference. At ARL member libraries, a preponderance (43.47%) are offering virtual reference services for at least some hours every day, providing a balance between the libraries whose virtual reference is provided twenty four hours a day, every day (23.91% of libraries) and those who only have virtual reference available five or six days a week (19.56% of the libraries). The libraries that offer virtual reference 24 hours a day, 7 days a week often do so through a consortium, whether local or national, so that no one group of library personnel is responsible for virtual reference all the time. The other libraries, for which ceaseless virtual reference is not practical, attempt to align the times virtual reference is most needed with the hours of their physical service desk, providing virtual and in-person assistance at these key times without maintaining around the clock assistance. This often means hours throughout each weekday and during the

afternoon and evening of weekends, when students and researchers are most likely to be using library resources and potentially to need assistance through virtual reference.

Design

While objectively noting the virtual reference information on each library website gives librarians an idea of the scope of the service and its common attributes, a discussion of the more subjective usability features is helpful to understand how patrons view and interact with it.

Library patrons are becoming more familiar with virtual reference-type services as many businesses offer online, real-time help services. Public libraries are also implementing virtual reference at about the same rate as academic libraries (Chua and Goh, 2010), meaning that academic library patrons may have also used virtual reference previously at a public library. This means that academic library websites do not need to explain in as much detail what a virtual reference service is, and can focus on making online users aware that (like other online websites) the academic library also offers synchronized virtual assistance. The website design should point patrons to the availability of virtual reference and then the design of the service should be user friendly.

Some libraries are already implementing design techniques to make sure their virtual reference programs are easy to learn about or locate, simple to access, and intuitive to use. These libraries received a 4 or 5 design rating, and together account for 34.78% of libraries with virtual reference. Their virtual reference services were a highly visible part of the website and made it simple for users to engage in an instant messaging conversation while continuing to access library resources. These libraries have integrated virtual reference fully into their patron-oriented services, showing that it is not just a

token Web 2.0 tool offered for the appearance of relevancy, but that virtual reference is an important part of ongoing patron-librarian communication. This should be the future of virtual reference, where the remaining 65.22% of academic libraries that received lower design ratings take steps to remove potential barriers from their virtual reference presentation.

Limitations

The results of this analysis have several limitations. First, by limiting the website assessment to only members of the Association of Research Libraries, other academic institutions were left out by necessity. While the ARL member libraries provide a good sample population for studying US academic libraries, it is not a perfect group since findings may not be generalizable to other types of libraries. A follow up study would do well to survey academic libraries that are not members of ARL to compare virtual reference at large, research-oriented schools with smaller, liberal arts schools and other non-ARL institutions.

A second limitation is in the nature of the study. Because this was a content analysis conducted entirely by studying the library websites, there was some information that could not be gathered. Twelve libraries did not provide their virtual reference hours and nine libraries did not make clear what software they were using to provide virtual reference. This data could have been gathered by surveying academic librarians instead. As well, while some judgments can be made about a virtual reference program's effectiveness based on its accessibility through the library website and design elements, a true comparison between libraries needs usage statistics and patron surveys from each institution. Without knowing to what extent virtual reference is utilized by patrons of

each academic library and how patrons at each institution view the service, it is hard to say how the online shortcomings noticed by outside observers are being experienced or encountered by patrons.

Conclusion

Virtual reference has come a long way since the 1990s when it was first implemented as a service by a few pioneering academic libraries. Today it is found at 92 out of 99 academic, research-oriented libraries in the United States, a service that only a few libraries choose to do without. This is one part of "a meaningful and substantive change in the history of libraries" as academic libraries shift focus from providing controlled information access to facilitating information transfer and increased information literacy (Maness, 2006, p. 9). As libraries continue to move online, they should continue to improve their virtual services, making user-oriented technology design decisions that provide streamlined access pathways to library resources and information. The future of academic libraries will be an integration of physical and virtual services, and librarians are shaping that future today with their implementation of virtual reference.

References

Anderson, C. (2009). How to be a Person: Tips and Tricks for Virtual Reference. *College & Research Libraries News*, 70 (10), 577-9.

Association of Research Libraries. (2002). *Chat Reference*. SPEC Kit 273. Washington, DC: Office of Leadership and Management Services.

Association of Research Libraries. (1999). *Electronic Reference Service*. SPEC Kit 251. Washington, DC: Office of Leadership and Management Services.

Bedwell, L. (2009). Making Chat Widgets Work for Online Reference. *Online*, 33 (3), 20-3.

Bergman, E. M. L. and Holden, I. I. (2010). User Satisfaction with Electronic Reference: A Systematic Review. *Reference Services Review*, 38 (3), 493-509.

Boyer, J. (2001). Virtual Reference at North Carolina State: The First One Hundred Days. *Information Technology and Libraries*, 20 (3), 122-128.

Brietbach, W. and DeMars, M. J. (2009). Enhancing Virtual Reference: Techniques and Technologies to Engage Users and Enrich Interaction. *Internet Reference Services Quarterly*, 14 (3), 82-91.

Chua, A. Y. K. and Goh, D. H. (2010). A Study of Web 2.0 Applications in Library Websites. *Library & Information Science Research*, 32 (3), 203-211.

Cummings et. al.. (2007). User Preferences in Reference Services: Virtual Reference and Academic Libraries. *Libraries and the Academy*, 7 (1), 81-96.

DeHart, D. L. and Viles, A. (2007). Virtual Reference Service in Southeastern Academic
     Libraries: A Study of Availability. *The Southeastern Librarian*, 55 (1), 36-40.

Duncan, V. and Fichter, D. M. (2004). What Words and Where? Applying Usability
     Testing Techniques to Name a New Live Reference Service. *Journal of the*
     Medical Library Association. 92 (2), 218–225.

Duncan, V. and Gerrard, A. (2011). All Together Now! Integrating Virtual Reference in
     the Academic Library. *Reference & User Services Quarterly*, 50 (3), 280–92.

Granfield, D. and Robertson, M. (2008). Preference for Reference: New Options and
     Choices for Academic Library Users. *Reference & User Services Quarterly*, 48
     (1), 44–53.

Lee, Y. and Kozar, K. A. (2012). Understanding of Website Usability: Specifying and
     Measuring Constructs and their Relationships. *Decision Support Systems*, 52 (2),
     450-463.

Liu, S. (2008). Engaging Users: The Future of Academic Library Web Sites. *College &*
     Research Libraries, 69 (1), 6-27.

Mahmood, K. and Richardson, J. V. Jr. (2011). Adoption of Web 2.0 in US Academic
     Libraries: A Survey of ARL Library Websites. *Program: Electronic Library and*
     Information Systems, 45 (4), 365-375.

Maness, J. M. (2006). Library 2.0 Theory: Web 2.0 and Its Implications for Libraries
     Webology, 3(2), Article 25.

Mathews, B. (2007). Moving Beyond the Reference Desk: Being Where Users Need Us.
     The Reference Librarian, 48 (2), 9-13.

Matteson, M. L., Salamon, J. and Brewster, L. (2011). A Systematic Review of Research on Live Chat Service. *Reference & User Services Quarterly*, 51 (2), 82–100.

Mounce, M. (2010). Ask a Librarian Link: Analyzing Its Usefulness. *Mississippi Libraries*, 74 (1), 3-5.

Peterson, K. (2006). Academic Web Site Design and Academic Templates: Where Does the Library Fit In? *Information Technology and Libraries*, 25 (4), 217-221.

Phan, T. A. et. al. (2009). *Academic Libraries: 2008*. National Center for Education Statistics, Institute of Education Sciences, Washington D.C.

Polger, M. A. (2011). Student Preferences in Library Website Vocabulary. *Library Philosophy and Practice*, Annual volume 2011.

Rod-Welch, L. J. (2012). Incorporation and Visibility of Reference and Social Networking Tools on ARL Member Libraries' Websites. *Reference Services Review*, 40 (1), 138 - 171.

Rourke, L., et. al. (2010). Learning from Chatting: How our Virtual Reference Questions are Giving us Answers. *Evidence Based Library and Information Practice*, 5 (2), 63-74.

Schneider, K. G. (2010). Death to Jargon [PowerPoint slides]. Retrieved from http://www.opal-online.org/LibraryJargon200710_files/frame.htm

Stormont, S. (2001). Going Where the Users Are: Live Digital Reference. *Information Technology and Libraries*, 20 (3), 129-134.

Strothmann, M., et. al. (2009). "Ask a Librarian" Pages as Reference Gateways to Academic Libraries. *The Reference Librarian*, 50 (3), 259-75.

Ward, J., et. al. (2010). Best Practices in Chat Reference Used by Florida's Ask a

Librarian Virtual Reference Librarians. *The Reference Librarian*, 51 (1), 53-68.

Wells, C. A. (2003). Location, Location, Location: The Importance of Placement of the

Chat Request Button. *Reference & User Services Quarterly*, 43 (2), 133.

Appendix A: Complete List of ARL Member Library Websites Analyzed

Institution	URL
University of Alabama Libraries	http://www.lib.ua.edu/
University at Albany SUNY Libraries	http://library.albany.edu/
University of Arizona Libraries	http://www.library.arizona.edu/
Arizona State University Libraries	http://lib.asu.edu/
Auburn University Libraries	http://www.lib.auburn.edu/
Boston College Libraries	http://www.bc.edu/libraries/
Boston University Libraries	http://www.bu.edu/library/
Brigham Young University Library	http://lib.byu.edu/
Brown University Library	http://library.brown.edu/index.php
University at Buffalo SUNY Libraries	http://library.buffalo.edu/
University of California Berkeley Library	http://www.lib.berkeley.edu/index.html
University of California Davis Library	http://www.lib.ucdavis.edu/
University of California Irvine Libraries	http://www.lib.uci.edu/
University of California Los Angeles Library	http://www.library.ucla.edu/
University of California Riverside Libraries	http://library.ucr.edu/
University of California San Diego Libraries	http://libraries.ucsd.edu/
University of California Santa Barbara Libraries	http://www.library.ucsb.edu/
Case Western Reserve University Libraries	http://library.case.edu/ksl/index.aspx
University of Chicago Library	http://www.lib.uchicago.edu/e/index.html
University of Cincinnati Libraries	http://www.libraries.uc.edu/
University of Colorado Boulder Libraries	http://ucblibraries.colorado.edu/
Colorado State University Libraries	http://lib.colostate.edu/
Columbia University Libraries	http://library.columbia.edu/
University of Connecticut Libraries	http://www.lib.uconn.edu/
Cornell University Library	http://www.library.cornell.edu/
Dartmouth College Library	http://library.dartmouth.edu/

University of Delaware Library	http://www.lib.udel.edu/
Duke University Libraries	http://library.duke.edu/
Emory University Libraries	http://web.library.emory.edu/
University of Florida Libraries	http://www.uflib.ufl.edu/
Florida State University Libraries	http://www.lib.fsu.edu/
George Washington University Library	http://www.library.gwu.edu/
Georgetown University Library	http://www.library.georgetown.edu/
University of Georgia Libraries	http://www.libs.uga.edu/
Georgia Tech Library	http://www.library.gatech.edu/
Harvard University Libraries	http://lib.harvard.edu/
University of Hawaii at Manoa Library	http://library.manoa.hawaii.edu/
University of Houston Libraries	http://info.lib.uh.edu/
Howard University Libraries	http://www.howard.edu/library/
University of Illinois at Chicago Library	http://library.uic.edu/
University of Illinois at Urbana-Champaign Library	www.library.uiuc.edu
Indiana University Bloomington Libraries	http://www.libraries.iub.edu/
University of Iowa Libraries	http://www.lib.uiowa.edu/
Iowa State University Library	http://www.lib.iastate.edu/
Johns Hopkins University Libraries	http://www.library.jhu.edu/
University of Kansas Libraries	http://www.lib.ku.edu/
Kent State University Libraries	http://www.library.kent.edu/
University of Kentucky Libraries	http://libraries.uky.edu/
Louisiana State University Libraries	http://www.lib.lsu.edu/
University of Louisville Libraries	http://louisville.edu/library/
University of Maryland Libraries	http://www.lib.umd.edu/
University of Massachusetts Amherst Libraries	http://www.library.umass.edu/
Massachusetts Institute of Technology Libraries	http://libraries.mit.edu/

University of Miami Libraries	http://www.library.miami.edu/
University of Michigan Library	http://www.lib.umich.edu/
Michigan State University Libraries	http://www.lib.msu.edu/
University of Minnesota Libraries	http://www.lib.umn.edu/
University of Missouri–Columbia Libraries	http://mulibraries.missouri.edu/
University of Nebraska–Lincoln Libraries	http://libraries.unl.edu/
University of New Mexico Libraries	http://www.unm.edu/libraries/
New York University Libraries	http://library.nyu.edu/
University of North Carolina at Chapel Hill Libraries	http://www.lib.unc.edu/
North Carolina State University Libraries	http://www.lib.ncsu.edu/
Northwestern University Library	http://www.library.northwestern.edu/
University of Notre Dame Libraries	http://library.nd.edu/
Ohio State University Libraries	http://library.osu.edu/
Ohio University Libraries	http://www.library.ohiou.edu/find/
University of Oklahoma Libraries	http://libraries.ou.edu/
Oklahoma State University Library	http://www.library.okstate.edu/
University of Oregon Libraries	http://libweb.uoregon.edu/
University of Pennsylvania Libraries	http://www.library.upenn.edu/
Pennsylvania State University Libraries	http://www.libraries.psu.edu/psul/home.html
University of Pittsburgh Libraries	http://www.library.pitt.edu/
Princeton University Library	http://library.princeton.edu/
Purdue University Libraries	http://www.lib.purdue.edu/
Rice University Library	http://library.rice.edu/
University of Rochester Libraries	http://www.library.rochester.edu/

Rutgers University Libraries	http://www.libraries.rutgers.edu/
University of South Carolina Libraries	http://library.sc.edu/
University of Southern California Libraries	http://www.usc.edu/libraries/
Southern Illinois University Carbondale Library	http://www.lib.siu.edu/
Stony Brook University SUNY Libraries	http://www.library.stonybrook.edu/
Syracuse University Library	http://library.syr.edu/
Temple University Libraries	http://library.temple.edu/
University of Tennessee Knoxville Libraries	http://www.lib.utk.edu/
University of Texas Libraries	http://www.lib.utexas.edu/
Texas A&M University Libraries	http://library.tamu.edu/
Texas Tech University Libraries	http://library.ttu.edu/
Tulane University Library	http://library.tulane.edu/
University of Utah Library	http://www.lib.utah.edu/
Vanderbilt University Library	http://www.library.vanderbilt.edu/
University of Virginia Library	http://www.lib.virginia.edu/
Virginia Tech Libraries	http://www.lib.vt.edu/
University of Washington Libraries	http://www.lib.washington.edu/
Washington State University Libraries	http://www.wsulibs.wsu.edu/
Washington University in St. Louis Libraries	http://library.wustl.edu/
Wayne State University Libraries	http://www.lib.wayne.edu/
University of Wisconsin–Madison Libraries	www.library.wisc.edu/
Yale University Library	http://www.library.yale.edu/

Appendix B: Figures

Presence of Virtual Reference

■ number of libraries without virtual reference ■ number of libraries with virtual reference
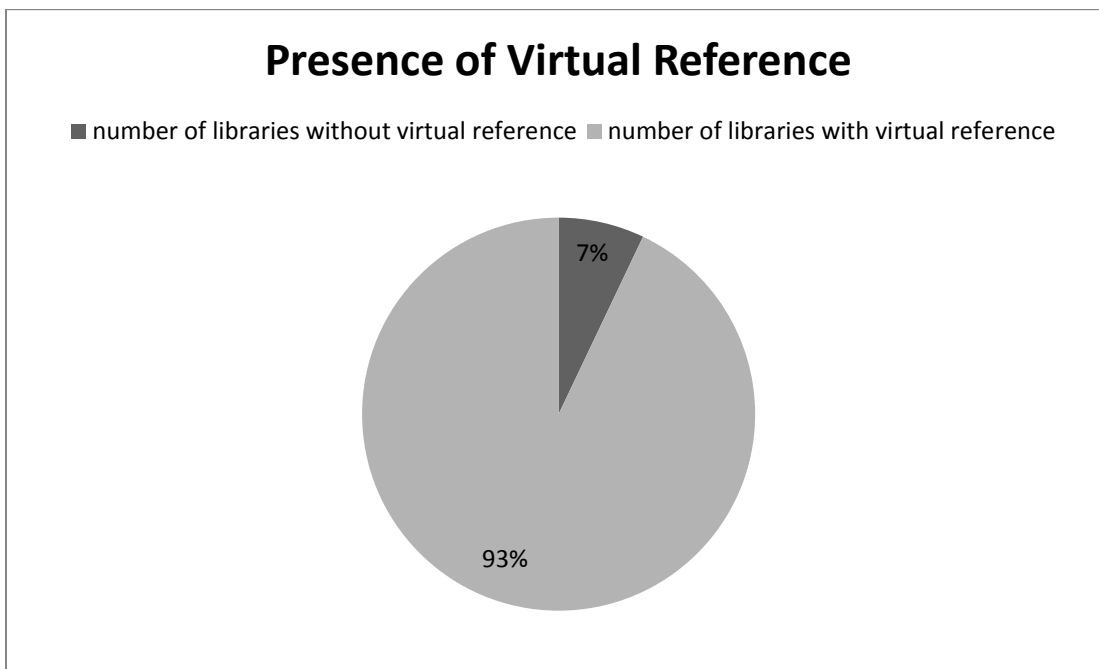
7%

93%

Figure 1: The Percentage of ARL Member Libraries with and without Virtual Reference
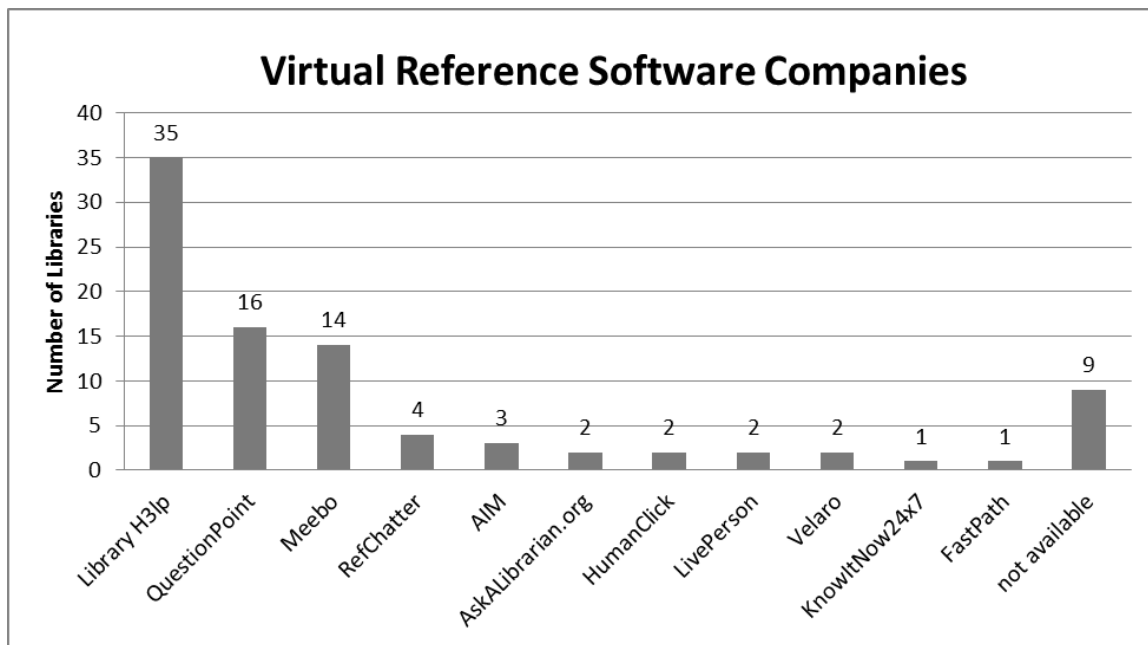
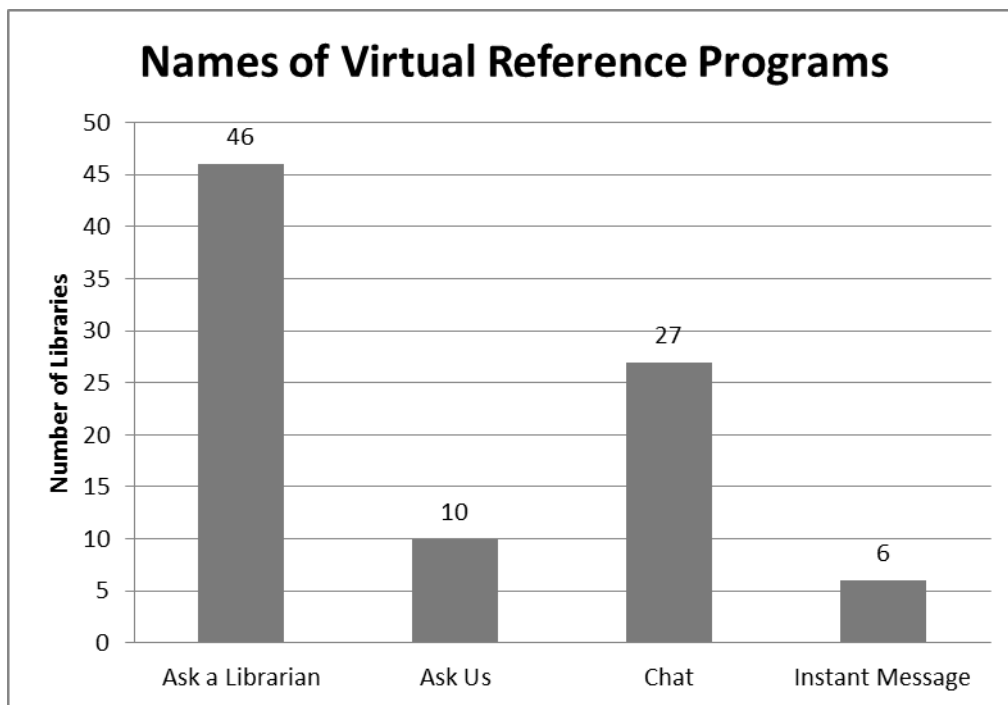Figure 2: The Virtual Reference Software Companies Used by ARL Member Libraries

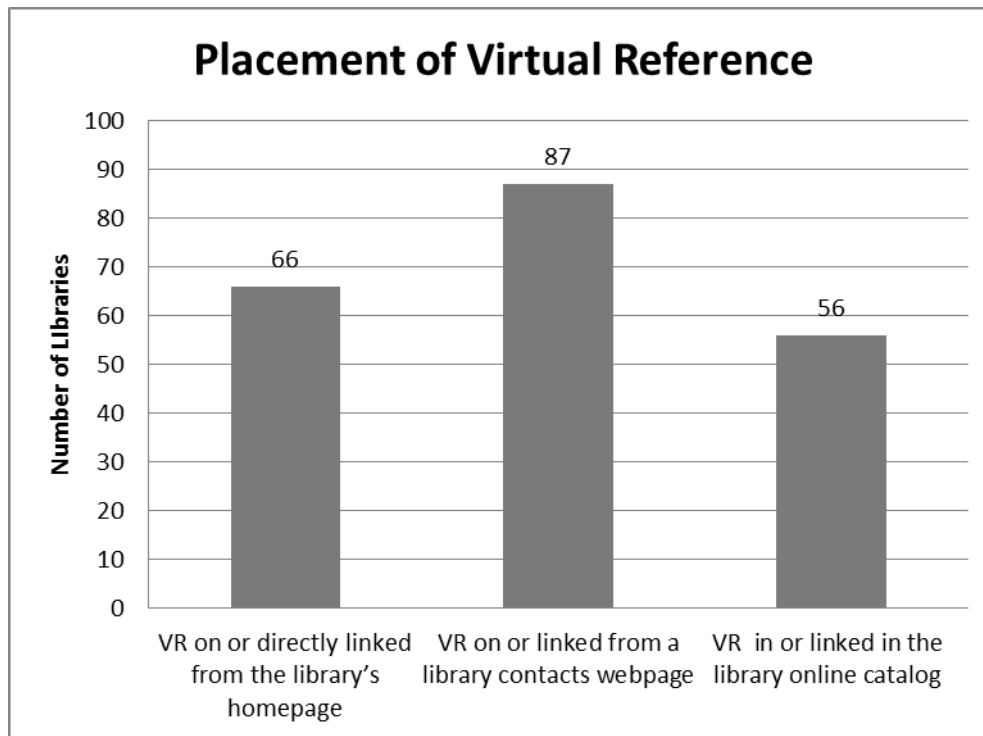Figure 3: Root Names of Virtual Reference Programs at ARL Member Libraries

Placement of Virtual Reference

Figure 4: The Placement of Virtual Reference Services on ARL Library Websites
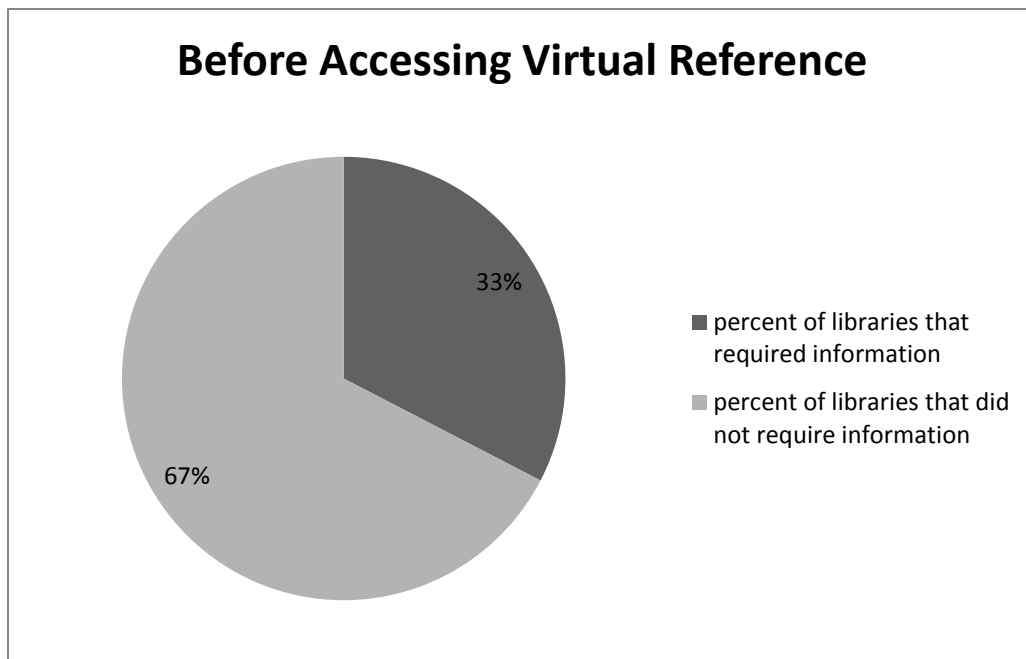
Figure 5: Percentage of ARL Member Libraries that Asked for Personal
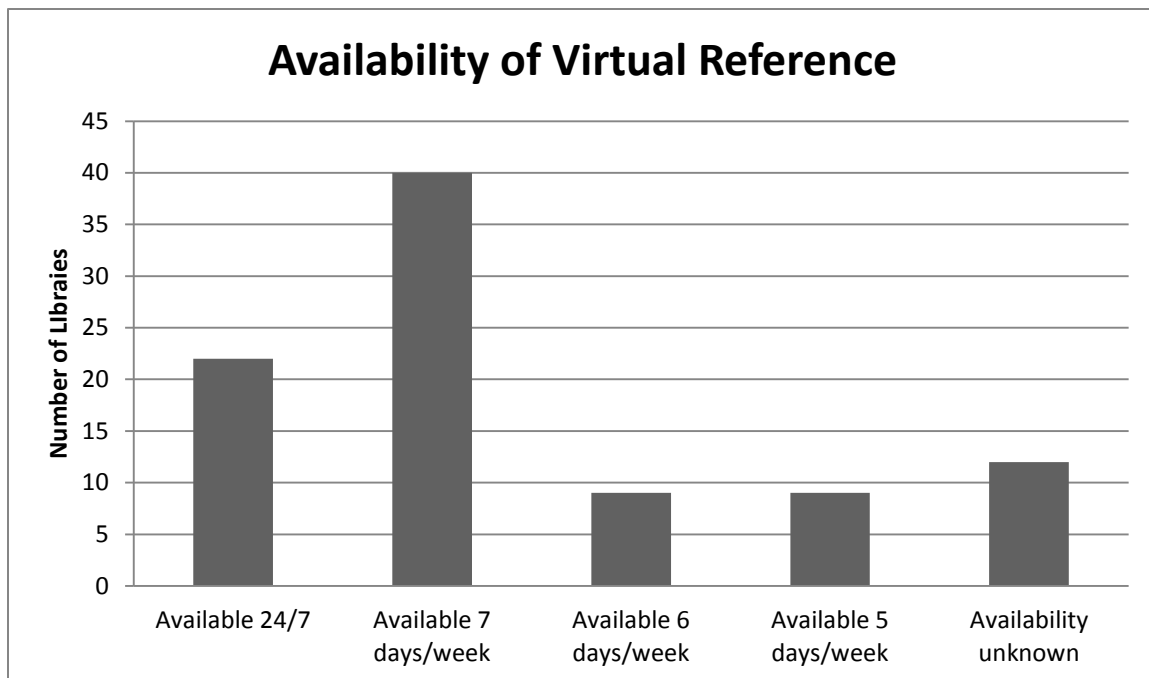Information before Allowing Access to Virtual Reference Services

Figure 6: Approximate Availability of Virtual Reference
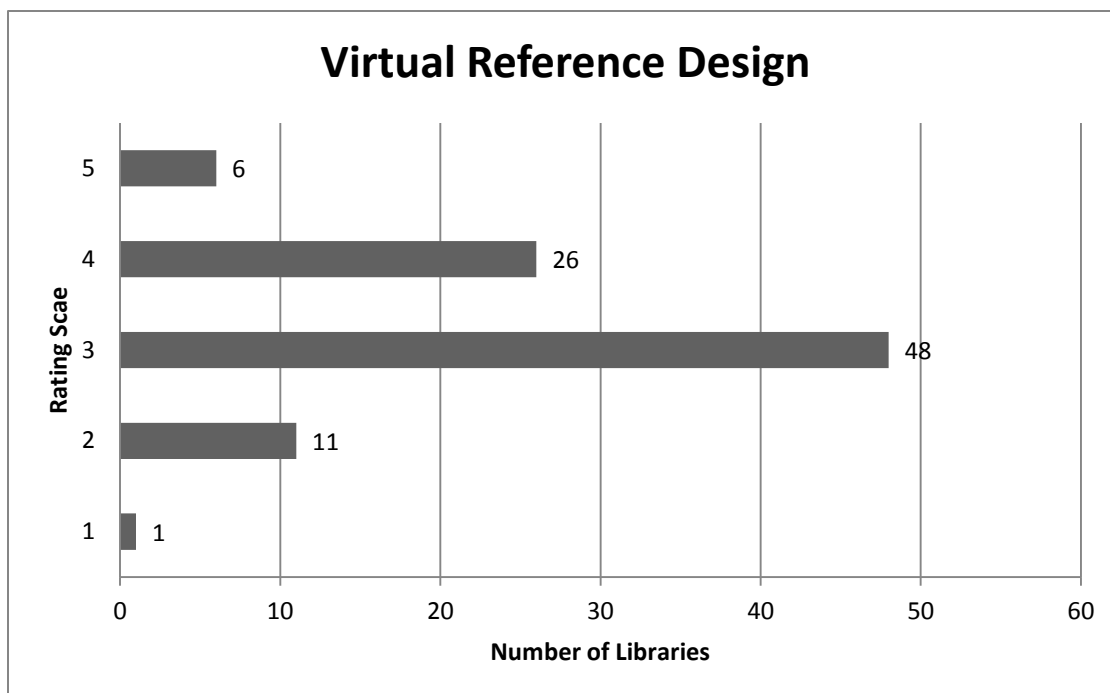Services at ARL Member Libraries

Figure 7: Subjective Rating Scale of Virtual Reference
Application at ARL Member Libraries