

A Usability Evaluation of Academic Virtual Reference Services

Anthony S. Chow
Assistant Professor
Department of Library and Information Studies
The University of North Carolina at Greensboro
School of Education
1300 Spring Garden St.
School of Education Building, #450
Greensboro, NC 27402-6170
Email: aschow@uncg.edu
Fax: 336.334.5060
Office: 336.334.3411

Rebecca A. Croxton
The University of North Carolina at Greensboro
School of Education
1300 Spring Garden St.
School of Education Building Greensboro, NC 27402-6170
Email: racroxt@uncg.edu
Fax: 980-598-1604
Office: 704-845-8685

Accepted: January 11, 2013

Anticipated Publication Date: May 1, 2014

Manuscript#: cr113-408

COLLEGE & RESEARCH LIBRARIES PRE-PRINT

A Usability Evaluation of Academic Virtual Reference Services

This study examined the usability of five virtual reference services – instant messenger chat, email, telephone, text-messaging, and Skype video conferencing – by having 31 undergraduate and graduate students evaluate the usability of the virtual reference services of two different universities. The study's results suggest that user preference and satisfaction for virtual reference service are highly correlated with the service's overall usability in terms of effectiveness and efficiency. Online chat was rated highest across all measures including satisfaction and seven different usability factors. Major implications of the study suggest that online chat is the virtual reference of choice for university students and that usability metrics are a good predictor of user preferences centered on high return on investment, speed of transaction, convenience, and minimal effort.

In order to stay relevant in this rapidly evolving information age, libraries across the world are racing to reinvent themselves. They must do so in an environment where information seekers have "...many options, little patience, and use many different types of information and communication technology."¹ While many libraries are increasingly making their content available digitally over the Internet, they are also taking steps to make their reference services available virtually. Some virtual reference services, including email, instant messaging (online chat), and telephone have been around for decades, while other services such as text messaging and video conferencing are just beginning to emerge. Sloan reported e-mail reference has been going strong for 20 years and live chat-based reference for 10 years.² Virtual reference services are becoming commonplace in both academic and public libraries across the United States. In a recent survey study of 1,226 academic and public libraries, 54.95% of survey respondents indicated they offer reference services virtually. In a separate phase of this study, the researchers found that 84.6% ($n = 203$) of library websites evaluated offered virtual reference services.³ The most common type of virtual reference was email reference, followed by chat, then text, then "other." Both surveys found the least used form of virtual reference was Skype or video conferencing.

While many libraries now offer a suite of virtual reference services, the proliferation of these services is not always matched by actual use.⁴ Many virtual reference projects initiated in recent years have been suspended or discontinued altogether. Several studies suggest the success of virtual reference services does not depend solely on the quality of the service, but may also be dependent upon funding, volume of reference questions, staffing levels, hardware and software issues, and institutional culture.⁵ Further, many library patrons are not aware that virtual reference services are available.⁶

While many elements contribute to a person's experience using a virtual reference service, a significant, yet often overlooked factor, is the overall *usability* of the digital services. Chow explains, "...digital environments are for human use, and taking a human centered design (HCI) approach with an emphasis on pervasive usability with representative users ... will help ensure that the digital environment is high on utility and ease-of-use."⁷

The International Organization for Standardization (ISO) formally defines usability as "the extent to which the product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."⁸ Analyses of the usability of virtual reference services must reach beyond the actual interface design of the tools. Mu et al. found "...there is no significant difference in users' opinions of a VRS [virtual reference service] and their willingness to use it that is caused by the design of the interface, provided ... users are aware of its existence and the link is clearly labeled with its function..."⁹

Looking beyond the interface design of virtual reference tools and ensuring awareness of services, usability evaluations must consider what factors make virtual services effective, efficient, and satisfying. Several studies have found that the popularity and usability of virtual reference services may be dependent upon the type of question with which a patron presents.¹⁰ Other factors which may play a role in perceptions of usability may include the type of user, age, and gender of library patrons.¹¹

A frequent oversight in the development of highly usable digital information environments, (including virtual reference services), is

...designers frequently develop digital information spaces utilizing their own paradigms – what they deem to be important, organized in a fashion that makes the most sense to them – in absentia of the people that will actually be using it. This disconnect creates a gap between the designer and the user.¹²

While it is ideal to engage representative users as design partners from the very beginning of a project, many libraries bypass this vital step. A key element of application and implementation of a usable digital information environment is to continuously improve, refine, and collect representative feedback.¹³ Therefore, usability of virtual reference services can continue to be improved upon, even if already developed and implemented.

Understanding how the usability of virtual reference mediums affects a library patron's information seeking experiences, preferences, and overall success will allow libraries to design and improve upon virtual reference services with greater precision, effectiveness and efficiency. Usability must be a developmental keystone of a successful library experience, for if users cannot access information easily, there is little point in expending the time, effort, and expense it takes to provide digital reference.¹⁴

The authors published an article examining the usability of virtual user services from the perspectives of university faculty, staff, students, and librarians¹⁵. A central limitation of this study was self-reporting from participants, many of whom had never used the virtual reference services they were rating. This study reflects the results of a more traditional usability evaluation with an emphasis on user testing, direct interaction with the services being tested, and the collection of specific metrics and data points representing an industry standard operational definition comprised of specific measures for how a user views a service's effectiveness, efficiency, and satisfaction. Are particular virtual reference services more usable than others? Are there factors which make particular reference services more usable than others?

Whereas previous studies have examined usability from an opinion and largely non-empirical (without usability testing with actual users) perspective, this study seeks to answer these questions empirically by examining the usability of five virtual reference services (email,

telephone, online chat, text messaging reference, and Skype video conferencing) offered in two doctoral granting institutions in the southeastern United States through the perspectives and usability results of undergraduate and graduate students who evaluated each of the services.

Literature Review

When considering the usability of digital information environments, one must look closely at factors of effectiveness, efficiency, and satisfaction.¹⁶ While many studies have examined various aspects of the usability of email and chat reference services, literature regarding the overall usability of the suite of virtual reference mediums offered by many libraries today (including email, telephone, online chat, text messaging, and video conferencing) is sparse. It does not reflect the more traditional usability practice of conducting formal usability tests involving users attempting to complete major tasks. Such formal testing allows more specific feedback through quantitative and qualitative test data; rather than relying solely on participant self-report opinions, it is based on their explicit ability to actually use a service or system.

Do Characteristics of Reference Mediums Affect the Usability of Virtual Reference Services?

Many studies have indicated that users value virtual reference services for their effectiveness, quality, convenience, speed, efficiency, and immediacy with which answers were received.¹⁷ However, differing characteristics of particular reference mediums may affect the overall usability, satisfaction with, and preferences for using individual virtual reference mediums. In a recent survey study and factor analysis of 936 university library users and their virtual reference preferences (email, telephone, online chat, text messaging, and video conferencing), Chow and Croxton found that across all study respondents, email was the most preferred (56.6%) virtual reference medium over all other choices.¹⁸ In this same study, the most

frequently cited reasons for email preference were convenience, familiarity, ease-of-use, and a written record that was both precise and in-depth. However, in a separate study utilizing semi-structured interviews with undergraduates, graduate students, and faculty members, Connaway, Radford, and Dickey found that while the majority of respondents indicated that subject expertise was very important to them, only 42% would be willing to wait for that expertise, as is often required when using email.¹⁹

Chow and Croxton further noted library patrons choose online chat, telephone, and text messaging reference services for their speed and quickness of response first, ease-of-use second, followed by multitasking (for using online chat). Texting and video conferencing reference services received consistently low preference scores throughout this same study.²⁰ Similarly, additional studies have found that individuals choose virtual reference services (e.g. online chat) for convenience, immediacy, efficiency, remote access, price, availability 24/7/365, anonymity, effectiveness, and quality.²¹

While email, online chat, and telephone reference services are commonplace in libraries today, text and video reference are beginning to emerge as virtual reference mediums in academic libraries. However, little data currently exists in the literature regarding either the usage or usability of these services. Current research suggests usage of these emerging reference mediums to be limited. In a review of digital reference activity for two semesters at Southeastern Louisiana University, Hill, Hill, and Sherman found text messaging constituted only a small portion of digital reference activity. Of 1,447 requests for information via digital reference, 66 percent ($n = 954$) were via chat, 28 percent ($n = 410$) were via email, and 6 percent ($n = 83$) were via text messaging.²² The researchers postulated, “With more convenient reference options available such as e-mail and 24/7 chat, patrons may choose these more robust forms of

communication that are better suited for college level research questions.”²³ Research further suggests that online video conferencing services may not be as usable as other forms of virtual reference. At Ohio University Libraries, Booth found, “The near impossibility of maintaining eye contact via a video chat interface is ...disconcerting and somewhat reduces one’s ability to engage in an effective, traditional face-to-face reference interview.”²⁴

Despite the generally positive findings regarding the usability of virtual reference services, other studies have brought to light negative factors which can affect the overall usability of virtual reference services. Dee and Allen suggested that problems accessing digital reference services and difficulty using it were two major barriers.²⁵ Thomsett-Scott found that students dislike having to wait for responses from email and chat.²⁶

These findings may be explained, in part, by the concept of “strategic satisficing,” introduced by Warwick, et al. who noted that their subjects “used the expertise that they had ... gained in information seeking to create time-saving strategies to complete coursework with minimum effort.”²⁷ In this study, the researchers noted their subjects chose both sources and strategies within a well-known comfort zone in information seeking. These findings suggest that convenience may play a role in judging the usability of a reference medium.

This current study sought to determine which virtual reference medium is considered to be the most usable for library patrons.

Does Type of Question Play a Role in the Usability of Virtual Reference Services?

Several studies have been conducted which examine the type of questions users bring to virtual reference service and the suitability of particular virtual reference mediums for different types of questions. A general perception is that online chat reference is suitable mostly for simple factual and directional but not reference questions.²⁸

Other researchers believe chat reference is capable of going beyond basic ready reference questions.²⁹ Ward reported that 78% of chat reference transactions in an academic library showed some indication of bibliographic instruction or question negotiation, which typically occurs in subject-based research questions.³⁰ In a review of survey data for 415 virtual reference transactions (e.g. online chat), Kwon found user satisfaction was the highest in subject-based research questions, while simple factual questions were the second highest, followed by local library information, circulation-related questions, and resource access questions.³¹

Bringing email into the conversation, Lee found many similarities among the questions asked using email and chat.³² Both chat and email virtual reference received approximately the same proportion of questions about finding known items, research and reference. Email received a small number of questions about referencing and citing, while chat received none of these questions.

According to the findings of Hill et al., text messaging reference is a unique service virtual reference service well suited for short answer questions. They noted,

Most of the questions [via text messaging] have been of the short-answer variety. However, the service also prompted short-answer reference questions ... that are atypical of reference questions received via phone, email, and chat.³³

Chow and Croxton (2012) found the preference for using both text messaging and Skype video conferencing to be very low.³⁴ Though studies have shown the use of text messaging reference to be low, current trends reported by the Cellular Telecommunications Industry Association (CTIA) suggest text messaging reference may soon become a more prevalent medium, regardless of type of question. Between June 2007 and June 2008, CTIA reported a 160 percent increase in the number of text messages sent (from 28.8 billion to 75 billion).³⁵

At this time there is no concrete data as to whether online video conferencing is perceived to be more usable for either a quick, factual question or a research related question. In a pilot study using Skype reference in an academic library, Booth noted, “overall trends confirmed our hypothesis that ... [Skype] ... would serve as a source for basic information rather than an in-depth point.”³⁶ The limited research currently available about preferences for and/or usability of providing online video conferencing services in libraries suggests users are simply not yet ready to use these services on a regular basis, regardless of the type of question with which they present.³⁷

Does Age or Patron Status Play a Role in the Perceived of Usability of Virtual Reference Services?

The type of patron may also play a role in perceptions of usability of virtual reference mediums. In a survey study of 345 chat users, Ward found that undergraduates saw the “chat” service as being applicable for most situations, while graduate students recommended the service noticeably more for ready reference questions.³⁸

In their study of 936 university faculty, staff, and students, Chow and Croxton noted that based on university status, age, gender, and race, specific users have particular reference service preferences based on type of question. They found,

Faculty, staff, and graduate students ranked telephone for factual questions at significantly higher levels than undergraduate students. Faculty and staff prefer using e-mail for faculty questions at significantly higher levels than both undergraduate and graduate students while students have a significantly higher preference for using text messaging. ... All user groups rated online chat relatively high for seeking help with a factual question. ... For research questions...faculty, staff, and graduate students preferred e-mail at statistically higher levels than undergraduates, while undergraduate students preferred online chat at significantly higher levels than faculty and staff.³⁹

If user preferences for particular reference services are an indicator of the actual usability of these services, one may expect the usability ratings to mirror that which is preferred. The

findings of Chow and Croxton (2012) suggest users select their virtual reference medium according to the type of question they have. Role and age also appear to be influencing factors in determining reference preferences.⁴⁰

Regardless of type of question, age, or role of the patron, information seeking appears to follow the Principle of Least Effort. Poole noted this principle to be the prominent result in a review of a dozen information seeking studies.⁴¹ Overall, Poole found that information seekers attempt to minimize the overall work associated with something both now and in the future. Rubin (2004) further explains that people will seek the most convenient source available to meet their information needs. In a focus group study of 33 university faculty, undergraduates, and graduate students, Young and Von Seggern found that when considering criteria for information seeking, concern for time was brought up most often.⁴² Study participants would often accept inappropriate information or information of lower quality if finding it took less time. Therefore, the findings of Poole and Young and Von Seggern suggest library virtual reference services patrons may choose the reference medium which requires the least effort, that which is convenient, quick, and easy-to-use.

This study attempts to determine the overall usability of the suite of virtual reference mediums offered by many libraries today. The study further examines the factors which make particular virtual reference mediums more usable than others. Within this study, the type of question and role of the user and how they are related to usability ratings will be explored.

Therefore, the purpose of the study is to seek answers to three research questions:

RQ1: Which virtual reference medium is most usable?

RQ2: Does the type of question play a factor in the usability of virtual reference mediums?

RQ3: Do perceptions of usability for virtual reference mediums differ depending on the role of the patron?

Method

In order to assess the usability of library virtual references services, this study utilized a mixed method quantitative and qualitative design to conduct a usability evaluation that analyzed and compared patrons' perceptions of usability of five virtual reference support services (email, telephone, instant messaging (online chat), text messaging, and Skype video conferencing) offered at two separate mid-sized public university libraries in the Southeast, each with a student population of approximately 18,500. The study was conducted over five months in the spring of 2011.

Participants

A randomly selected group of undergraduates ($n = 13$) and graduate students ($n = 18$) participated in this study. Though 31 individuals participated in the study, there were occasions where fewer individuals responded to particular survey questions. Of the study participants, 74.2% were female and 25.8% were male. Age range was primarily concentrated under age 34, with the following breakdown: 48.3% under 24, 37.9% age 25-34, 10.3% age 35-44, and 3.4% age 55-64. In terms of prior experience with the technologies used in the study, participants were experienced with email, chat, and telephone, respectively, moderately experienced with text messaging, and inexperienced with using Skype.

Materials, Instrumentation, and Data Analysis

In order to properly conduct a usability evaluation for each of the virtual reference services, each study participant was emailed a set of detailed instructions which included 10 different questions – five quick, factual questions and five procedural or research based questions which required a more detailed response by the librarian (see Appendix A for sample instructions). The questions assigned to study participants were of similar subject matter and

depth. The actual questions, however, differed throughout the study in order to control for familiarity with the questions received on the part of the reference librarian (see Appendix B for a list of questions). Participants were assigned a particular university library (University A or University B) to which to direct their pre-assigned questions. Fifteen participants asked questions virtually at University A, while 16 participants asked virtual reference questions at University B. Questions were asked using the five virtual reference services (email, telephone, online chat, text messaging, and online video conferencing) as illustrated in Table 1. An exception was University B did not offer online video conferencing.

Insert Table 1 - Participant Frequency Counts x Type of Question

Subjects completed online surveys of their experiences – rating measures of usability and satisfaction after evaluating each virtual reference medium (see Appendices C – G for survey instruments). Preferences for reference formats were ranked at the completion of the study (see Appendix H). Data regarding study participants' prior experience with virtual reference mediums or tools were gathered at the beginning of participation in the study.

The instructions and survey instruments were pilot tested with graduate students for preliminary face and construct validity, refined accordingly, and then administered via e-mail to study participants.

Virtual Reference Services Tested

Five virtual reference mediums were tested in this study. Consistent across each of the mediums, study participants were instructed to ask the first, pre-assigned quick, factual question, wait four hours, and then ask the second, pre-assigned procedural, research based question. Once replies to both questions were received, study participants were instructed to complete online surveys of their experiences after each medium was tested. *E-mail reference* was utilized by directing study participants (through a link in their emailed instructions) to a university

library's *Ask Us!* page. Subjects were then instructed to move on to *Telephone reference*. They were given toll free phone numbers to use to call their assigned library's reference desk. At the completion of telephone reference evaluation, participants were then instructed to contact the *Online Chat* reference services and ask both factual and procedural research based questions. Participants were given a link in their instruction set, directing them to the online chat window. Study participants then were instructed to contact the library using text messaging reference via their cell phones/mobile devices. They were given a specific number to contact via text, along with a particular number and/or word to initiate their reference inquiries. Finally, study participants contacting University A were instructed to contact the Reference Department via Skype video conferencing and ask their two assigned questions, waiting at least four hours between each inquiry. (University B does not offer Video Conferencing reference at this time.) Participants were given specific instructions about how to contact the library using a given Skype username. Participants needed to have a computer with the free Skype software downloaded as well as a web camera. After participants completed this portion of the study, they completed online surveys of their experiences with this reference medium.

Results

"...chat has the speed and efficiency of phone usage and the in-depth effectiveness of email"
(research participant)

Instant Messenger Chat the Clear Choice

The results found a perfect relationship between participant satisfaction and their usability ratings for each reference medium tested during the study. Undergraduate and graduate students were most satisfied with chat reference, for both research and factual questions, followed by telephone, email, text, and Skype, respectively. See Table 2.

Insert Table 2- Undergraduate and Graduate Reference Service Preferences

Table 3 shows the combined cumulative scores of both graduate and undergraduate students.

Insert Table 3- Combined Undergraduate and Graduate Ratings for Reference Service Preferences

Chat was also was rated the highest across all usability factors by participants - more effective (9.6 out of 10), efficient (9.4), and satisfying to use (9.6) than any other reference service. Participant usability ratings for the remaining four reference services - telephone, email, text, and Skype – also exactly paralleled participant satisfaction. See Figure 1.

Insert Figure 1- Reference Service Usability Ratings

Chat was rated the most usable service because it scored the highest for all reference services across all seven usability factors for both research and factual questions. One-way ANOVA, a statistical test used to compare mean scores within and between groups, showed that the usability ratings for chat across participants were statistically the same for six of seven usability factors, which suggests consistently high ratings for chat across participants. Overall, chat had statistically significant higher usability ratings across factors in comparison to other mediums with its grand mean (mean of means for all factors) being statistically significantly higher than email and Skype. See Table 2.

Insert Table 4 - Reference Service by Individual Usability Factors

Face-to-face Versus Virtual Reference

When participants were asked to select only one reference medium including face-to-face, participants still preferred chat reference more frequently for both research (53%) and factual (60%) reference questions than all other reference options combined. See Table 3.

Table 5 - Reference Service Preferences for Research Questions

Online chat and telephone combined represented the preferences of 73% of the study's participants for seeking help with a basic factual question. See Table 4.

Insert Table 6 - Reference Service Preferences for Factual Questions

Time a Factor

Four of the five reference services – chat, telephone, text, and Skype – represent potentially quick responses to participants' questions. For factual questions, chat had the quickest response time with 96% of all transactions taking less than five minutes with 23% taking less than a minute. The second highest rated reference service was telephone and 90% of all transactions were less than five minutes with 42% taking less than a minute to complete. Both chat and telephone were rated the first and second most preferred, respectively.

In contrast, only 52% of text message and 67% of Skype transactions were completed within five minutes. For email, more of an asynchronous mode of communication, only 52% of transactions were resolved within one hour and 39% took over 12 hours to resolve.

The pattern was similar for research questions. Chat transactions had 100% resolved and telephone resolved 97% of all transactions within 15 minutes or less. Skype had 15% and text had 31% of their transactions take longer than one hour. For email, 48% of all transactions took longer than two hours and 30% took 12 hours or longer.

Chat Favored Independently of All Factors

Analysis of various factors found no significant differences for gender, age, race, library, or prior experience. This suggests that the majority of participants consistently rated chat and the four other mediums independent of other factors.

Discussion

The results of our study support our previous study which found undergraduate students preferred online chat over all other reference services.⁴³ One limitation of that study was the majority of respondents to our survey had not actually used the reference services. This study represents one of the first usability evaluations, which had participants specifically test each reference service by using each of them to answer a set of tasks. Participants tested each service for both research and factual questions and rated each across seven established usability factors.⁴⁴ The results help operationally define participant preferences based on usability ratings emphasizing effectiveness, efficiency, and satisfaction.

Online chat was rated highest in effectiveness, efficiency, and satisfaction. One reason for this was because of how fast the transactions were in comparison to all other services. In addition, participants noted other prominent factors such as real-time interaction, the ability to multitask while chatting, the convenience of “already being on the computer,” and the visual and archival aspects of text-based chat that also allows for the sharing of links. As one participant noted:

Chat was more user friendly than the telephone. I think that seeing the response in a written form helps me to crystallize my understanding of the answer. I also liked the fact that the librarian could easily send me links via the chat; it would be more difficult to do so over the telephone. I also think that the chat was a lot more to the point, without being curt; on the telephone you actually have to converse with the other person which may not be ideal if a quick answer is needed.

Telephone was the next most preferred reference medium and, similar to chat, had an extremely fast transaction time for participants. In fact, an immediate response was the primary

factor mentioned by participants for why they liked using the telephone. The other prominent factor was the real-time interaction. As one participant put it, “I like the telephone for when I need information quickly and right then.” Another noted, “Through telephone you can again ask questions or recheck something with the person and would receive more accurate response in a timely manner.” One negative for telephone service is that it may cost students money by using limited cell phone minutes.

Email was the third rated reference service. Unlike the other four services, the majority of email transactions took over 12 hours to complete. While it is much slower compared to the other services, strong points include the ability to ask a detailed question and receive a similarly detailed response with web links. In addition, it serves as a written record that can be referred back to anytime. One participant noted, “Email communication allows for the responder to provided [sic] detailed information along with links, examples, and attachments.”

Text-messaging was rated much lower than expected given the prevalence in which students use text-messaging for social communication. Participants noted that one of the reasons why text was rated so low was because, although it is very similar to online chat, they had to remember a phone number and use a cell phone as opposed to just opening a web browser and engaging in an online chat from their computer. As one participant noted, “I liked chat better than text messaging because it was all on the computer. The chat told me when the person was responding so I liked that. I wasn't just waiting around.” Another issue was the quality of support for text-messaging reference services as several participants noted they never received a response at all and gave up.

Skype was the lowest rated reference service. Analysis of participant comments suggests that this low rating was due to a host of problems. First was technical in nature – some could not

get the software to work properly, some did not have a functional webcam, and others had slow connections. Second, while some lauded the ability to see and hear the reference librarian, others did not feel that visual cues added anything to the process and at times made them feel uncomfortable. One participant noted the differences between chat and Skype, “Chat was very fast and simple to use--I didn't have to download a new program onto my computer to get answers. Also, being able to see and hear the person made me feel a little weird because I don't usually communicate with people via video chat.”

High Usability, High Satisfaction

The International Organization for Standardization defined usability as a person's ability to use a product or service with maximum effectiveness, efficiency, and satisfaction. Utilizing this framework, our study found a perfect positive relationship between user preferences and how they rated each reference service across usability factors -the higher the usability, the higher rated the reference service was. In other words, the higher the participant's return-on-investment in terms of time and mental effort, the more highly rated the service. This supports Warwick, et al.'s concept of *strategic satisficing*, where students choose the information seeking paths that are most comfortable and convenient for them.⁴⁵

The results of the study suggest that each of its three research questions can be answered – online chat was found to be the most usable and participant preference was independent of all other factors examined including type of question, university service tested, gender, race, academic status, or age.

Study Limitations

The study had four primary limitations. First, the study conducted a usability evaluation instead of a traditional usability test with participants in a lab setting; outside of this controlled

testing environment the study relied on the self-reports of students under the assumption that they actually completed all tasks and completed each of the usability surveys in a valid, authentic manner. Second, a low sample size of only 31 student participants evaluating two university reference services limits the study's internal and external validity and overall generalizability. The third major limitation was that Skype reference services were not offered at both reference departments, and therefore only half of the participants were able to evaluate and test this service. The last primary limitation had to do with the quality of scenarios used to test the reference services. Feedback from one library's reference service staff was that the redundant questions being asked allowed them to recognize participants in the study and may have slightly influenced the quality of responses they received.

Conclusion

The study's implications center on the fact that it represents one of the first formal usability evaluations of library virtual reference services utilizing a usability framework. Five types of virtual reference services were examined at two different university reference departments and the results clearly suggest that participant satisfaction and preferences were guided by time of response, convenience, effectiveness, and efficiency.

Online chat was clearly preferred by the majority of participants and rated the highest for time of response and across all seven usability factors on a statistically significant basis – task completion, quality of output, deviations, errors, time-on-task, mental effort, and overall satisfaction. These findings support Poole's Principle of Least Effort where information seekers want access to information with the least amount of effort possible.⁴⁶

Online chat appears to combine the strengths of other reference services into one service – the immediacy of response and real-time interaction of telephone, the convenience, written

record and content sharing of email, and the instant messaging of text-messaging and Skype. The study's results suggest that with the increased proliferation of wireless technologies such as smart phones and tablets, instant messaging chat may continue to grow in popularity as the younger population entering college will be even more familiar and comfortable with this technology.

Given the rapid changes brought on through current and emerging technologies there is a need for more agile methods of measuring usability in the field. Making use of the study's instruments and protocol the study represents a process for how to conduct similar usability evaluations that have users complete a set of tasks so that they have actually "tested" the service before completing a scale about the overall effectiveness, efficiency, and satisfaction of their user experience. This provides organizations with both qualitative and quantitative data to ensure at a more precise level that services are indeed high in usability. Furthermore, the quantitative data can be analyzed statistically to see more clearly what specific factors of usability might represent opportunities for improvement.

Such usability evaluations, while less comprehensive and valid than traditional usability testing in controlled environments, may replace the use of the standard controlled usability test in terms of frequency and choice because it is much quicker, cost effective, and viable to conduct. This may lead to usability evaluations occurring more often. These will complement rather than completely replace controlled tests, which should still take place but less often and for only those who are prepared to do so with the appropriate time, participants, and hardware and software.

Future research involves seeking to replicate this study at other universities as well as to examine faculty and staff usability evaluations for the same virtual reference services, who have been found to prefer email over chat. In addition, further examination of whether these findings

can generalize to the virtual reference service preferences of public and special library patrons need to also be explored.

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Notes

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Figures and Tables

Table 1 – Participant Frequency Counts x Type of Question

University	Student Type	Participants	Reference Service and Type & Number of Questions									
			Email		Phone		Chat		Text		Skype*	
			Quick Fact	Research	Quick Fact	Research	Quick Fact	Research	Quick Fact	Research	Quick Fact	Research
University A	Grad Student	9	9	8	9	8	9	9	9	6	8	7
	Undergraduate	6	6	6	6	6	6	6	6	6	5	5
University B*	Grad Student	9	9	8	9	9	9	9	8	8	0	0
	Undergraduate	7	7	7	7	7	6	6	6	5	0	0
Total		31	31	29	31	30	30	30	29	25	13	12

*University B did not offer Skype reference services

Table 2 - Undergraduate and Graduate Reference Service Preferences

Undergraduate and Graduate Student Usability Ratings

	Email		Telephone		Chat		Skype		Text	
	UG	G	UG	G	UG	G	UG	G	UG	G
Effectiveness	8.4	8.1	8.9	8.5	9.5	9.7	5.8	6.4	5.8	6.3
Task Completion	8.9	7.9	9.0	8.6	9.5	9.5	5.8	6.6	6.1	6.3
Quality of Output	7.8	8.2	8.8	8.4	9.5	9.8	5.8	6.2	5.5	6.3
Efficiency	8.7	8.0	8.9	8.5	9.2	9.4	5.8	5.0	6.5	6.3
Deviations	9.3	8.3	9.2	9.0	9.5	9.4	5.4	4.9	6.5	6.4
Error Rate	9.1	8.6	9.2	9.0	9.5	9.5	5.6	5.4	6.9	6.3
Time-on-Task	7.3	7.3	8.5	7.7	8.9	9.6	6.4	4.7	5.7	6.2
Mental Effort	9.1	7.9	8.7	8.4	9.1	9.4	5.8	4.9	7.0	6.2
Satisfaction	8.4	7.8	9.0	8.5	9.4	9.7	5.8	5.6	6.4	6.4
Usability (Grand Mean)	8.5	8.0	8.9	8.5	9.3	9.5	5.8	5.5	6.3	6.3

Table 3 – Combined Undergraduate and Graduate Ratings for Reference Service Preferences

Reference Medium	Research Question	Factual Question
Chat	9.1	8.9
Telephone	9	7.5
Email	7.5	7.1
Text	5.9	5.8
Skype	5.8	6.3

Table 4 - Reference Service by Individual Usability Factors

Factor	Chat	Tel.	Email	Text	Skype
Task Completion	9.5*	8.8**	8.3***	6.2*	6.3*
Quality of Output	9.7	8.5*	8.1**	6.0*	6.1
Deviations	9.4*	9.1**	8.7*,**	6.5*	5.1
Errors	9.5*	9.1*,***	8.8*,**	6.5*	5.5*
Time-on-task	9.3*	8.0	7.3**	6.0	5.3*
Mental Effort	9.3*	8.5	8.4*	6.5	5.2*
Satisfaction	9.6*	8.7	8.0***	6.4	5.7
Grand Mean	9.5*	8.7	8.2**	6.3	5.7**

*Homogeneity of Variance is significant at the $p < .05$ level.

**Statistically significant at the $p < .05$ level.

*** Statistically significant at the $p < .01$ level.

Table 5 - Reference Service Preferences for Research Questions

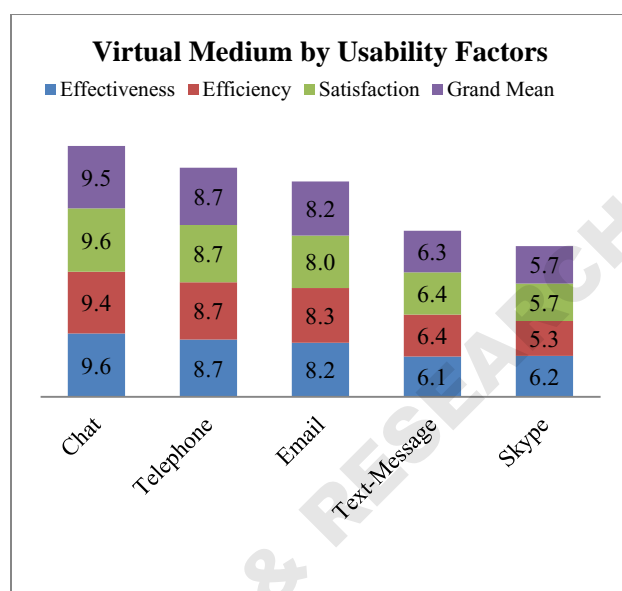
Medium	f	%
Online Chat Reference	16	53.3%
Face-to-Face Consultation	8	26.7%
E-Mail Reference	5	16.7%
Telephone Consultation	1	3.3%
Skype Video Reference	0	0.0%
Text	0	0.0%

Table 6 – Reference Service Preferences for Factual Questions

Medium	f	%
Online Chat Reference	18	60.0%
Telephone Consultation	4	13.3%
Text-a-Librarian Reference	3	10.0%
Face-to-Face Consultation	2	6.7%
Other	2	6.7%
E-Mail Reference	1	3.3%
Skype Video Reference	0	0.0%

Figures

Figure 1 - Reference Service Usability Ratings



Appendices A-H are attached as separate documents because they are in PDF format:

Appendix A – Research Protocol

Appendix B – Factual and Research Questions Used for Testing

Appendix C – Email Online Survey

Appendix D – Telephone Online Survey

Appendix E – Chat Online Survey

Appendix F – Skype Online Survey

Appendix G – Text Online Survey

Appendix H – Debriefing Usability Survey

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