Digging Deeper into Virtual Reference Transcripts

Journal:	*Reference Services Review*
Manuscript ID:	RSR-04-2015-0024.R2
Manuscript Type:	Original Article
Keywords:	Reference Services, Academic libraries, Content analysis

SCHOLARONE™
Manuscripts

For Peer Review

Digging Deeper into Virtual Reference Transcripts

Abstract

Purpose

The purpose of the study is to identify the information needs of patrons in a large Canadian academic library system by analyzing the types of questions asked through the Library's "Ask A Librarian" system. The results provide information on specific areas of competencies and training for staff providing virtual reference services.

Methodology

This article looks at virtual reference data collected between January and April 2012 from a large Canadian academic library and provides an analysis of the types of questions asked by library users. The researchers developed a detailed coding scheme for the analysis of question type and referrals made, and used the qualitative analysis software NVivo™ to code and analyze the data.

Findings

The results of this analysis found that patrons often tap into synchronous online library help when they encounter challenges with online library resources. Specific areas of patron training to be developed were also identified. Finally, areas for staff training were uncovered which will help the library provide a consistent level of service to patrons.

Originality

This is the first study in the library community to conduct a detailed analysis of the virtual reference transcripts from a large Canadian university using the NVivo™ content analysis software. The study developed and employed more detailed coding categories then has been used in previous studies in order to provide more information about the questions that patrons

For Peer Review

are unable to complete on their own. The study also captures detailed information pertaining to referrals.

Introduction

Virtual Reference (VR) also referred to as chat reference, is defined by the American Library Association as "…a reference service initiated electronically, often in real-time, where patrons employ computers or other Internet technology to communicate with reference staff, without being physically present. Communication channels used frequently in virtual reference include chat, videoconferencing, Voice over IP, co-browsing, e-mail, and instant messaging" (Guidelines for Implementing and Maintaining Virtual Reference Services, 2004). The text transcripts of these reference interactions provide Library and Information Science (LIS) researchers with a wealth of data which can be analyzed in numerous ways to provide insight into patrons' use of the library and its resources.

Libraries continue to struggle to provide more and better service to patrons while in the midst of ongoing budget reductions. The improvement and expansion of virtual services will be seen as a logical and economical solution to this ongoing challenge. One of the challenges of any reference service is providing a consistent level of service. Differences in staff competencies, subject knowledge, and experience will impact the success of each reference transaction and patron satisfaction. This is particularly true of institutions that have more than one subject-specific library where staff tend to be trained to handle reference questions that are typical of specific disciplines, such as science or humanities, and may rarely encounter questions outside of their areas of expertise. In virtual reference however, reference staff will be exposed to questions from all disciplines and at different times of the day, when subject-specific staff may not be available for consultation. As a result virtual reference training needs to factor in many

For Peer Review

different aspects, from basic customer service, to knowing when and how to refer a patron. Standardized and on-going training are the key to providing a consistent level of reference service.

The "Ask-A-Librarian" service was first introduced at the institution in 2003 and from the start was enthusiastically embraced by the Library's patrons. Over the next several years, the service continued to see heavy use and rapid growth in the number of chats received. As such, the Library during this time was focused on ensuring that the service was adequately staffed and hours of service were extended to meet the demand. The Library had yet to do any evaluation of the service or gather user feedback. However, after almost ten years since the implementation of the service, the Library realized that it needed to solidify the framework of the virtual reference program. Questions started to surface regarding the types of questions that were being received through the service, if the service was adequately staffed, and what problems, if any, were there with the service. The researchers decided to start with analyzing the types of questions asked through the service, which they felt would provide a basis for future evaluations of other aspects of the service. Thus, the purpose of the study is to identify the information needs of patrons in a large Canadian academic library system by analyzing the types of questions asked through the Library's "Ask-A-Librarian" system.

This study used a mostly quantitative content analysis procedure to analyze the question type of virtual reference transcripts. Content analysis is a research technique often used in the social sciences "…for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (Krippendorff, 2013). The study also developed and employed more detailed coding categories then has been used in previous studies. The majority of past studies used only a few codes based on Katz's definitions of reference questions (Directional, Ready

For Peer Review

Reference, Specific Search, and Research) (Katz, 2002), the current study developed a coding scheme of 59 codes (Appendix A). The rationale for employing a more detailed analysis and coding scheme is that the results will provide librarians with information on the questions that patrons are unable to complete on their own. The study also captures detailed information pertaining to referrals such as which questions result in the patron being referred to a subject librarian, library department, and web page or library website. The analysis of the transcripts will help the Library better understand its users' information needs, discover gaps in staff training and instructional services, and contribute to the improvement of its online library services and resources.

Literature Review

Question Type Analysis

The analysis of virtual reference transcripts, and in particular, the types of questions asked using this medium, has been the subject of numerous studies. So much so, that in 2011, Matteson, Salamon, and Brewster published a systematic review of research on live chat reference services (Matteson *et al,* 2011). Of the 59 studies in their review, 13 analyzed the transcripts for types of questions asked (Matteson *et al,* 2011). Their review also highlighted the fact that while the coding schemes used in these studies were usually developed by building upon one another, the Library and Information Science community still lacks a common question type coding scheme that would allow for cross-institutional analysis (Matteson *et al,* 2011). However, they did note that "...four basic question types were observed with nearly equal frequency: reference; specific search/known item; policy/procedure; and information/directional" (Matteson *et al,* 2011). More recent studies by Arendt and Graves (2011), Morais and Sampson (2010), Radford and Connaway (2013), and Rourke and Lupien (2010) also used these previous coding schemes in

For Peer Review

order to develop and refine their own. Youngbar (2012) developed one of the most detailed coding schemes to date which included twenty-six question categories.

Referrals

One of the challenges library staff face when providing virtual reference services is that they often are confronted with questions outside of their area of expertise. At institutions with many subject-specific libraries, most patrons will visit the reference desk within the library of their discipline and thus are more likely to be helped by a library staff member with subject-specific expertise. In many cases, virtual reference staff provides service independently, sometimes outside of regular hours, and thus are unable to call upon colleagues for subject-specific assistance in the virtual environment. In such cases, library staff will often refer the patron to another library staff member (with a phone number, email or other contact methods), a website or web page, or another department, such as Circulation or Document Delivery. Kwon's (2006) study on user satisfaction with referrals at a collaborative virtual reference service found that patrons who received a referral "were significantly less satisfied than the patrons whose questions were completely answered", and in fact reported the same level of satisfaction as those patrons whose questions were partially answered or not answered at all. Virtual reference transcripts allow for the analysis of the types of questions that are referred and where or to whom they are referred. Such an analysis can provide clues to inconsistencies in service, the need for additional training in particular subject areas, policies, and service, or the need for library staff to have broader access to library systems, e.g. circulation modules in the library information system. A number of previous studies have incorporated an analysis of referrals into their research. Results range widely from a low of 2% of questions being referred, to a high of 29%. Levels of detail pertaining to referrals range from very basic, e.g. yes/no values (Houlson *et* al, 2007) to specific, e.g. referrals to circulation departments, subject specialist librarians,

For Peer Review

faculty, or other departments both on and off campus (Neuhaus and Marsteller, 2002). Neuhaus and Marsteller (2002) found that 20% of responses to VR questions resulted in referrals. Ward (2004) tracked referrals in order "…to check for what Ross and Dewdney refer to as 'Unmonitored Referrals', where the staff makes a referral as a way of circumventing the reference interview". In their study, referrals made up only 2% of the responses (Ward, 2004). Arendt and Graves (2011) found that 29% of all transcripts analyzed resulted in referrals. Of these, 39% were policy and procedural questions, 25% were ready reference, 24% were for specific search or research questions, 20% for holdings/do you own questions, and 17% were directional questions (Arendt and Graves, 2011). The majority of referrals (29%) were to the Circulation Department or its staff (Arendt and Graves, 2011). Eighty-five percent of these were policy and procedure related questions (Arendt and Graves, 2011). The study by Broughton (2003) resulted in only 2% of questions falling into the "referrals" category, where questions "…needed to be answered in other areas of the main library, such as circulation, or in a branch library or special collection". Arnold and Kaskes (2005) tracked which questions (12.47%) were referred to other staff, complete with names and contact information. De Groot *et al* (2005) analyzed questions received by both e-mail and chat and found that "…9.4% of questions were answered through reassignment, referral, or consultation". A slightly higher percentage of these referrals happened through e-mail rather than chat. Fennedwald (2006) found that 41% of questions in their study were referred to Access Services, Interlibrary Loan, and other departments. Kwon's (2007) study of a collaborative chat reference service found that local questions, i.e. those questions that can only be answered by the local library, were referred 44.2% of the time, whereas only 9.5% of non-local questions were referred. In her study, referrals were defined as those transactions where "…the patron's initial question was not answered during the reference transaction but offered referrals to other information sources or

For Peer Review

agencies that may or may not answer the question" (Kwon, 2007). Analysis by Powers *et al* (2011) found that referrals to the Reference Department were made "…27% of the time, including those to subject specialists and to the physical reference desk". The largest category for referrals was to the Interlibrary Loan department, at 38% (Powers *et al*, 2011).

Methodology

This study followed a mainly quantitative content analysis procedure as described by White and Marsh (2006). The exception to the quantitative procedure was the establishment of a hypothesis, as the focus of the study was to quantify the types of questions and referrals made while providing reference services through VR. In addition, the analysis of the transcripts in order to ascertain the types of questions being asked is in itself subjective, thus bringing an aspect of qualitative analysis to the study.

Prior to the collection of transcripts, the authors obtained ethics approval from the researchers' institutions' Research Ethics Board. All transcripts from the virtual reference service were collected for the period of January 3 – April 30, 2012. A total of 3473 transcripts were collected. Raw transcript data and metadata were downloaded from the LibraryH3lp online server, stripped of identifying information, and reformatted for import into NVivo™ for analysis.

A coding scheme was developed *a priori* based on those used in previous studies (Arendt and Graves, 2011; Arnold and Kaske, 2005; Marsteller and Mizzy, 2003; Maximiek *et al*, 2010; Sears, 2001; and Youngbar, 2012). The use of NVivo™ allowed the researchers to create a hierarchical, flexible set of codes that were not repetitive and had enough detail to answer the researchers' questions. This coding scheme also relied heavily on the researchers' considerable experience with providing virtual reference service, reference service and local system knowledge. The

For Peer Review

coding scheme was tested and refined during two rounds of reliability testing. A coding book (Appendix 1) and detailed coding instructions were also developed for use by the researchers during coding.

The unit of analysis was the "real" question that was being asked, not just the first question asked by the patron. As with other types of reference assistance, often the first question asked by a patron is not actually the real question. The researchers relied on their skills and experience in order to identify, where possible, the real question asked by the patron. If a transcript contained a second, unique question, i.e. not a follow-up question, this was coded as its own question. If the question resulted in the patron being referred to another staff member, department, web site, web page, etc., this was also coded.

Transcripts were randomized and each researcher was assigned a third of the transcripts for coding.

Data analysis was performed using the query functions within NVivo™.

Results

Question Type

Coding was split into two main themes. Codes related to the type of questions asked and codes related to attributes of the transcripts. Attributes coded included "Amusing Comments", "Testimonials", and "Referral" to a particular resource. The attributes were removed from the data set in order to focus the analysis on question type.

Broad Themes

As Figure 1 shows, the majority of the time, patrons used virtual reference to seek assistance with a particular material format (42%), followed by questions about Library Systems (20%) and

For Peer Review

Services (11%). The Miscellaneous category (11%) contained questions that fell outside of the coding scheme, e.g. non-library related questions, as well as references to partial chat sessions, in which patron questions could not be determined. Non-library related questions included those about obtaining old exams, assistance with interpreting assignment instructions, lost and found in the library, university related questions (non-library) such as Bookstore hours, employment opportunities, admissions, and finally, prank questions. Partial chat sessions occurred when a patron was disconnected from the service because they navigated away from the chat session window often before their question had been answered. When a patron came back to the service after being disconnected transcripts would often not contain a question but instead only indicate they had been disconnected. Such transcripts made up 17% of the Miscellaneous coded references or 2% of the total coded questions. Whereas previous studies had removed similar types of transcripts from their data set, in following the principles of quantitative analysis, the researchers determined that they should be included in the final data set.

(Insert Figure 1)

Questions about Library Materials

The three main formats sought by patrons were articles (43%), books (21%), and databases (12%) (Figure 2). The "Unspecified" category referred to patron requests for help in finding any type of material. This category was used when the coders were unable to determine the type of material sought by the patron. A typical question would be "I need help finding information on topic X".

(Insert Figure 2)

For Peer Review

Help with looking up an article reference, i.e. where the patron already had a citation to an item, made up the majority of the types of assistance required (Figure 3). Patrons most often required technical support with articles and databases. Technical support for articles mainly involved problems with opening and/or printing the article PDF, the wrong article being displayed, intermittent e-journal technical issues resulting in error messages, and attempts at accessing articles not owned by the library. Most of the database technical support queries involved problems with patrons not able to access certain databases due to intermittent database outages. Technical support issues for books naturally involved e-books. Problems reported by patrons included difficulty with viewing, downloading, or printing pages from e-books, and setting up mandatory accounts with specific e-book vendors.

(Insert Figure 3)

Questions about Library Systems

Of the questions coded for library systems the majority related to account questions (53%), holds (19%), and reserves (12%) (Figure 4). Further analysis of the account questions revealed that patrons were mainly seeking help with getting or resetting their library password to access electronic materials remotely. Questions about holds pertained mainly to how to place a hold on an item, how long it will take to receive the item after a hold is placed, how to recall an item, and how the patron will know when the item is ready to be picked-up. The majority of reserves questions were from students wanting to know how to find reserve material, either in print or through the Library's e-reserves.

(Insert Figure 4)

Questions about Library Services

For Peer Review

The majority of the questions (37%) about library services were related to circulation services (Figure 5). Further analysis of these questions revealed that the majority of questions were about library access and privileges for external patrons and alumni. Other top questions related to circulation included information on overdue items, fines, recalls, and lost books; how and where to check-out items; and account status, such as questions about barred or expired accounts. Just under a quarter (21%) of library services questions were related to document delivery. Further analysis revealed that the majority of these questions were of a general nature, i.e. seeking help getting access to an article, book, etc., that is not available in the local library collection. The majority of questions within the hours and locations category were regarding opening hours of specific libraries. There were very few questions about library locations. Of the questions about library services, 22% pertained to library policies, with 88% of these related to circulation policies.

(Insert Figure 5)

(Insert Figure 6)

Questions Not Asked

While it is interesting to know what questions our patrons are asking via chat reference, it is equally interesting to know what they are not asking about. Figure 1 shows that during the time period sampled, very few questions were asked about technology (specifically software), citations, search strategy, contact information, collections or copyright. Technology related questions only accounted for 3% of all questions. The majority of these were related to remote access. Two percent of the questions were about citations, with the majority of these being about how to cite a particular reference and bibliographic management software. Not surprisingly, the majority of questions about citing and bibliographic management systems

For Peer Review

occurred mid-term (February and March), when term papers and assignments dominate the student course work.

With regards to format type, Figure 2 shows that there were very few questions related to audio-visual materials, newspapers, theses, or archival materials. Most of these questions related to assistance with looking up known theses and specific audio-visual materials (Figure 3).

Interestingly, very few patrons used chat reference to inquire about library services such as literature searches, reference, archives, or training (Figure 5).

Referrals

Of the 3609 questions asked during the sample time period, 18% of all questions resulted in a referral to another library staff member, department, or website or library subject guide (Figure 7). The majority of referrals (29%) were made to a circulation desk, with 49% of these being in regards to account questions, mainly pertaining to resetting of library passwords to access library electronic resources. Of the 250 account questions referred, 72% were to the circulation desk whereas only 26% were referred to the Library's website where patrons could reset their passwords themselves. Of the 16% of referrals to the Document Delivery department, 47% of these were related to assistance with finding a known item that was not available through the Library's collection.

Of the 561 "Format-Type of Assistance" questions that were referred, 297 were referred to either a librarian (19%), an online subject guide (19%), or a subject-specific library's reference desk (15%). A review of these transcripts showed that the VR staff attempted to assist the patron with their question and for the most part were able to get them started on their research by pointing them in the direction of a specific database or online subject guide. It was also clear that in some instances the VR staff felt that patrons would be better served by contacting the

For Peer Review

discipline-specific liaison librarian, for which they supplied the contact information in the form of a phone number, email, or both. A review of the questions showed that they were indeed rather complex, subject-specific questions that were too involved to be answered through VR and required the assistance of a librarian with knowledge and experience in a specific discipline.

(Insert Figure 7)

Discussion

This study employed a content analysis methodology to analyze the types of questions asked and referred using a virtual reference service in order to inform patron and staff training, and library website content and navigation. The large dataset provided a wealth of information which will allow the Library to make informed decisions about staffing levels, operator training, patron instruction, and website content. The detailed level of coding and analysis will be of particular use to the Library when revising the Library's website. Virtual reference library staff training will be aided by the detailed categories and the ability to easily find examples of questions asked to direct training topics.

The study found that the majority of questions asked through chat reference mirror that of anecdotal evidence provided by library staff, mainly questions about assistance with library materials, library systems, and library services. Interestingly almost twice the number of questions related to assistance with accessing a known item rather than finding resources on a particular topic. This may suggest that in many cases patrons are having difficulty finding or accessing the items in the library's electronic resources. In this study, most questions related to finding articles on a particular topic appeared to be rather uncomplicated. This might indicate a lack of knowledge of where to begin searching or what kinds of materials might be appropriate

For Peer Review

for a topic. Known citation questions were found to be equally straight forward. Most known citation questions for both books and articles were the result of patrons having incomplete citation information or just not knowing how to use the federated search system, catalog or perhaps not having the time to negotiate the system. Twenty-seven percent of questions asked about finding information on a particular topic did not specify a format. This may suggest that the client would be happy with any type of content that would answer their question regardless of format; that they don't know what type of content would be most appropriate; or that they don't understand the difference between journals, articles, and books.

The high number of questions related to technical support with articles, books and databases suggests that although patrons may be able to find needed information on their own, frequent technical issues with vendor resources prevent users from accessing owned library materials in an efficient manner. Diagnosing the technical issues patron encounter when trying to retrieve electronic articles can be a tricky undertaking in virtual reference. The most common technical challenges resulted from patrons not understanding how to navigate the various electronic journal aggregators' platforms which often have different features and navigation menus. Compatibility issues with article linking software and services, incorrect URLs, embargos, remote access issues, and the temporary unavailability of various databases due to technical troubles on the vendors' end also contribute to patron frustration with retrieving electronic articles. Patrons were equally stymied when attempting to use the various e-book platforms.

Questions about library systems and services made up the second and third largest number of questions asked by patrons. More than half of the library systems questions were related to users' accounts and in particular assistance with forgotten passwords. The library system used at the Library during the study required patrons to use a library account number (usually their staff

For Peer Review

or student ID number) and a password to access library resources when not on campus. These accounts and passwords were also required when placing holds on items. Library account and password combinations were separate from university computer accounts. This often caused confusion for patrons. It is not surprising that patrons attempting to access online library resources off-campus used chat reference to obtain assistance with this process. Inconsistencies in service were seen when almost three-quarters of patrons were referred to a circulation desk, either in-person or by phone, rather than to the Library's password reset web page in order to have their library account password reset. Many library staff did not have access to the circulation module of the library information system while performing chat reference which would have allowed them to reset passwords for patrons. Interestingly, the Library's homepage provided a link to help with library accounts and resetting library passwords. This may suggest that when patrons encountered difficulties accessing library resources they did not consider returning to the library homepage for help. Rather, they clicked on the nearest help which was the "Ask-A-Librarian" widget.

Questions about library services mainly centered on circulation and document delivery services, and library hours. A significant number of circulation services questions pertained to circulation policies regarding access and privileges for external patrons and alumni. While a few patrons specifically asked for information on accessing electronic resources, most were general questions about access to library materials. Alumni are particularly interested in library access as they are most familiar with what they used to be able to access when they were students or staff at the university. Once they are no longer current students or staff, they quickly discover that the information they may have thought they were accessing for free was actually being licensed to the university's library for their use.

For Peer Review

The data from library services questions indicates knowledge and understanding of circulation and access policies as well as access to patron account information are very important for VR staff. At the time of this study, some staffs providing virtual reference were not familiar with circulation and access policies, nor did they have access to patron information from the LIS at their desktop. This is likely the reason that patrons were often referred to the circulation desk when encountering an account problem or asking a policy-related question.

Referrals were made in 18% of all questions asked in this study. This number falls within the range reported in previous studies. It's not possible to directly compare this study's results with those of previous studies due to the differences in codes used to track questions and referrals. However, Arendt and Graves (2011) reported that 29% of all referrals were to the Circulation department or its staff. In the current study, 28% of all referrals were to the Circulation Desk. Kwon's (2006) study on user satisfaction with referrals at a collaborative virtual reference service found that patrons who received a referral reported the same level of satisfaction as those patrons whose questions were partially answered or not answered at all. The researchers hope that this means that the majority of patrons were satisfied with the virtual reference service but future research would be needed to confirm this.

Questions about holds and reserves made up the remaining two largest categories. The data suggests that patrons have difficulty understanding the process for placing holds and finding reserve items. The questions regarding holds may have been caused by a less than intuitive catalog interface. The questions regarding course reserves are less easily explained as the Library's homepage provided a direct link to course reserves. The confusion by students may be with the concept of reserves themselves and how they differ from regular library materials.

For Peer Review

The study identified a number of staff training opportunities in order to provide more effective and efficient service. The results indicate that virtual reference staff need to have a good understanding of how to lookup known citations, find articles on a specific topic, and help with troubleshooting electronics articles. The ability to troubleshoot technical issues with e-resources is definitely an area that requires thorough and constant staff training. At this institution, the e-resources experts reside within our technical services department. Going forward, it will be imperative from them to provide ongoing training, especially as platforms and functionality changes are introduced to existing resources and new resources are added. In order to provide better service, VR operators should have access to the circulation module of their LIS at their desktop, and be trained in its use. Again, this is an area for ongoing staff training. Up-to-date training and easy access to library policies will also allow VR operators to provide more efficient service and complete service. Finally, as with traditional face-to-face reference, the knowledge and ability to know when and how to refer a patron to another staff member, department, etc., is critical during VR. This is especially true in cases where the VR service is staffed by paraprofessionals, or in a shared-collaborative model. Training of new staff and ongoing monitoring of chat transcripts can help ensure that referrals occur only when necessary and in an appropriate way.

With regards to using the results of the study to inform website content and navigation, further analysis of the data will be required in consultation with the Library's web services staff. While the chat transcripts can add to data collected through usability testing, focus groups, evaluations, etc., for the purposes of website planning, they should not be relied upon as the sole indicator of patrons' need and use of the website. They are but one piece to the puzzle. The results of the chat transcript analysis highlight the areas that are troublesome for patrons, not necessarily the areas of the website that are working well. The large number of questions

For Peer Review

related to finding known items (citation look-up) may indicate a need for a direct link off of the homepage to a citation look-up function. One could also advocate for the development of online, in-context help related to troubleshooting based on the results.

Future Research

This research has produced a vast amount of data that has the potential for more analysis than has been presented here. There are opportunities to further analyze the data that has already been coded. While this study specifically looked at question type and referrals, the data could be explored further in order to provide insight into particular aspects of reference service, usability of the Library's website and resources, and consistencies with or quality of service. Repeating the study using the coding scheme developed at another point in time, for example after the implementation of a new library system or website, could provide the Library with indicators for success. As discussed above, there were a few types of questions that fell into the category of "questions not asked", or at least those that garnered few questions. Why questions about citations, search strategy, copyright, archival materials, and theses, for example, occurred infrequently, could be the subject of future research. Perhaps these are areas that the Library needs to better promote or educate students on? Finally, adoption of the coding scheme by other libraries would allow for cross-institutional analysis in order to compare and contrast different populations and services.

Conclusion

The Library has made a number of changes to its website since the data for this study was collected, though these were planned before this study took place. In January 2014, a new library information system was introduced along with a new federated search engine. In April

For Peer Review

2014, the University and the Library introduced a single sign-on process thus eliminating the need for a separate library username and password. The homepage during the study period did not provide direct links to information regarding alumni and/or external borrower privileges. The current homepage provides a link to additional information about borrowing privileges, which also leads to a link specifically for alumni regarding borrowing and access to electronic resources. The researchers will be working with the Library's newly hired User Experience Librarian to use this study's results to help inform the Library's future website content and navigation updates.

The results of this analysis indicate that patrons are most often tapping into synchronous online library help when they encounter challenges with online library resources. Chat reference seems to be filling a specific need as patrons are able to get help with their information challenges at the time they occur. One must question whether such patrons would physically go to or call the library when such problems arise. Without access to online help, these patrons may not bother to pursue the needed information and thus lose access to important research. In addition, they may lose faith in the library's ability to provide them with the information they require. Ideally if chat reference were not available, libraries would be able to provide in-context online tutorials or videos when patrons encounter problems. However, this is challenging when e-journal and e-book providers insist on proprietary interfaces, platforms, and functionality.

One of the challenges of any reference service is providing a consistent level of service. Differences in staff competencies, subject knowledge, and experience will impact the success of each reference transaction and patron satisfaction. Standardized and on-going training are the key to providing a consistent level of reference service. This study demonstrates that staff training for virtual reference should focus on developing:

For Peer Review

- Basic reference interview skills;
- Search skills in major literature databases;
- Awareness of citation matching / article linking tools;
- An understanding of the different features of major e-journal and e-book platforms; and
- Familiarity with relevant library policies and procedures.

For VR staff, up-to-date information on library policies, systems, services, electronic resources and their status are essential. Libraries should develop a website, email list, and/or wiki resource that alerts and archives such information, and allows VR staff to communicate and update each other on new issues as they arise.

The results suggest that library staff will need to continue to provide information literacy and training on electronic resources to patrons. Such efforts might include information about:

- Reserve materials;
- Subject specific resources available for search;
- Awareness of citation matching / article linking tools; and
- Library policies.

Traditional classroom teaching is not likely to reach these patrons so information literacy efforts might take the form of in-context help on library web pages or videos. These could help patrons better help themselves.

The current study created a wealth of data and information that will be used as part of additional assessment and usability studies at the Library to inform decisions on staff training, patron instruction, and library website content and navigation. The methodology can be used to analyze new data in subsequent studies to assess the impact of changes made by the Library in

For Peer Review

these areas.

For Peer Review

Appendix 1

Code Name	Code Description
Citations	**Questions about citations and citing.**
Cited Author Searching	Questions about cited author searching.
Citing	Questions about citing references. Includes questions asked about the details of a particular citation style.
Collections	**Questions about specific collections in the Libraries.**
Digital Collections	Questions about accessing or finding local digital collections.
Special Collections	Questions about the Libraries special collections.
Copyright	**Questions about, or problems with copyright and fair use.**
Contact Information	**Questions regarding contact information for a specific individual.**
Format	**Questions referring to different types of material formats found in the Libraries.**
Archival Materials	Archival materials.
Articles	An article or articles.
Audiovisual materials	Audiovisual materials. Includes VHS, Video-recordings, Images, CDs, DVDs, slides, streaming video, etc.
Books	A book or books.
Databases	A database or databases.
Journals	A journal title or titles.
Newspapers	A newspaper or newspaper article.
Theses	A thesis or theses.
Unspecified	Materials where the format is not specified.
Format - Type of Assistance	**Refers to the type of assistance requested by the patron. Use with "Format" code.**
Finding	References to patrons looking for assistance with finding items on a particular topic.
Lookup	References to when a patron is asking for assistance with looking up a known item.
Tech support	References to patrons looking for assistance with technical issues related to accessing a particular resource.
Library Systems	**Questions referring to library systems or specific aspects of library systems.**
Account	Questions about logging into the patron's library account or authentication for electronic access.
Holds	Questions about placing holds, or a patron looking up their holds through their account. Use for all internal (inter-unit) requests for library materials.
Library Catalog	Questions about searching or accessing the Library Catalog.
One Stop Search	Questions about searching or accessing the One Stop Search.
Renewals	Questions about item renewals.
Reserves	Questions about finding or accessing reserve material. Includes questions from professors asking to put materials on reserve.
Miscellaneous or odd	**Questions for which there is no other code.**
Policy	**Questions about library policies, such as loan periods, fines, access, etc.**
Referral	**Questions where a library staff member refers a patron to another individual or service for further assistance. Use the following codes when the Library staff member refers the patron to…**
Administration	The University Librarian (or Director of Libraries), Head of a Library or

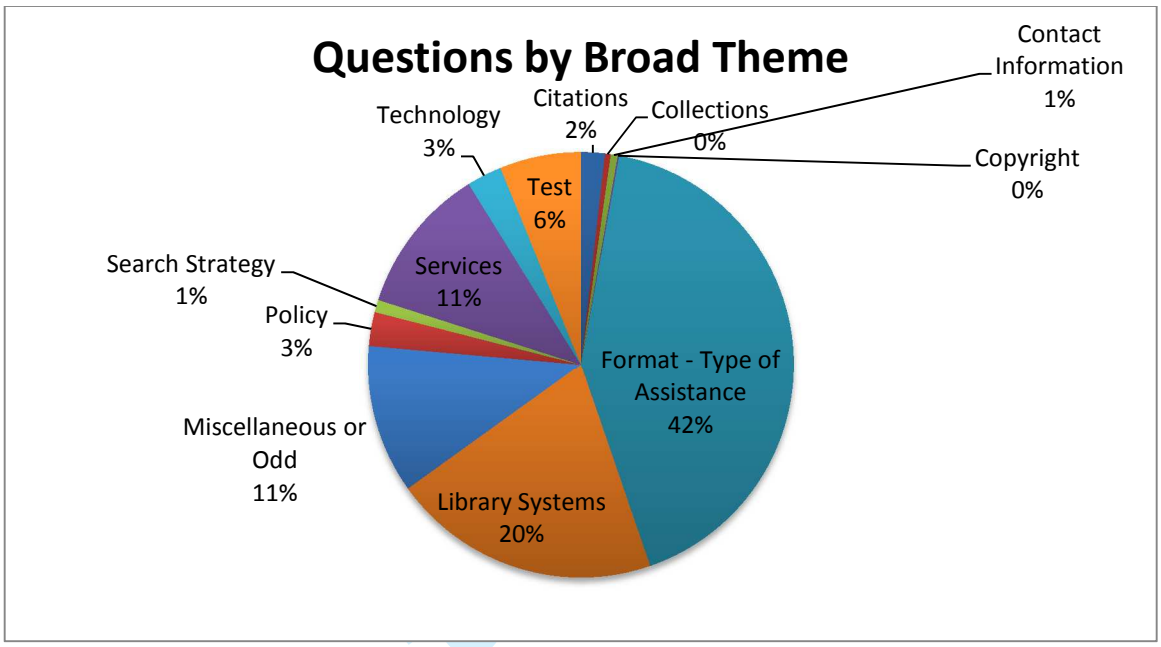
For Peer Review

	Department.
Archives	The Archives or archives staff.
Circulation Department	The Circulation department or circulation staff.
Document Delivery Desk	The Document Delivery department or document delivery staff.
Librarian	A subject specific liaison librarian.
Library Web Site	A page located on the library web site. Excluding subject guides.
Professor	Their/a professor.
Reference Desk	A Reference department.
Subject Guide	A library Subject Guide.
Technical Support Desk	IST/ Computer Support for computer related technical support.
Search Strategy	**Questions about search strategy. Includes strategies used for searching databases, the library catalog and web-bases search engines.**
Services	**Questions about a specific library service. Select from the following…**
Archives	Archives services. Includes Faculty of Medicine Archives.
Circulation	Circulation services.
Document Delivery	Document Delivery / ILL. Used to refer to those items which have been borrowed outside the libraries holdings (interlibrary loan).
Hours and/or Location	Library hours and/or locations.
Literature Searches	Mediated literature searches or literature reviews.
Off Campus	Off Campus Services or Distance Education Services.
Reference	Reference services.
Training	"House calls", one-on-one session training sessions or group training sessions.
Technology	**Questions about technology. Select from the following…**
Bibliographic Management Software	Citation management systems, such as RefWorks, Mendeley, Zotero, EndNote, Procite, Reference Manager, Papers, etc.
Printing	Printing.
Remote Access	Remote access.
Software	Computer software. Including Word, PowerPoint, Excel, SPSS, SAS, Pages, Numbers etc.
Theses - Electronic Submission	Electronic submission of theses to institutional repository.
Test	**Test questions initiated by a patron or a library staff member.**

Note. Broad coding categories are shown in bold.

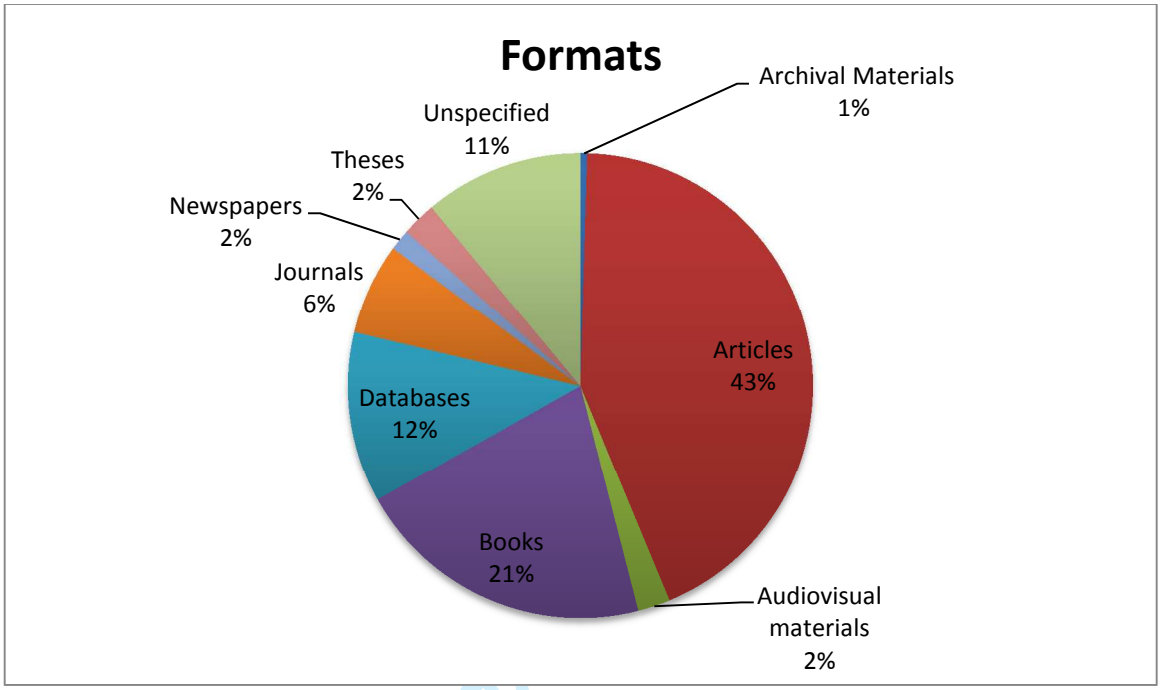
For Peer Review

Figure 1 Questions by Broad Theme



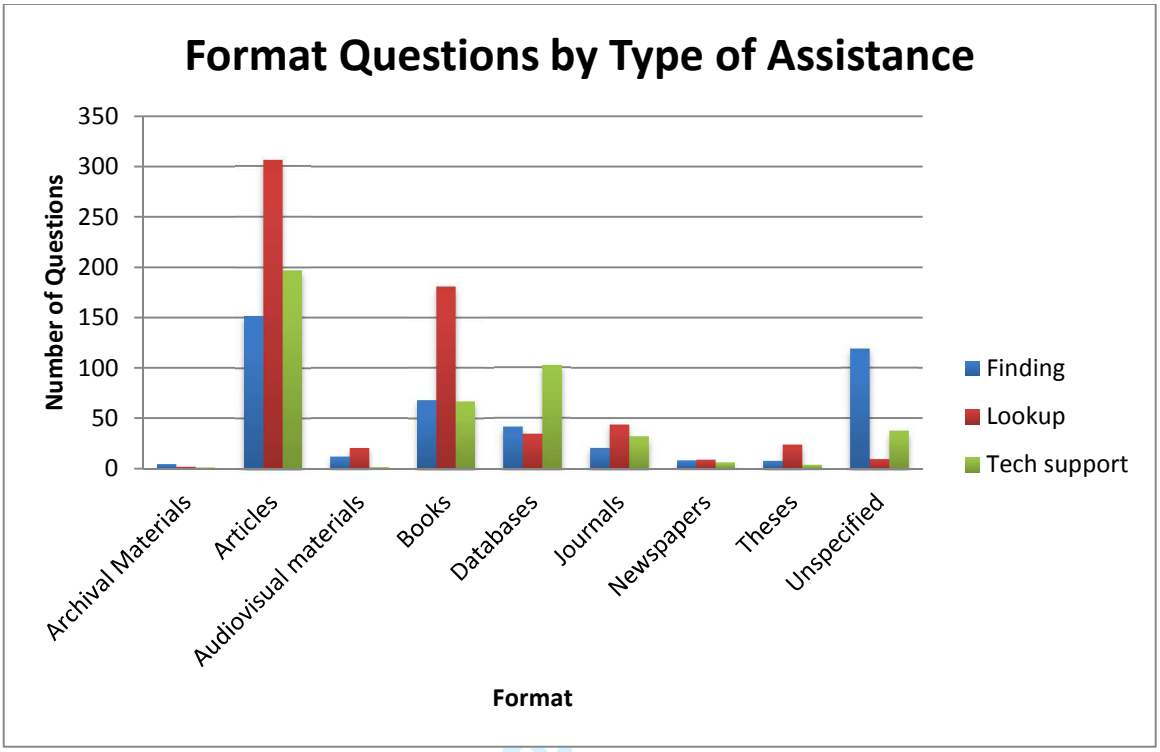
Peer Review

Figure 2 Formats



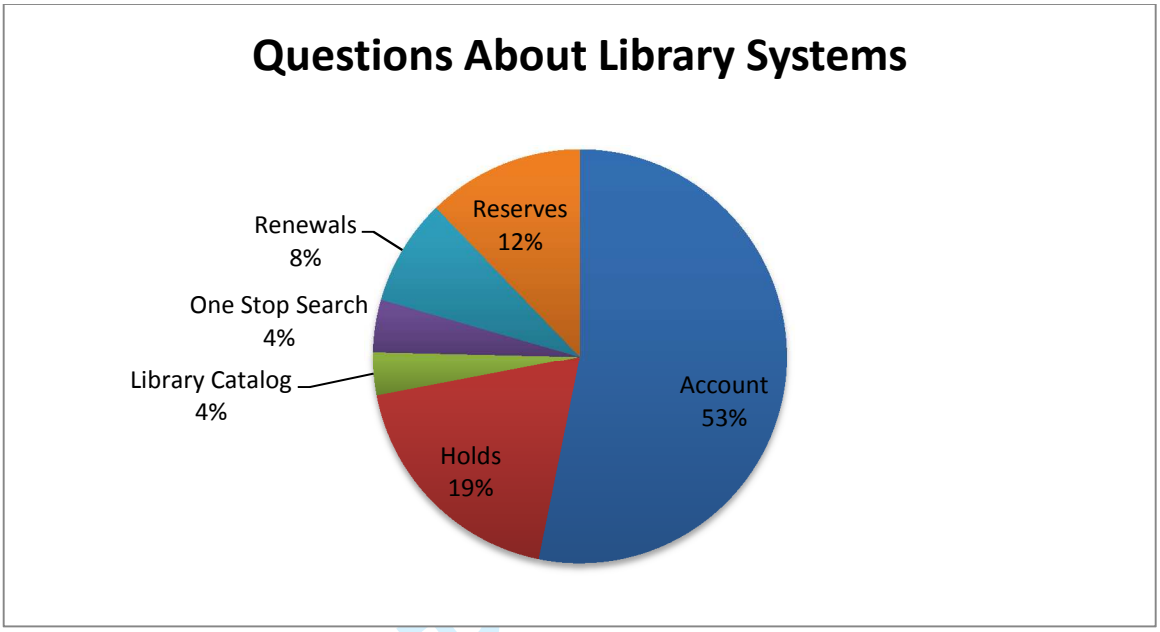
For Peer Review

Figure 3 Format Questions by Type of Assistance



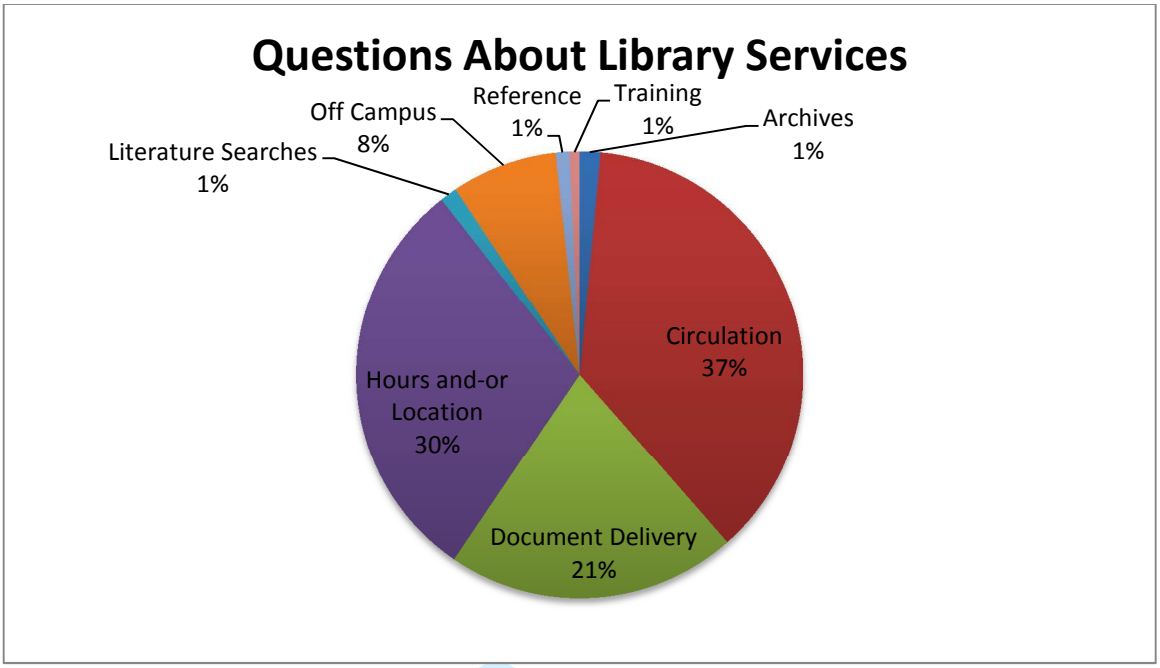
er Review

Figure 4 Questions About Library Systems



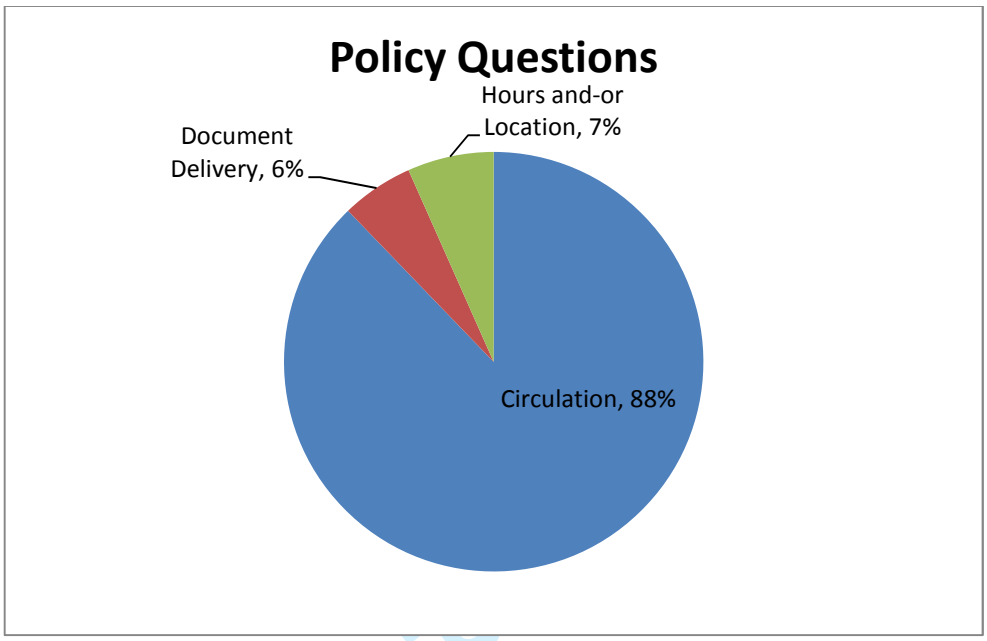
For Peer Review

Figure 5 Questions About Library Services



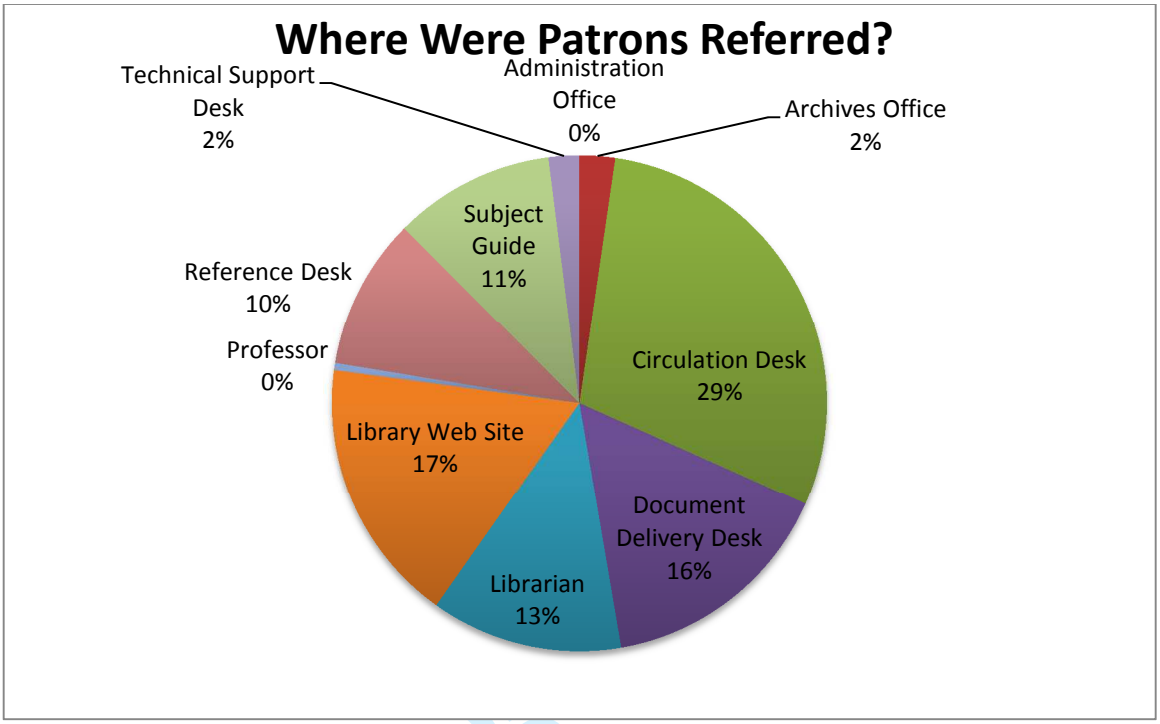
eer Review

Figure 6 Policy Questions



For Peer Review

Figure 7 Where Were Patrons Referred?



For Peer Review

References

Arendt, J. and Graves, S.J. (2011), "Virtual question changes: reference in evolving environments", *Reference Services Review,* Vol. 39, No. 2, pp. 187-205.

Arnold, J. and Kaske, N. (2005), "Evaluating the Quality of a Chat Service", *portal: Libraries & the Academy,* Vol. 5, No. 2, pp. 177-193.

Broughton, K.M. (2003), "Usage and User Analysis of a Real-Time Digital Reference Service", *Reference Librarian,* Vol. 38, No. 79, pp. 183-200.

de Groote, S.L., Dorsch, J.L., Collard, S. and Scherrer, C. (2005), "Quantifying Cooperation: Collaborative Digital Reference Service in the Large Academic Library", *College & Research Libraries,* Vol. 66, No. 5, pp. 436-454.

Fennewald, J. (2006), "Same Questions, Different Venue: An Analysis of In-Person and Online Questions", *Reference Librarian,* Vol. 46, No. 95, pp. 21-35.

"Guidelines for Implementing and Maintaining Virtual Reference Services" (2004), *Reference & Users Services Quarterly*, Vol. 44, No. 1, pp. 9-13.

Houlson, V., McCready, K. and Pfahl, C.S. (2007), "A Window into Our Patron's Needs: Analyzing Data from Chat Transcripts", *Internet Reference Services Quarterly,* Vol. 11, No. 4, pp. 19-39.

Katz, W.A. (2002), *Introduction to Reference Work, Vol. 1: Reference Services and Reference Processess*, McGraw Hill, New York, NY.

Krippendorff, K. (2013), *Content Analysis: An Introduction to its Methodology*, Sage, Thousand Oaks, CA.

Kwon, N. (2006), "User Satisfaction With Referrals at a Collaborative Virtual Reference Service", *Information Research*, [Online] Vol. 11, No. 2, paper 246. Available from - http://InformationR.net/ir/11-2/paper246.html. [Accessed: August 25, 2015]

Kwon, N. (2007), "Public library patrons' use of collaborative chat reference service: The effectiveness of question answering by question type", *Library & Information Science Research,* Vol. 29, No. 1, pp. 70-91.

Marsteller, M.R. and Mizzy, D. (2003), "Exploring the Synchronous Digital Reference Interaction for Query Types, Question Negotiation, and Patron Response", *Internet Reference Services Quarterly,* Vol. 8, No. 1, pp. 149-165.

Matteson, M.L., Salamon, J. and Brewster, L. 2011, "A Systematic Review of Research on Live Chat Service", *Reference & User Services Quarterly,* Vol. 51, No. 2, pp. 172-190.

For Peer Review

Maximiek, S., Rushton, E. and Brown, E. (2010), "Coding into the Great Unknown: Analyzing Instant Messaging Session Transcripts to Identify User Behaviors and Measure Quality of Service", *College & Research Libraries,* Vol. 71, No. 4, pp. 361-373.

Morais, Y. and Sampson, S. (2010), "A Content Analysis of Chat Transcripts in the Georgetown Law Library", *Legal Reference Services Quarterly,* Vol. 29, No. 3, pp. 165-178.

Neuhaus, P. and Marsteller, M.R. (2002), "Chat Reference at Carnegie Mellon University", *Public Services Quarterly,* Vol. 1, No. 2, pp. 29-41.

Powers, A.C., Shedd, J. and Hill, C. (2011), "The Role of Virtual Reference in Library Web Site Design: A Qualitative Source for Usage Data", *Journal of Web Librarianship,* Vol. 5, No. 2, pp. 96-113.

Radford, M.L. and Connaway, L.S. (2013), "Not dead yet! A longitudinal study of query type and ready reference accuracy in live chat and IM reference", *Library & Information Science Research,* Vol. 35, No. 1, pp. 2-13.

Rourke, L. and Lupien, P. (2010), "Learning from Chatting: How Our Virtual Reference Questions Are Giving Us Answers", *Evidence Based Library & Information Practice,* Vol. 5, No. 2, pp. 63-74.

Sears, J. (2001), "Chat reference service: an analysis of one semester's data", *Issues in Science & Technology Librarianship,* [Online] No. 32. Available from - http://www.istl.org/01-fall/article2.html. [Accessed: August 25, 2015]

Ward, D. (2004), "Measuring the Completeness of Reference Transactions in Online Chats", *Reference & User Services Quarterly,* Vol. 44, No. 1, pp. 46-56.

White, M.D. and Marsh, E.E. (2006), "Content Analysis: A Flexible Methodology", *Library Trends,* Vol. 55, No. 1, pp. 22-45.

Youngbar, A. (2012), "Questions by Keystroke: An Analysis of Chat Transcripts at Albert S. Cook Library", *Library Student Journal,* [Online] pp. 2. Available from - http://www.librarystudentjournal.org/index.php/lsj/article/view/272. [Accessed: Oct 13, 2013]

For Peer Review