

# “Are We Getting Warmer?”

## Query Clarification in Live Chat Virtual Reference

As virtual reference services (VRS) have become vital alternatives to traditional face-to-face (FtF) and phone reference, guidelines for best practices emerged to ensure that users are being well served across different modes of service delivery. Yet much remains to be understood about whether and how the essential process of query clarification occurs in the live chat reference environment. This study is among the first large-scale analyses of chat transcripts from libraries of different types, sizes, and world-wide geographic regions. It reports results from a qualitative analysis of a random sample of 850 transcripts from QuestionPoint, a 24/7/365 cooperative reference service administered by OCLC Online Computer Library Center with one thousand plus member libraries across the world. A Query Clarification Coding Scheme was developed as part of the analysis by using the constant comparative method. Close reading and evaluation of the transcripts revealed that librarians ask clarifying questions heavily before searching, while users generally offer clarification of their information need more often during the searching process. Both groups clarify to seek or offer information about the query topic and background; search history; and extent, depth, and type of resource needed. They also clarify to verify understanding and correct misunderstanding. Results indicate that accuracy was enhanced for

librarians who used clarifying questions in answering ready reference (factual) questions. Although highly recommended query clarification techniques, especially using the follow-up question before logging off, are generally prescribed to improve accuracy, only 50 percent of librarians used follow-up questions and 33 percent of all questions asked to users were open questions. These findings suggest that emphasis on increasing these two techniques during VRS librarian training will improve the effectiveness of chat reference. Additionally, users with queries related to school, academic, or work-related information seeking were found to comprise 26 percent of the analyzed transactions, suggesting important implications for further research efforts as well as VRS librarian training and practice.<sup>1</sup>

**T**hough research-based guidelines for traditional, face-to-face (FtF) reference are firmly established, investigation into query clarification practice in virtual reference services (VRS), including live chat reference, is still in the early stages. As VRS have continued to grow as popular alternatives to FtF and phone reference, guidelines for best practices have emerged to ensure that users are being well served across different modes of service delivery.<sup>2</sup>

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Because of the proliferation of VRS, it is increasingly important to have a deeper understanding of current practice as well as research-based recommendations for service excellence, as several scholars have pointed out.<sup>3</sup> Lankes articulates important assumptions and central issues for a research framework that need to be addressed to advance the field's understanding of VRS as emerging phenomena.<sup>4</sup> He posits that human expertise is useful to incorporate into information systems, which Curry calls "the human touch."<sup>5</sup> In addition, Lankes believes that the digital nature of reference systems provides a significant differentiating context from FtF reference.<sup>6</sup>

Several authors have made a strong case for the need for query clarification and conducting reference interviews in VRS encounters, but little is known about current practice beyond sporadic data collected at the local level.<sup>7</sup> What is the frequency and nature of query clarification in VRS? What questioning techniques are used? At what point in the chat session are clarifications requested by librarians or offered by users? What do they seek to clarify? This article addresses the above questions by reporting the results of a large-scale international research project that seeks to further the understanding of query clarification practices of both VRS librarians and users. Results are obtained through an in-depth analysis of a random sample of 850 live chat transcripts randomly selected from an international VRS provider, OCLC Online Computer Center's QuestionPoint.<sup>8</sup>

### QUERY CLARIFICATION IN FACE-TO-FACE (FTF) REFERENCE

Research in query clarification techniques of traditional, FtF reference has been plentiful since Taylor's seminal article, which proposes a theoretical model that conceptualizes reference as a process of question negotiation.<sup>9</sup> The essence of this negotiation is one person's attempt "to describe for another person not something he knows, but rather something he does not know."<sup>10</sup> Taylor's major contribution has been to raise awareness of the complexity of the interaction and to stimulate research.<sup>11</sup> Since Taylor, the framing of reference as a process of query clarification has produced a body of research concerning the reference interaction, defined as "a conversation between a member of the library reference staff and library user for the purpose of clarifying the user's needs and aiding the user in meeting those needs."<sup>12</sup> Radford prefers the term "reference encounter" rather than "reference interview" to acknowledge that complex relational, interpersonal dimensions are present in

addition to the information exchange.<sup>13</sup> While Wilson notably challenges the unquestioning assumption that there is a need for clarification in every reference transaction, Ross, Nilsen, and Radford and Ross suggest that there is almost no situation in which a reference interview is not needed to clarify the user's query.<sup>14</sup>

Research on reference interviews in the FtF environment has found that asking questions makes a librarian more likely to produce a correct answer and the user more likely to be satisfied, but it also indicates that librarians seek clarification less than 60 percent of the time. Gers and Seward find that librarians who do not negotiate the query almost never provide a correct answer, while those who do negotiate provide a correct answer 62 percent of the time; nevertheless, clarification occurs in only 49 percent of reference encounters.<sup>15</sup> Arguing that willingness to return is a better measure of the reference interaction than accuracy of the answer, Durrance finds that students are more likely to return to librarians that they rate highly for interviewing skill, ability to determine need, and search strategy.<sup>16</sup> Building upon Durrance's work, researchers at the University of Western Ontario conducted the library visit study using MLS students as participant-observers in FtF reference encounters. They found that librarians asked clarifying questions in only 51 percent of encounters in phase 1 (1991–1993), and 48 percent in phase 2 (1998–2000).<sup>17</sup>

Best practices guidelines for reference service recommend a variety of query clarification techniques such as the strategic use of open questions to elicit information about the user's situation, closed questions to verify the question, and follow-up questions to ensure that the user is satisfied.<sup>18</sup> Dervin and Dewdney propose that librarians engage in "neutral questioning," which involves asking open questions that encourage users to express the query in their own terms.<sup>19</sup> Durrance finds that users are most likely to be willing to return to librarians who started the reference encounter with an open question; librarians are, however, most likely to begin with a statement (37 percent) or closed question (31 percent) rather than an open question (27 percent).<sup>20</sup> Studies of reference encounters suggest that the follow-up question is a particularly effective technique of query clarification because of its potential to correct misunderstandings and repair unsatisfactory interactions, which often leads to a re-negotiation or more complete negotiation of the query.<sup>21</sup> Gers and Seward found that librarians who follow up the query negotiation by asking "Does this answer your question?" provide a correct answer 76 percent of the

time, compared to 52 percent when this question is not asked.<sup>22</sup> Despite its apparent effectiveness, they found that the follow-up was only asked in 12 percent of reference interactions. Interpreting the follow-up question more broadly, Dewdney and Ross found that variations of the follow-up question occur in only 37 percent of the reference interactions.<sup>23</sup> Further studies confirm similar occurrence rates of 37 percent and 35 percent.<sup>24</sup> In situations in which the reference librarian is truly unable to adequately help the user, the most beneficial follow-up behavior of referring the user to other resources has been recommended.<sup>25</sup>

In addition to increasing the accuracy of librarians' answers, clarification techniques also have an effect on the relational, interpersonal dimension of the reference interaction. Many elements of interpersonal communication have been shown to impact the librarian's effectiveness during the reference encounter: showing interest in and comfort with the user's question; approachability, friendliness, and confidence; and a nonjudgmental attitude.<sup>26</sup> While Katz frames the reference interaction from the librarian's perspective in which the goal is to find a satisfactory answer, Radford applies interpersonal communication theory in an analysis of FtF reference in academic libraries to show that the *content-oriented* (information) dimensions of a reference encounter cannot be separated from its *relational* (interpersonal) dimensions.<sup>27</sup> Radford found that 74 percent of users reported that relational, interpersonal factors were more important than content-related factors in assessing FtF reference interactions, with three important categories of relational factors emerging from the analysis: attitude, relationship quality, and approachability.<sup>28</sup>

According to Gross, most of the findings that have contributed to the creation of best practices guidelines for reference assume that the user is the originator of the query in question, that the query is self-generated.<sup>29</sup> Her research indicates that many users are seeking information related to imposed queries. Imposed queries are defined as those in which the person pursuing the question has been put on the course by someone else, usually a teacher, parent, work colleague or supervisor, family member, or friend.<sup>30</sup> Gross suggests that recommended techniques designed for self-generated queries are not translatable to imposed queries in which the query originator is absent from the reference process. Recommendations in light of the distinction between imposed and self-generated queries include developing a professional stance of contextual empathy, recognizing that right answers are probabilistic, and recognizing the absence of true feedback.<sup>31</sup> Ultimately, Gross

suggests that the first and most important task of query clarification is the identification of question type.<sup>32</sup> In an important study that formally incorporated question type into its data collection, 25 percent of adult public library users indicated that they were seeking information for someone else.<sup>33</sup>

## QUERY CLARIFICATION IN VIRTUAL REFERENCE SERVICES (VRS)

VRS, in asynchronous (i.e., e-mail or SMS text messaging) and synchronous (i.e., live chat or instant messaging [IM]) forms, have burgeoned in number and frequency of use since their emergence in the mid-1990s. Librarians and researchers have since been grappling with understanding what effect the virtual environment has on the nature of reference services. Is there a need for query clarification in VRS? If almost every question benefits from a reference interview in the FtF environment, then it is likely that there is even more of a need in the virtual environment in which librarians operate without visual or auditory cues.<sup>34</sup> Ronan suggests that without the sensory cues of the FtF encounter, VRS librarians should rely much more heavily on classic questioning techniques.<sup>35</sup> Luo's survey finds that librarians identify "reference interview skills" as one of three universal competencies for reference work, essential both to in-person and remote environments.<sup>36</sup>

But does reference interviewing occur in the virtual reference environment? Nilsen and Ross report that "the reference interview has almost disappeared," with only 20 percent of VRS encounters (eighty-five visits) including a reference interview, though the percentage increases to 40 percent if only chat reference and not e-mail reference is considered.<sup>37</sup> Analysis of 114 chat transcripts of librarians helping students with homework by Walter and Mediavilla find that only 32 percent of librarians probed the students for more information before referring them to the Live Homework Help service.<sup>38</sup> Marsteller and Mizzy report that "the reference interview seems to be alive and well in the brave new world of synchronous digital reference," occurring in 64 percent of 865 analyzed transcripts.<sup>39</sup> Because of the localized nature of most VRS studies and differing definitions of "reference interview," it is difficult to generalize these findings.

One of the earliest concerns raised about VRS was that it is not conducive to complex research questions that require extensive reference interviewing, and that users would not tolerate librarians' efforts at query clarification. In a survey conducted by Janes, 80 percent of reference librarians

thought ready reference questions would be well served by VRS, but only 33 percent thought detailed research questions would be well served;<sup>40</sup> 46 percent thought research questions would actually be poorly served in VRS environments. Librarians may assume that users are impatient and unwilling to engage in query clarification, which causes feelings of pressure-induced anxiety, leading to fewer clarification attempts.<sup>41</sup> While librarians assume that chat users are in “such a rush that they don’t have patience for the traditional reference interview,” only 5 out of 270 chat reference transcripts examined in the Marsteller and Mizzy study contained a user displaying a negative response to clarifying questions on the part of the librarian.<sup>42</sup> Kern suggests that, contrary to librarians’ perceptions, chat reference users “don’t use online chat because they are in a hurry, but because it is more convenient.”<sup>43</sup> Connaway and Radford have confirmed convenience as a factor in users’ decision to use VRS.<sup>44</sup>

One of the ways in which the profession encourages best practices like query clarification in reference encounters is to create guidelines that can be used for implementation, training, and evaluation purposes. Both the *RUSA Guidelines for Behavioral Performance of Reference and Information Services Professionals* and the *Digital Reference Guidelines* promote query clarification techniques such as using open and neutral questions to elicit the query, closed or clarifying questions to refine the query, and follow-up questions to confirm that the user’s query has been adequately answered.<sup>45</sup> Kwon and Gregory test the effect of the RUSA Guidelines on user satisfaction with chat reference by analyzing 422 transcripts and corresponding user surveys from a public library system participating in a national chat consortium.<sup>46</sup> They find that asking users the follow-up inquiry of whether their question was answered completely to be a strong predictor of satisfaction. Kwon’s further analyses of the transcripts and user surveys reveal chat’s inherent advantage in dealing with queries requiring a level of subject expertise and its corresponding disadvantage in handling questions specific to local library’s hours, policies, resources, and services.<sup>47</sup> She identifies two types of referrals: redirection local referrals, which are detrimental to collaborative VRS, and expert research referrals, which are conducive to collaborative VRS.<sup>48</sup> Kwon also finds that question type has an effect on outcome measures of answer accuracy and user satisfaction: local-specific questions, defined as circulation-related or inquiries about local library services, were answered less completely and users expressed lower levels of satisfaction compared to nonlocal questions.<sup>49</sup>

One thousand four-hundred thirty-five transcripts from Texas A&M University Libraries’ chat service were reviewed for compliance to RUSA’s guidelines by van Duinkerken, Stephens, and MacDonald, who found poor compliance with the guidelines related to “listening/inquiring behaviors” typically associated with reference interviews.<sup>50</sup> Only 10 percent of librarians restated the question; 50 percent asked open-ended questions; 57 percent refined the original question with close-ended confirming questions; and only 31 percent asked follow-up questions to see if the need had been fully answered. The authors surmise that poor compliance is related to time, as 805 of the 1,435 users indicated that they were in a hurry to get the information they needed. In an unobtrusive evaluation of a sample of fifty academic and public libraries offering chat reference, Ronan, Reakes, and Ochoa found that 41 percent of VRS librarians adhered to the RUSA guidelines regarding use of open-ended questions and 70 percent for close-ended questions.<sup>51</sup> Despite the existence of clear professional guidelines for chat VRS, levels of adherence to these guidelines regarding reference interviewing are generally low.<sup>52</sup>

Luo derives an original list of chat reference competencies based on a survey completed by 597 chat librarians.<sup>53</sup> The resulting competencies are classified as general reference competencies, competencies highlighted in chat, competencies specific to chat, and competencies not as important in chat. The essential competencies include reference interview techniques in addition to customer service mentality, keeping users informed by constantly notifying them what the librarian is doing; the ability to work under pressure; and a knowledge of effective online communication skills. Radford’s use of interpersonal communication theory sheds light on the workings of these online communication skills, revealing that both librarians and users engage in relational facilitation through rapport building, shows of deference, compensation for lack of nonverbal cues, and greeting and closing rituals.<sup>54</sup> Clarifying questions can be used to both build rapport (e.g., “Is this what you are looking for?”) and to give deference to the user (e.g., “Do you agree that this is a good search term?”).<sup>55</sup> Of particular note in this approach is that transcripts are analyzed as communicative encounters, which considers librarians and users as equal participants in maintaining the interaction. Similarly, Westbrook uses politeness theory as a framework for a discourse analysis of 402 transcripts from one academic year at a large, public university, identifying syntactic and content-based markers of formality levels in chat reference encounters.<sup>56</sup>

The present study builds upon the communicative approach to frame query clarification in chat reference as a complex process between librarians and users, with both content and relational dimensions.<sup>57</sup> It is among the first large-scale analyses of transcripts from an international consortium representing a wide variety of public, academic, special, and consortial VRS that seeks to understand if and how query clarification occurs in the live chat environment. It seeks to investigate the following research questions:

- What is the state of current practice of query clarification in chat reference?
- What kinds of query clarification techniques are being utilized in chat reference?
- At what stages of the chat reference interaction is query clarification occurring?
- What question types are being used in chat reference query clarification?
- What are the patterns of librarian versus user clarification?
- What is the frequency of self-initiated versus imposed queries in chat reference?
- What is the impact of query clarification on accuracy for ready reference questions?

## METHOD

Between July of 2004 and October of 2006, a sample of 850 transcripts was randomly selected from a total of 651,687 sessions from OCLC's QuestionPoint, an international chat consortium. All identifying information (e.g., librarian and user names, e-mail and IP addresses) was stripped from the transcripts before analysis. Of the 850 transcripts, 258 transcripts provided no opportunity for query clarification (e.g., no question was asked, session consisted of only abbreviated utterances, or session was abruptly disconnected due to technical issues), resulting in 592 transcripts with at least one instance of query clarification by librarians or users.

Analysis of a sample of the 592 transcripts according to the constant comparative method involved a process of repeated reading, comparison, search for patterns, and identification/revision of categories, resulting in the development of a Query Clarification Coding Scheme (see appendix A).<sup>58</sup> Four teams of two coders used the Query Clarification Coding Scheme and detailed instructions developed by the principal investigators in consultation with the research team to analyze the transcripts. Transcripts were coded line-by-line and user responses were coded separately from librarian responses. Attention was paid to the types

of clarification as well as to when the clarification took place (i.e., the beginning of the interaction, middle, or near the end). In addition, a subset of 180 questions was identified to be factual or ready reference questions. The ready reference transcripts were further analyzed to determine whether the answer was accurate.<sup>59</sup> To ensure intercoder reliability, each team member coded 20 percent of a partner's transcripts, resulting in an initial average intercoder reliability score of 0.83. The team then met to resolve differences and achieved a final reliability score of 0.98.

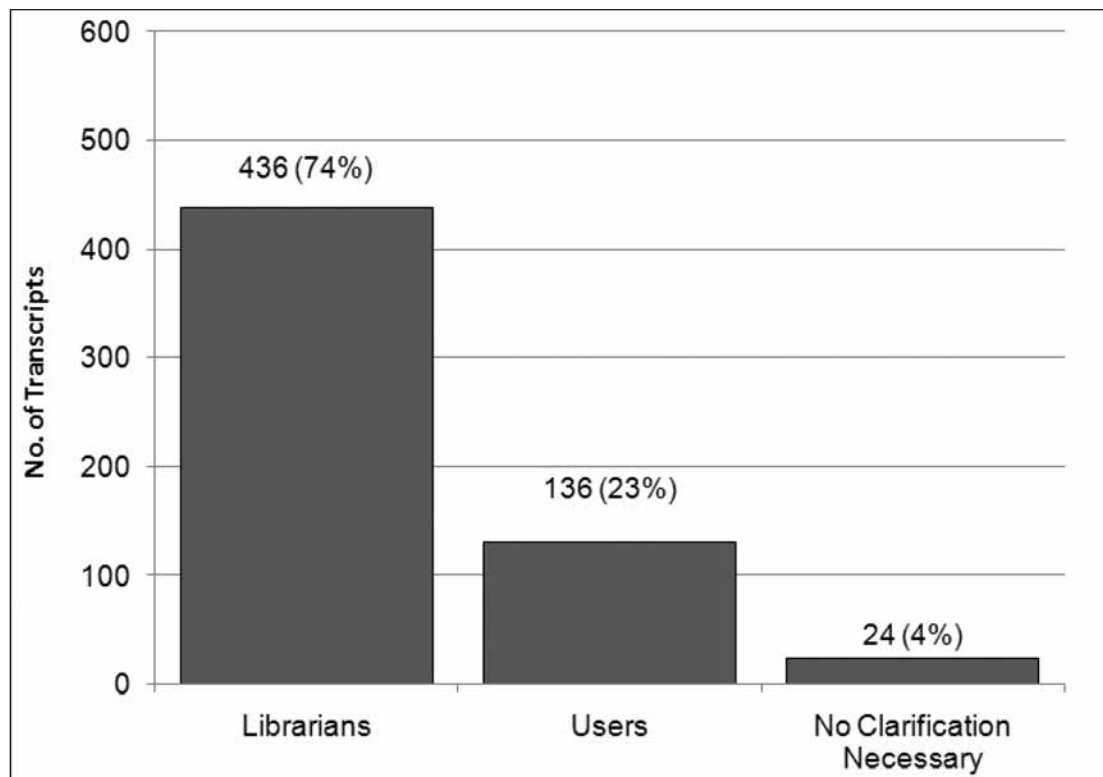
## RESULTS AND DISCUSSION

### Occurrence of Query Clarification

Did librarians and users engage in query clarification when necessary in the chat environment? Figure 1 shows that librarians engaged in query clarification in 74 percent (436) of the interactions. This rate of query clarification is notably higher than those found in studies of FtF reference, generally ranging from 45 to 60 percent.<sup>60</sup> As the current analysis is different in kind from the small sample sizes and participant observation data collection methods of the FtF studies, the rates of query clarification cannot be directly compared. However, it is safe to conclude that clarification by librarians occurs at a high rate in chat reference and is personalized, as librarians in only 6 percent of the transcripts utilized any pre-prepared scripts during query clarification.

The application of interpersonal communication theory suggests a shift from a librarian-centric perspective of the reference interview to a focus on the entirety of the reference encounter as being maintained jointly by the librarian and user.<sup>61</sup> While previous studies discussed in the literature review have examined query clarification by librarians in FtF and VRS environments, this study is among the first to systematically study query clarification by users as well as librarians. Analysis found that users engaged in clarification in 23 percent (136) of the interactions by offering information on various elements of the query as discussed below without librarian prompting.

In VRS environments, as in FtF reference, not every interaction requires query clarification. Interactions coded as "no clarification necessary" were those situations in which, given the content or detail of the user's question, clarification by the librarian is not an appropriate response. This category includes questions about the library's hours and services or simple instructional questions, such as how to access databases electronically.



**Figure 1.** Query Clarification by Librarians and Users ( $N = 592$ )  
(Percentages do not add to 100% because of rounding)

Kaske notes that instances in which clarification is not necessary are easily recognizable: “We know these questions do not need to be negotiated; because once the customer has the answer, they are gone. They hang up the phone or sign off of a chat service, sometimes without even saying thank you, thanks, or tks.”<sup>62</sup> For example, from the present transcript set, one user stated, “I cannot find the Writ of Execution form online with the other forms. Please direct me,” to which the librarian replied, “That’s form no. EJ-130. Here’s the link” (see appendix A).<sup>63</sup> Having received the link, the user disconnected from the session without any further interaction and the librarian sent the closing script.

Analysis revealed that 96 percent (568) of the interactions provided opportunities for clarification by the librarian. Only 4 percent (24) of the interactions did not necessitate query clarification. This finding indicates that there is ample opportunity and need for librarians to engage in query clarification in the chat reference environment.

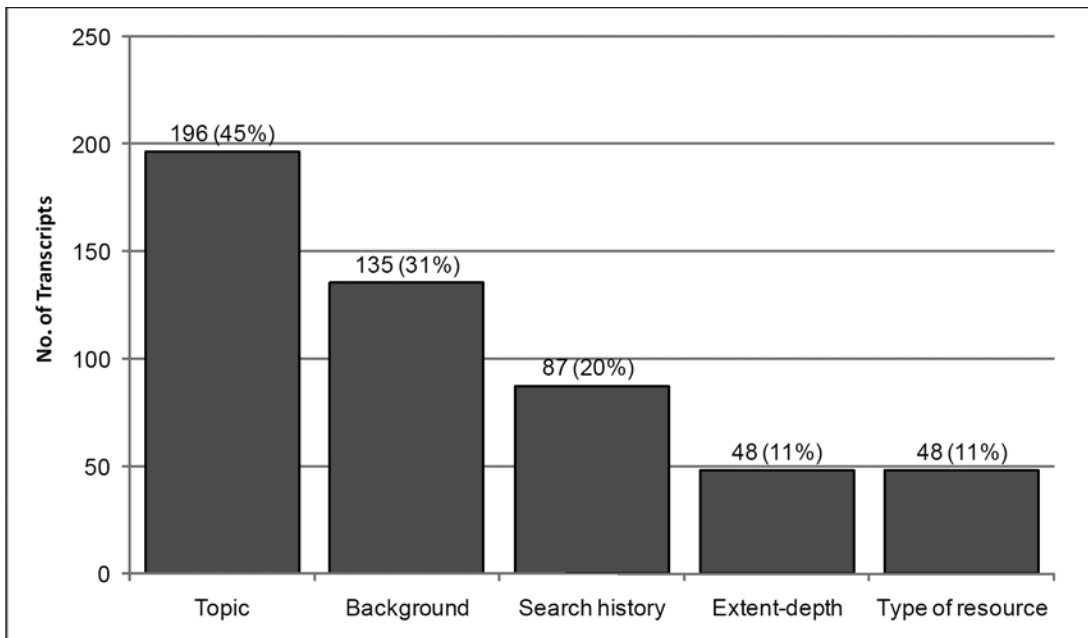
### Types of Information Sought

Librarians and users were found to ask questions or offer information to clarify topic, background, search history, extent/depth of information needed,

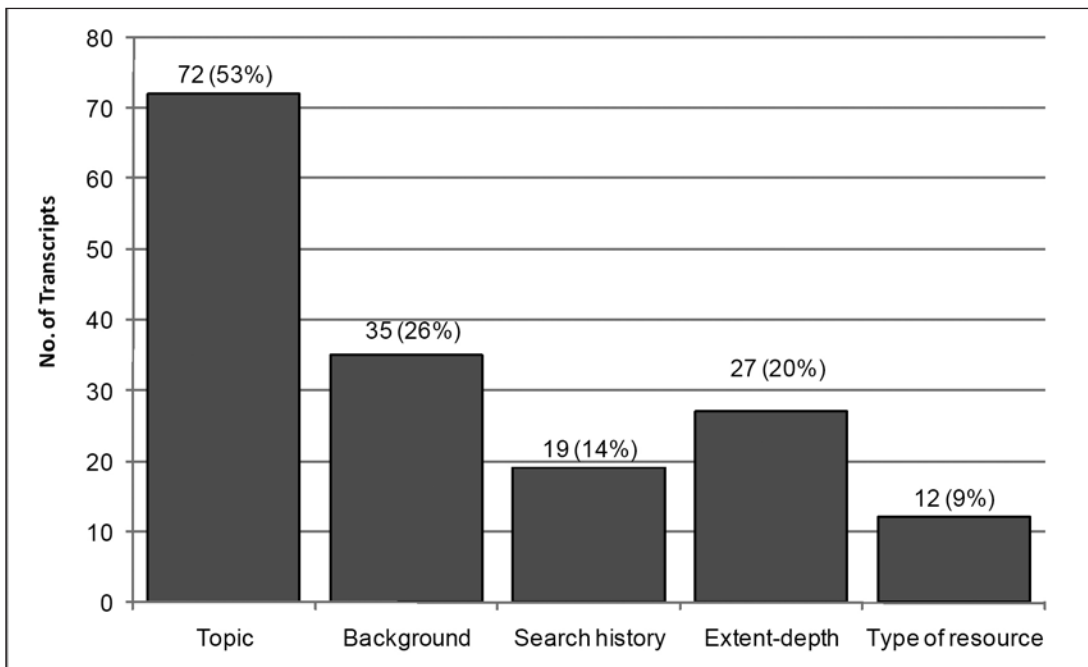
and type of resource sought. Figure 2 shows the percentages for various types of information sought by librarians during query clarification, while types and percentages of information given by users are shown in figure 3. These types are discussed further in the following section in descending order of occurrence. See appendix A for definitions and examples for each of these categories.

### Topic

For both users and librarians, topic-related clarifications were the most commonly occurring type of information sought by clarification. Additional topic information was requested in 45 percent (196) of the 436 interactions in which librarians asked clarifying questions. To illustrate, one librarian asked, “Is there a specific animal that you’re researching?” According to Taylor, the primary purpose of topic-related query clarification is to determine the limits and structure of the subject to define, expand, narrow, and qualify the search.<sup>64</sup> Users offered topic information in 53 percent (72) of the 136 interactions in which they engaged in clarification. For example, one user who offered topic information stated, “I am doing marketing research on marylands [sic] restaurant industry.”



**Figure 2.** Types of Information Sought by Librarians ( $N = 436$ )  
 (Totals exceed  $N$  because transcripts may include more than one query type)



**Figure 3.** Types of Information Offered by Users ( $N = 136$ )  
 (Totals exceed  $N$  because transcripts may include more than one query type)

*Background*

Background information was the second most common type of information offered or sought through clarification by both librarians and users. In 31 percent (135) of the query clarification interactions, librarians sought background information

on the parameters of the query, such as time limitations or relevant information about the user (i.e., geographic location, grade, or career). Users provided clarifying background information in 26 percent (35) of the clarifying interactions. Some types of background information that are implicitly ascertained by the librarian in FtF reference

encounters through observation of nonverbal cues (such as the user's age group, gender, ethnic background, and physical location) necessarily become an explicit part of the chat encounters. Librarians sought clarification on background information by asking, "When is your paper due?" or "Are you in the NYC area?" while users offered information like "I am in 7th grade GT Scien and I am Doing a 2 year research project."

### *Search history*

Another critical function of query clarification is to help the librarian determine what sources and strategies already have been used; in other words, how much information does the user already have about the topic?<sup>65</sup> Of the related clarifications, 20 percent (87) of librarian-initiated clarifications and 14 percent (19) of user-initiated clarifications provided information on search history. Search history also can indicate to the librarian which stage of the information-seeking process the user is in, which has implications for the user's affective state as well as the extent and depth of their informational need.<sup>66</sup> By asking clarifying questions such as "Where have you looked for an answer to your question so far?" or "Ok, and have you checked their websites yet?" VRS librarians reduce searching time by avoiding duplication of the users' previous efforts and simultaneously gain contextual information about the user's affective and cognitive states relative to the information-seeking process. In some cases, users offer the search history information voluntarily: "I looked in the card catalogue and didn't see it there."

### *Extent/Depth*

Clarifying questions about the extent and depth of the query relate to the amount, as well as the degree of sophistication, of the information required by the user;<sup>67</sup> 11 percent (48) of the librarian-initiated clarifications and 20 percent (27) of user clarifications concerned the extent and depth of the information needed. Librarians asked for these types of clarification by asking questions such as "Were you looking for an in-depth history? Or a summary?"; while users offered clarification by statements such as "the thing is i need it to be simple and not to [sic] wordy so its [sic] easy to find the information that i need."

### *Type of Resource*

Clarification on the resource type, what kind of information is needed, comprised 11 percent (48) of

librarian-initiated clarifications and 9 percent (12) of user clarifications.<sup>68</sup> Librarians asked questions similar to "Are you looking for books, articles, or online information?"; while users clarify with statements such as "Yes, but I'm looking for more historical and architectural resources." Clarification of the type of resource desired or expected by the user can be purely practical in nature, as when a student who may have a looming assignment deadline clarifies that he/she wants immediately available resources: "... And [not] a book, online though," but can also be conceptually intertwined with the nature of the query, such as when a user asks for articles instead of books, knowing that the area of interest is one in which change may be so rapid that books may be outdated by the time they are published.

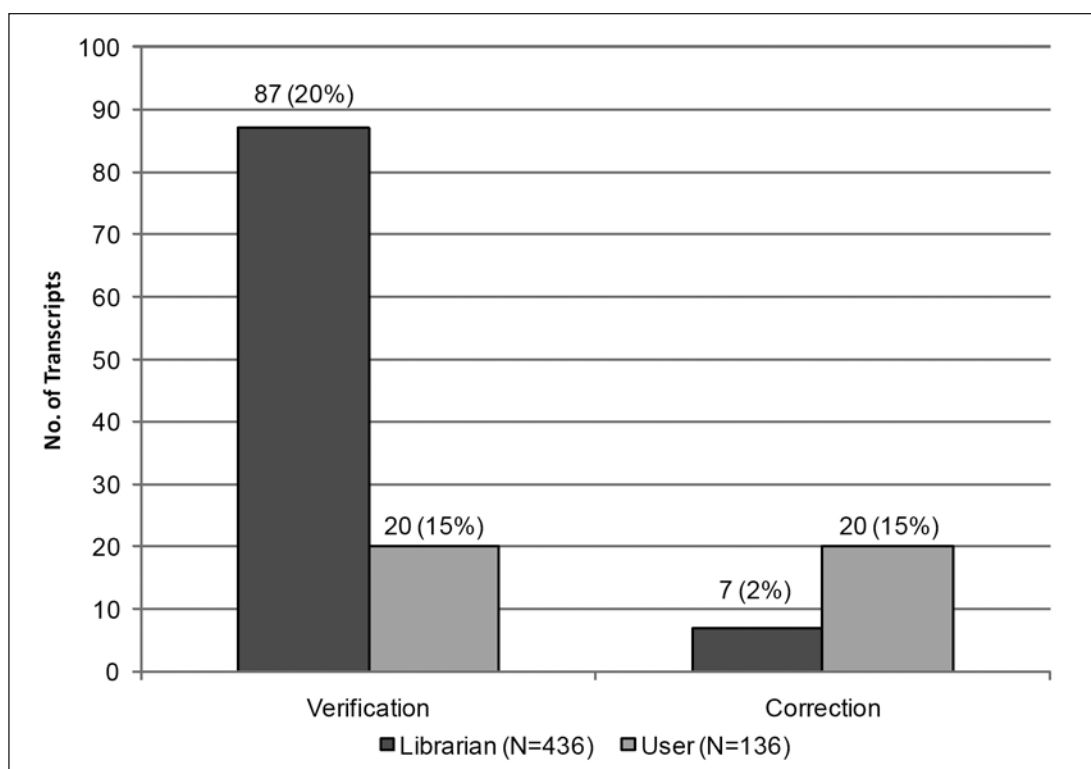
### Verifying Understanding

Figure 4 compares the rate of librarian and user query clarification to verify the other person's understanding of the query or to correct their misunderstanding. Verification of understanding is defined as clarification by confirming, paraphrasing, or summarizing the question or facets of the question to allow one interactant to correct or modify the other's understanding.<sup>69</sup> Analysis found that librarians verified their understanding of the query in 20 percent (87) of the clarifying interactions. Instances of verification were inquisitive ("So you are looking for the reasons why the Japanese attacked Pearl Harbor?") and declarative ("OK so it sounds like you want to protest the election results"). Users engaged in verification in 15 percent (20) of their clarifying interactions, such as when asking "So the best thing is to find it on the online catalog . . . is that correct?"

### Correcting Misunderstanding

In addition to verifying each other's understanding of the query, librarians and users also engage in clarification to correct misunderstandings of particular utterances or the general nature of the query;<sup>70</sup> 2 percent (7) of the occurrences of librarian clarification served to correct a misunderstanding. Misunderstandings occur due to librarian error (by the way, what I told you about the list being in strictly chronological order was not correct; I'm sorry.) as well as user misconceptions ("Yes, you can get into westlaw for free, but from what i can tell this is only access to legal information and laws, not individual criminal records"). Users corrected the librarians' misunderstandings in 15 percent (20) of the occurrences of user-initiated





**Figure 4.** Rates of Verification and Correction of Understanding

clarification to correct ambiguous initial queries, as when one librarian asks, “Do you mean John Stevens who was the chief engineer of the Panama Canal?” to which the user replies, “No John Stevens III, He was the father of American railroads.”

### Follow-up Questions

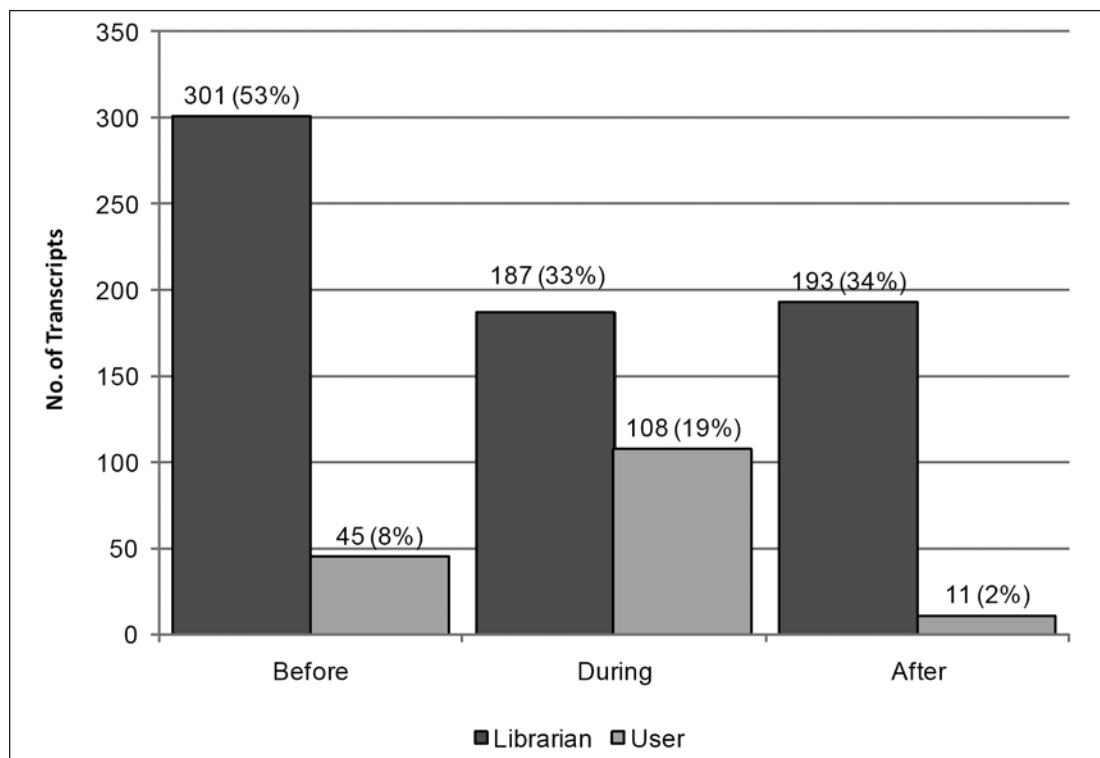
According to research in FtF reference, the follow-up question creates an opportunity to fix problems which may have occurred during the reference interaction, such as miscommunication, faulty assumptions, or not understanding the question.<sup>71</sup> Gers and Seward found that reference performance can be significantly improved by closing the reference interaction with a very specific follow-up question, “Does this completely answer your question?”<sup>72</sup> By following-up the question negotiation stage with this evaluative question, the VRS librarian confirms that the user has received relevant and sufficient information to answer the query. In the current study, 50 percent (219) of the librarians who clarified asked the follow-up question recommended by Gers and Seward or asked variants of this question, such as “Does it give you the info you need?”; “Does this answer your question?”; or “Do you think you can use what I’ve given you?”<sup>73</sup>

The referral question is another variant of

follow-up question that has an effect on user satisfaction.<sup>74</sup> According to Kwon, referrals in VRS interactions can be divided into expert research referrals, which are conducive to collaborative VRS, and redirectional local referrals, which are detrimental to collaborative VRS.<sup>75</sup> Kwon and Gregory find that providing referrals in chat reference interactions does not increase user satisfaction, which is consistent with findings on unmonitored referrals in FtF reference.<sup>76</sup> In the current analysis of 592 interactions, only four percent (17) of the 436 librarian-initiated clarifications ended with a librarian referral and only four percent (5) of the 136 user-initiated clarifications featured users requesting a referral. One example of a librarian’s referral question is “Do you want me to refer your question to your library?”

### Stages of Interaction of Query Clarification

Studies in FtF reference divide the reference encounter into two basic stages: the question negotiation stage and the answer searching stage.<sup>77</sup> In line with this basic division, the occurrence of query clarification in chat reference environments was coded as occurring “before searching” or “during searching,” with an additional code for “after searching” to capture the interaction that occurs



**Figure 5.** Stage of Query Classification Occurrence ( $N = 568$ )

related to closure of the reference interaction.<sup>78</sup> The current analysis demonstrated that librarians and users engage in two strikingly different patterns of query clarification, as shown in figure 5. More than half of librarians' clarifications occur before the search stage, with the percentage of clarifications dropping during and after the search. On the other hand, users offer clarifying information most often during the search and much less frequently before and after the search stage. This pattern indicates that users offer information without prompting by librarians, which may be unexpected. In addition, the transcripts indicate that some users realize that the librarian is on the wrong track and seek to help remedy the situation. It is also possible that users find that a page pushed to them is off-target, and they recognize that there is a need to offer additional information during the search process to correct misunderstandings regardless of whether the librarian has asked for it. The pattern of VRS librarians engaging in more clarification in the presearch stage and users engaging more in the search stage is consistent with Wu's findings concerning patterns of microlevel information seeking by librarians and users in retrieval interactions.<sup>79</sup>

### Open and Closed Questions

In the early question negotiation stage of the

reference encounter, the librarian's goal is to encourage the user to talk through the use of open questions, or what Dewdney and Michell refer to as the "why" questions.<sup>80</sup> Open questions "allow users to respond in their own words and do not limit answer to the narrow range of choices presented by the closed question: are invitations to talk."<sup>81</sup> In response to the open questions, the user likely will cover much of what the librarian needs to know and some aspects that the librarian would not think to ask about.<sup>82</sup> Open questions allow the user to shape the interaction according to their understanding of the query and to help the librarian to understand the user's motivation. In the second stage of the negotiation process, the reference librarian seeks to translate the user's query into system terms, often utilizing closed questions to do so. Closed questions do not give a choice in response other than those provided by the questioner; they often take the form of yes-or-no, either/or questions and are system-centric.<sup>83</sup> They are useful for identifying relevant resources once question negotiation has occurred ("Is this the type of website you're looking for?"). But when used during the presearch stage of the interaction, closed questions only clarify the query according to the extent of the librarian's incomplete understanding, or misunderstanding, of the user's information need.

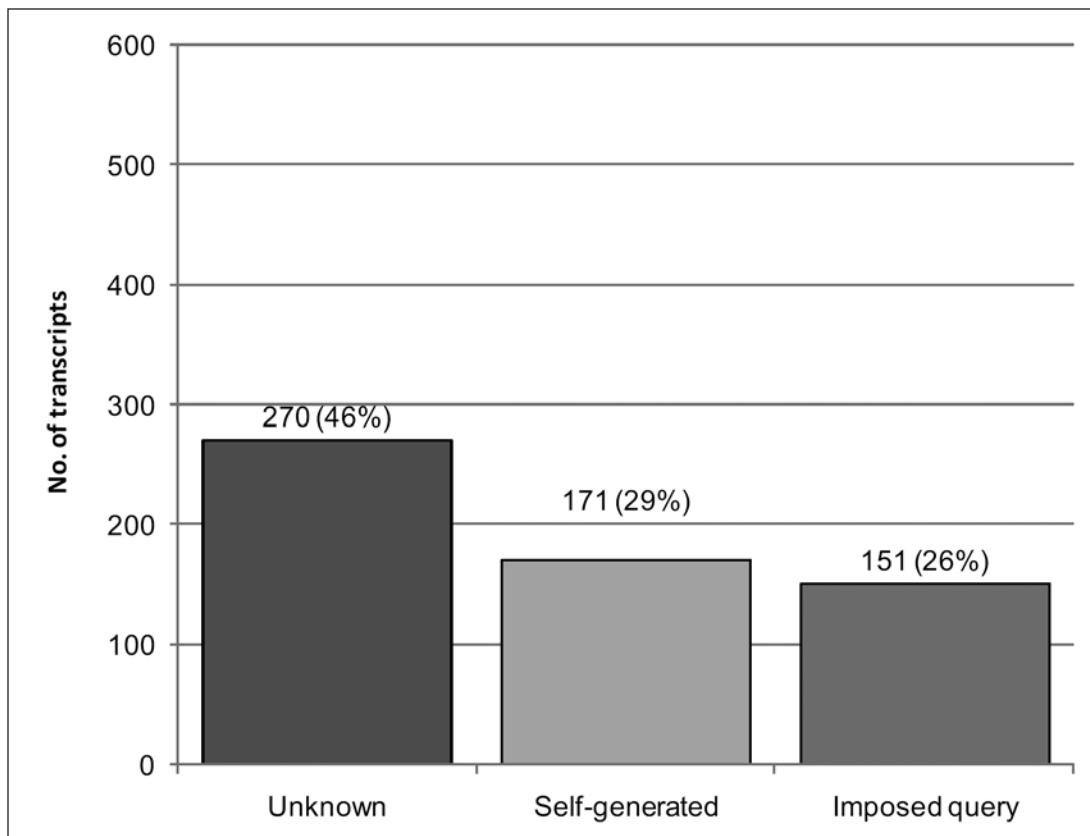
King notes that a common problem is that reference librarians skip to the use of closed questions and searching stage without first using open questions to negotiate the query.<sup>84</sup> The current analysis of VRS interactions confirms that this also is true of the chat environment. In this analysis of the 854 total questions asked in 592 transcripts, librarians used open questions in 33 percent (285) of their clarifications while they used closed questions in 67 percent (569) of these, twice as often as open questions. Despite Dervin and Dewdney's and King's exhortations to use open or "neutral" questions to negotiate the reference query, only a third of clarifying interactions are open questions, which suggests that librarians may not be attending to the importance of using open questions in the presearch stage of the VRS interaction.<sup>85</sup> As this analysis did not cross-reference question type by the search stage in which it occurred, conclusions cannot be determined as to the frequency of open and closed questions in the presearch and search stages.

Interestingly, it should be noted that sometimes it was difficult for coders to determine whether questions were open or closed. Consider these two

examples. In the first example the librarian asks, "Can you tell me more about what you are looking for?" This wording presents an invitation to talk, but is still a closed question which could be answered with a yes or no. In the second example, the librarian similarly asks, "Can I ask what grade level this is for so I don't give you something that is too technical or too easy?" The user responds, "Ok." The user takes what is meant to be an open question to be a closed one and indicates that it is "Ok" to ask about grade level, an unhelpful response.

### Self-Generated versus Imposed Queries

Gross identified two sources of query formation: self-generated and imposed queries.<sup>86</sup> Self-generated queries are defined as those in which the user identifies an information need and asks a question.<sup>87</sup> Imposed queries are those in which a question is given to someone else to transact or resolve.<sup>88</sup> These can indicate a formal relationship between imposer and agent, as in a school assignment or work-related query, or an informal relationship, as when friends and family seek information for each other to solve problems or meet recreational needs.<sup>89</sup>



**Figure 6.** Origin of Query (N = 592)  
(Percentages do not add to 100% because of rounding)

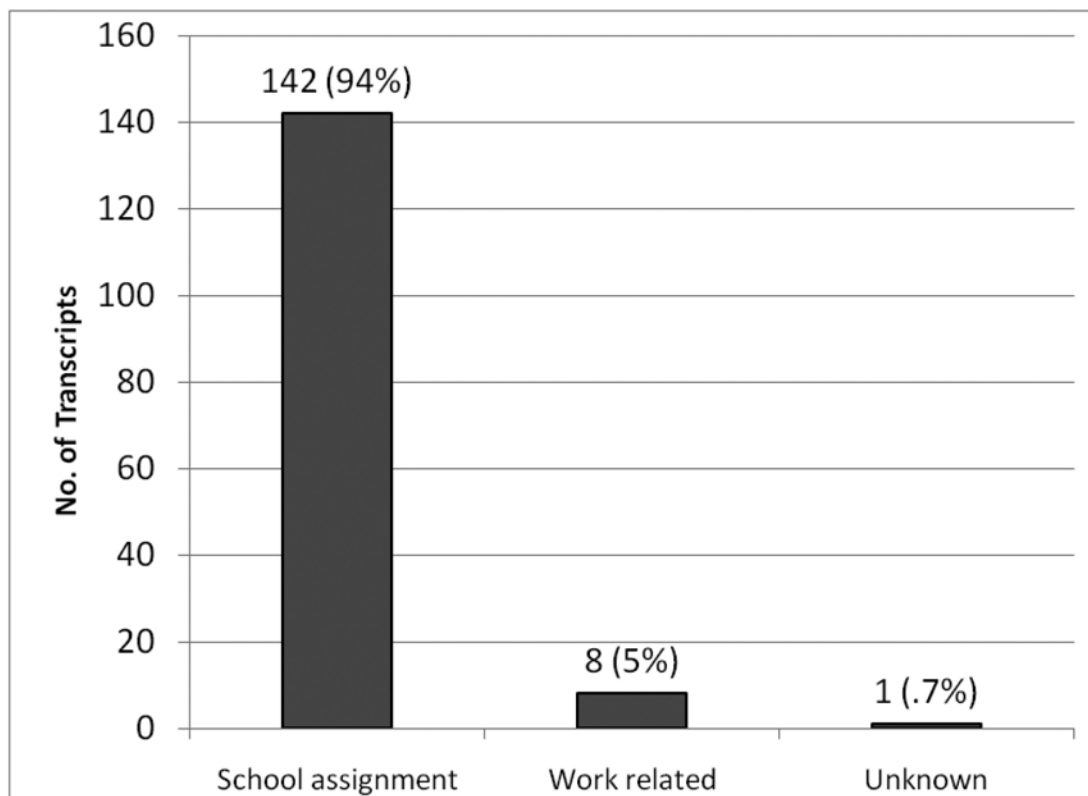
Figure 6 shows the results of transcript coding according to query type as self-generated, imposed, or of unknown origin. Query type could not be determined in 46 percent (270 of 592 transcripts), indicating that librarians did not clarify by asking about query type in almost half of the analyzed interactions and that users did not volunteer this information. In 26 percent (151 of 592 transcripts), the queries were found to be imposed. A slightly higher 29 percent (171 of 592 transcripts) were coded as self-generated queries, often identified with an “I” statement, such as “I want to plan a camping and rock climbing trip to Pilot Mountain. Do you have any recommendations?” However, this is not a hard and fast rule, as “I” statements could also be part of an imposed query as in this example: “For a history project, I must do a poster diagram of the evolution of pyramids from masatbas to step pyramids to straight-sided pyramids.”

As seen in figure 7, the imposed queries were further subdivided, with 94 percent (142) concerning school assignments, five percent (8) concerning work-related tasks, and one was imposed, but not identifiable as school- or work-related. So for the 54 percent (322 of 592) of queries in which origin could be determined, approximately half

were self-generated and half were imposed, most of these being school-related assignments.

### Query Clarification and Accuracy

A further analysis of accuracy was conducted on a subset of 180 ready reference questions (i.e., those having a factual answer that could be easily and quickly verified, usually from a single authoritative source) from the corpus of 592. Of these, 134 were found to be usable for these further analyses. As can be seen in figure 8, query clarification considerably improved accuracy. A total of 73 percent (72 of 98) correctly answered ready reference questions were clarified as opposed to 21 percent (21 of 98) which were correctly answered although there was no clarification. In addition, 5 percent (5 of 98) were found to be correct and no clarification was needed. Out of the total (134) ready reference questions analyzed, the librarians who clarified the query gave the correct answer 54% (72) of the time and an incorrect answer only 18% (24) of the time. Thus, clarifying the question, even for ready reference queries which may initially appear not to need clarification, was found to be related to higher level of accuracy.



**Figure 7.** Types of Imposed Queries (*N* = 151)  
(Percentages do not add to 100% because of rounding)

One example of a question that was not clarified resulted in the librarian initially searching for and sending information that focused on the wrong question. In this case, the user asked "if a 15 year old can start diving classes now." After saying "One moment please. I will see what I can find," the librarian begins to search. Several minutes elapse and then the librarian replies, "After looking at a few websites it seems that beginning scuba diving classes start at age 12 to 16. It depends on how good a swimmer the person is. As a scuba diver myself I think the age range sounds right." The user then responds, "i don't want scuba diving classes I want driving classes." Although the user actually mistyped the word "diving" instead of "driving," to trigger the misunderstanding, the librarian wasted valuable time searching when a quick clarification (e.g., "Do you mean scuba diving or sky diving?") would have immediately revealed the typo. Later the user grows impatient with waiting for a reply and logs off abruptly.

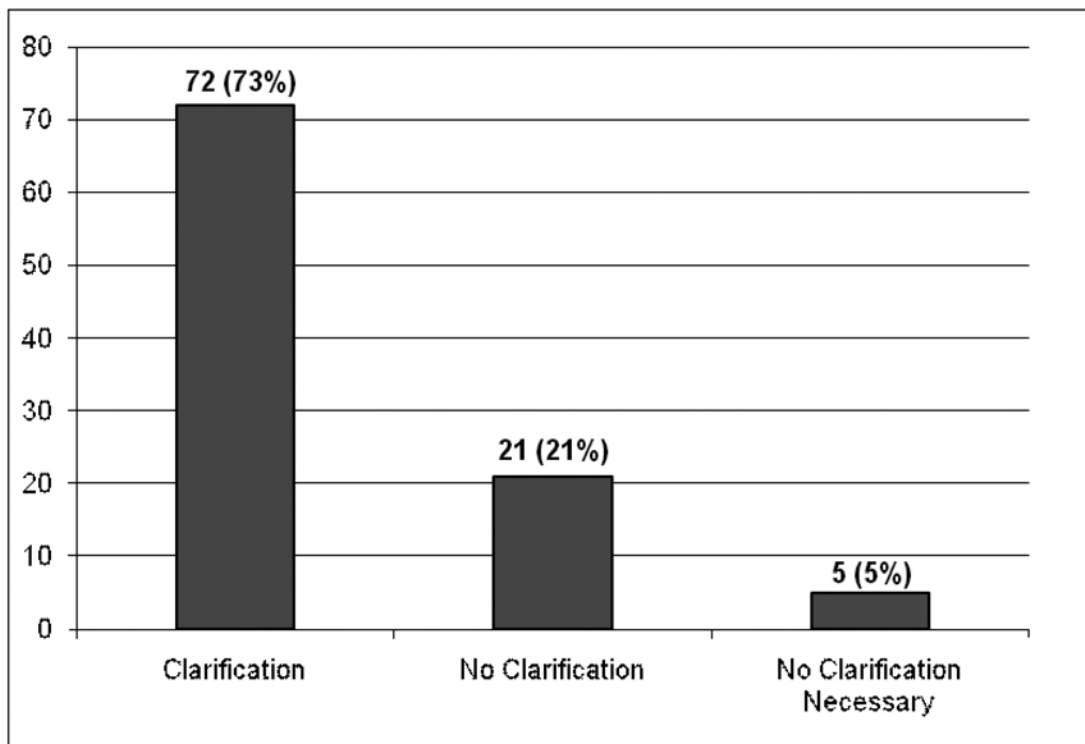
clarification because of the archival nature of the transcript that is produced for each interaction. This study was among the first to subject a large sample of reference transcripts to detailed qualitative analysis to produce a typology of query clarification in the chat environment.

Major findings include the following:

- Query clarification does occur in the chat reference environment, by both librarians and users. Librarians clarified in 74 percent (436) of the 592 analyzed interactions, while users clarified in 23 percent (136). The rate of librarian clarification is higher than those reported in FtF studies but is difficult to compare directly as FtF studies most often used experimental methods, compared to the post-occurrence analysis of a random sample of chat reference transcripts drawn from a large sample.
- Librarians and users engage in many different types of query clarification techniques including seeking information, verifying understanding, and correcting misunderstanding. Types of information most commonly clarified by librarians and users concern the query topic and background information about the user

## MAJOR FINDINGS

Chat reference is a rich environment in which to study the reference interview as a process of query



**Figure 8.** Impact of Clarification on Accuracy in Ready Reference Questions (N = 98 Ready Reference Questions Correctly Answered) (Percentages do not add to 100% because of rounding)

or query. Additional types of information clarified include search history, type of resources, and extent and depth of information needed. Librarians ask follow-up questions in half of all interactions and refer the user to a different librarian in 4 percent of all interactions.

- Librarians and users engage in different patterns of query clarification in the chat reference environment. Librarians tend to clarify heavily before the search, then to a lesser extent during and after the search; users offer clarifying information most heavily in the search stage. This suggests that the reference librarians clarify to negotiate the query before employing a search strategy, while users most often clarify once the searching has already begun.
- Librarians and users have different goals in their query clarification. Librarians usually clarify to seek information, drawing out search history and getting a better idea of what is sought. Users clarify through offering information when realizing that the librarian is off base or that there has been a miscommunication.
- Librarians asked twice as many closed questions (67 percent) as open questions (33 percent) as clarifying techniques from the corpus of 854 questions asked by librarians across all transcripts.
- Imposed queries, which may or may not be amenable to the same question negotiation techniques as self-generated queries, comprised 25 percent of the chat reference interactions analyzed. Of the 25 percent imposed queries, 94 percent were school or academic assignments.
- There was an increase in accuracy of responses to ready reference questions (73 percent vs. 21 percent) when clarifying questions were asked by VRS librarians.

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## RECOMMENDATIONS FOR PRACTICE

Findings with regard to query type indicate several practical implications. Query clarification does enhance accuracy and is recommended for almost all VRS questions, even those that seem obvious upon first look (like the diving/driving example above).

Queries related to school assignments constitute 94 percent of imposed queries. This result shows that students (thought to be from a wide range of educational levels from elementary, middle, and high schools as well as colleges and universities) are a key user group of chat reference. The practice of question negotiation should be attuned to the special needs of school assignments as well as the general difficulty of negotiating

formally- and informally-imposed queries.

Since VRS librarians do not clarify query type in nearly half of the transcripts analyzed, they should heighten their awareness of the importance of, and techniques for, determining query type in every chat reference interaction. This process can be a bit tricky as users may be put off by the closed question: "Is this a homework assignment?"; which is better asked as an open question: "Can you tell me more about what you're working on?"

Findings that librarians use twice as many closed as open questions indicates that VRS training should stress the importance of open questions in aiding query clarification and effectiveness of reference service provision, especially in the early part of the encounter.

Librarians in 50 percent (219) of the transcripts used the follow-up question. Since "this behavior alone assures better performance," training VRS professionals to follow-up each interaction with "Does this completely answer your question?" or a similar question may improve users' satisfaction with VRS.<sup>90</sup>

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## LIMITATIONS

As in previous studies utilizing chat transcripts, transcripts were stripped of all information that personally identified the clients and librarians.<sup>91</sup> As such, it is not possible to draw any conclusions about the effect of demographic characteristics (age, gender, race, etc.) on the aspects of query clarification in chat VRS considered in this research. The stripping of personally identifying information also prevented comparisons of query clarification behaviors by public versus academic reference librarians or by their level of experience or other demographic variables.

In the case of ready reference questions, the research team was able to track accuracy of answers, but in these and the other interactions, satisfaction of users and librarians with the interaction is only inferred through dialog and closings (e.g., "Thanks, this information is perfect!").<sup>92</sup>

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## CONCLUSION

There is no doubt that investigations, such as this one, into the practice of query clarification in virtual environments can be used to improve accuracy and satisfaction. The picture that emerges from this analysis of chat reference transcripts demonstrates that query clarification does occur frequently in the chat reference environment, but that there is room for improvement of the reference librarians' techniques, particularly in the use

of open questions and follow-up questions. Future research should investigate the frequency of librarians' use of clarifying questions by type during each of the stages to analyze whether librarians are utilizing open questions most frequently during the before searching stage and closed questions more frequently in the searching and after searching stages.

There also is a need for continued research efforts to understand the mechanics and meanings of query clarification for imposed queries, specifically for students working on school or university assignments. No best practice guidelines have been established yet for question negotiation of imposed queries; much more research is needed on this process to serve the significant proportion of users who come to chat reference (and FtF reference) with an imposed query. Research on the level of subject versus general reference expertise required for imposed questions also is recommended. This area of focus could also inform the development of chat reference technology to enable these questions to be routed to reference librarians who have the needed expertise.

Query clarification is an essential aspect of the human intelligence that VRS librarians bring to the digital environment. Evaluation of query clarification along the above criteria should continue, as VRS have become established and expected library services, as distance education programs grow in number, as English Language Learners and the deaf and hard of hearing continue to adopt VRS, and as software environments continue to develop. By combining the benefits of synchronous, remote technologies with the human touch of reference librarianship, users can have the best of both worlds—the convenience of the digital environment and the value-added assistance of professional librarians.

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**APPENDIX A. QUERY CLARIFICATION CODING SCHEME, NODE DESCRIPTIONS, AND TRANSCRIPT EXAMPLES**

**Query Clarification Coding Scheme**

CLARIFIER

- User
- Librarian

CLARIFICATION

- Yes
- Scripted
- No
- No Clarification Necessary

QUESTION TYPE

- Open Question
- Closed Question

QUERY TYPE

- Self-Generated Query
- Imposed Query
  - School Assignment
  - Work Related
- Unknown

STAGE OF INTERACTION

- Before Searching
- During Searching
- After Searching

TYPE OF INFORMATION SOUGHT/OFFERED

- Topic
- Background
- Search History
- Extent/depth
- Type of Resource
- Verification
- Correction

CLOSING

- Follow-up Question
- Referral Question

**Query Clarification Coding Scheme with Node Descriptions and Transcript Examples**

<b>Nodes</b>	<b>Description</b>	<b>Examples</b>
<b>CLARIFIER</b>		
User		N/A
Librarian		N/A
<b>CLARIFICATION</b>		
Yes	Occurrence of clarification	N/A
Scripted	An occurrence of clarification by means of a script	L: "Is this for a school assignment? If so, what grade level so I don't give you something that is too difficult or too easy."
No	Absence of clarification	N/A

<b>Nodes</b>	<b>Description</b>	<b>Examples</b>
No Clarification Necessary	In light of content/detail of user's question, no clarification is necessary on the librarian's part	U: "I cannot find the Writ of Execution form online with the other forms. Please direct me." L: "That's form no. EJ-130. Here's the link:"
<b>TYPE OF QUESTION</b>		
Open Question	Questions that cannot be answered with a "yes" or "no"	L: "How are you hoping to use this information?"
Closed Question	Questions in which the respondent does not have a choice in his response other than those provided by the questioner	L: "Do you want the Trenton or Washington representatives?"
<b>QUERY TYPE</b>		
Self-Generated Query	User identifies an information need and asks a question	U: "I want to plan a camping and rock climbing trip to Pilot Mountain. Do you have any recommendations?"
Imposed Query	A question that is given to someone else to resolve	(See below examples)
School Assignment	Clarifies the school-related project requirements	U: "For a history project, I must do a poster diagram of the evolution of pyramids from masatbas to step pyramids to straight-sided pyramids. Please find me websites and books (at least 1 book) with information on these different types of pyramids."
Work Related	Clarifies work-related project requirements	U: "I work for a Poli-Sci professor and she needs some information from "The Working Press of the Nation" (magazines and internal publications directory). We don't have a copy of this on campus, and I haven't been able to reach the Reference desks of the 3 area libraries that have the book. Can you help?"
Unknown	Unable to determine origin of query	U: "who is the state rep for nj"
<b>STAGE OF INTERACTION</b>		
Before Searching	Clarifies before beginning of search or at the beginning of interaction during or immediately following greeting ritual	N/A
During Searching	Clarifies after searching has commenced or in the middle of interaction	N/A
After Searching	Clarifies immediately before or even after closing ritual	N/A

<b>Nodes</b>	<b>Description</b>	<b>Examples</b>
<b>TYPE OF INFORMATION SOUGHT/OFFERED</b>		
Topic		<p>L: "Where did you hear this term, in class?"</p> <p>L: "Do you mean what natural resources?"</p> <p>L: "What kind of advertisements are you thinking about or considering?"</p> <p>L: "I'm not finding that title. Do you know anything about it?"</p> <p>U: "I am doing marketing research on marylands restaurant industry"</p>
Search History	Clarifies sources and strategies already used	<p>L: "Have you tried the last four digits of your phone number"</p> <p>L: "Where have you looked for an answer to your question so far?"</p> <p>U: "I looked in the card catalogue and didn't see it there . . ."</p>
Background	Clarifies personal background characteristics of user.	<p>L: "Are you at uni?"</p> <p>L: ". . . what year are you in?"</p> <p>L: "Is this for a school project?"</p> <p>L: ". . . can you tell me more about your project . . ."</p> <p>L: "Can you tell me a bit more about your assignment?"</p> <p>U: "I am in 7th grade GT Sciene and I am Doing a 2 year research project . . ."</p>
Extent/Depth	Clarifies extent/depth/amount of information sought	<p>L: "Were you looking for in-depth history? Or a summary?"</p> <p>U: "the thing is i need it to be simple and not to wordy so its easy to find the information that i need"</p>
Type of Resource	Clarifies type of materials or formats for desired resources	<p>L: "Are you looking for books, articles, or online information?"</p> <p>L: "What sort of materials or formats are you interested in?"</p> <p>L: "Are you trying to find titles of e-journals, by keyword? Or, rather, are you trying to find individual articles?"</p> <p>U: "And [not] a book, online though"</p> <p>U: "Yes, but I'm looking for more historical and architectural resources"</p>

Nodes	Description	Examples
Verification	Clarification by confirming/paraphrasing/summarizing	<p>L: "You want a website on Brown vs Bd of Educ?"</p> <p>L: "So there was some kind of vote in your county back in 2000? Is that correct?"</p> <p>L: "OK so it sounds like you want to protest the election results."</p> <p>U: "So the best thing is to find it on the online catalog . . . is that correct?"</p>
Correction	One corrects the other's misunderstanding	<p>U: "i know you can access it as a student for free"</p> <p>L: "Yes, you can get into westlaw for free, but from what i can tell this is only access to legal information and laws, not individual criminal records"</p> <p>L: "Do you mean the John Stevens who was the chief engineer of the Panama Canal?"</p> <p>U: "No John Stevens III, He was the father of American Railroads"</p> <p>L: "There is a book called Heroes of the Holocaust by Arnold Geier."</p> <p>U: "no heroes of the holocaust by allan zullo and mara bovsun"</p>

**CLOSING**

Follow-Up Question	Librarian confirms user has received the correct information and the right amount	<p>L: "Does it give you the info. you need?"</p> <p>L: "Does this answer your question?"</p> <p>L: "Do you think you can use what I've given you here?"</p> <p>L: "Does this completely answer your question?"</p>
Referral Question	Librarian asks if user would like to be referred to another librarian for follow-up to the query	<p>L: "I'm not having much luck, a business librarian might know of a source I am missing, Can I have one contact you back via e-mail?"</p> <p>L: "Would you like me to forward it for followup by e-mail?"</p> <p>L: "There is a library in NJ that specializes in business questions. Would you like me to forward your question to them?"</p>