The Journal of Academic Librarianship 41 (2015) 68–86

Contents lists available at ScienceDirect

The Journal of Academic Librarianship

Delivering Virtual Reference Services on the Web: An Investigation into the Current Practice by Academic Libraries

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ARTICLE INFO

Article history:
Received 20 May 2014
Accepted 1 October 2014
Available online 11 November 2014

Keywords:
Virtual reference
Digital reference
Chat
Academic libraries
Remote reference
Library technologies

ABSTRACT

This article describes a study on web-based reference services in academic libraries. A random sample of 362 institutions was taken from Peterson's Four-Year Colleges 2013. The authors scanned each library's website for reference-related activities, specifically if the library 1) provides or advertises reference on the main page and terminology used to advertise the reference service; 2) provides chat and related information such as chat box location, provider (in-house vs. consortia), and the vendor or program used and 3) provides other forms of virtual reference through email, phone, text messaging, instant messenger, video chat, interactive knowledge base, and other technologies. The findings indicate that approximately 68% of the libraries in the sample stated reference services on the main webpage. About 74% of the libraries used at least one of the following technologies for virtual reference: email, phone, chat, IM, text, and video chat. Exactly 47.5% of the libraries provide chat. The institutions that offer more advanced degrees and have more students are more likely to offer chat than those who offer low-level degrees and fewer students. This is the only study on a large scale with details about virtual reference in academic libraries.

INTRODUCTION

Librarians have always been avid users of new technologies. Reference librarians have employed the most cutting edge technology, tools, and software products to find new ways to reach their distance users quickly and conveniently. Librarians quickly adapt to new technologies and software products as each becomes available, practical, and popular. In the 1970s and 1980s, academic libraries provided toll free phone numbers and fax lines for reference queries and during the 1990s email reference queries grew tremendously (Casey, 2004; Coffman & Arret, 2004). As far back as 1987, librarians provided digital reference on a system wide computing network (Copler, 1989). In the mid to late 1990s, synchronous video chat service was utilized by librarians (Casey, 2004; Matteson, Salamon, & Brewster, 2011) and in 1999, chat software programs such as Library Systems & Services (now Tutor.com), LivePerson, and QuestionPoint became pervasive, all of which had advanced features such as co-browsing and usage statistics (Casey, 2004; Coffman & Arret, 2004; Matteson et al., 2011). During this time chat reference expanded and library consortia worked together to provide virtual reference for extended hours. For example, Florida Distance Learning Reference and Referral Center began offering real time reference via chat in 1999 (Bishop & Torrence, 2007). In the late 1990s, librarians began to offer reference service via instant messaging tools, maintaining accounts on services such as AOL Instant Messenger (AIM) and Yahoo Messenger. Instant messenger did not include advanced features but was inexpensive, easy to use, and popular among college students. Instant messenger (IM) became cumbersome to manage as librarians attempted to use multiple account logins to reach patrons on whichever IM account they happened to use. This led to the use of aggregator services such as Meebo, Trillian, and Pidgin (Matteson et al., 2011). Meebo provided another desirable feature: a chat widget allowing users to chat without logging into or even obtaining accounts with specific instant messenger programs. Meebo became wildly popular among libraries offering chat services but in 2012, this service shut down and librarians were forced to review other options for a replacement (Breitbach, 2012).

In 2014, academic librarians are still proactively reaching users in a post-Meebo and rapidly growing technological age. As library users are growing more sophisticated, technologically equipped, and mobile, librarians are striving harder to be a part of the users' worlds by being available wherever they are. This study explores the current landscape of distance reference services and technologies offered by academic libraries on a large scale. It further examines the correlations of the aforementioned services and technologies to the characteristics of the libraries' parent institutions.

LITERATURE REVIEW

There are numerous research studies on virtual reference and granting full coverage to them is beyond the scope of this paper (see

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http://dx.doi.org/10.1016/j.acalib.2014.10.003
0099-1333/

Matteson et al., 2011 for a recent synthesis of the literature related to live chat reference). Librarians are offering reference virtually anywhere. Reference services are provided via virtual worlds, such as Second Life (Godfrey, 2008), via web conferencing tools, such as Adobe Connect (Arvin & Kaiser, 2012), and via Web 2.0 websites, such as Twitter (Arya & Mishra, 2011). Librarians continue to pursue virtual reference technologies in order to meet users' needs.

HOW DO USERS DISCOVER VIRTUAL REFERENCE?

How users engage with virtual reference services determine many aspects of a typical library's use and promotion of them. Connoway and Radford's (2011) research on the interpersonal aspects of virtual reference reveals that users do not often discover virtual reference from the website, but instead from the staff's promotion of the services in settings such as the reference desk or research instruction sessions. Connoway and Radford (2011) still recommend that virtual reference be placed on the most frequently accessed pages of libraries' websites. For the purposes of the study reported in this article, it is only feasible to discover if virtual reference services are available on libraries' websites and whether the services are listed on either the library's main webpage or a subpage. The existence of virtual reference on a library's home page is an indicator that the service is active and most likely promoted to its users as well.

While researching this literature review, the authors encountered virtual reference surveys conducted in concurrence with usability studies. These studies ask how users discover reference services on libraries' websites with particular attention to the placement of the link to services on libraries' websites (Chow & Croxton, 2014; Dee & Allen, 2006; Mu, Dimitroff, Jordan, & Burclaff, 2011). Bao (2003) reports only 52% of the libraries in the sample presented web-based interactive reference services on their homepages. More recent surveys indicate that close to 80% of libraries place reference service information or links on their main webpages (Dee & Allen, 2006; Mu et al., 2011). In addition, the studies take note of the terminology used for reference. Dee and Allen's (2006) participants identify whether or not the term used for reference is clear, while others report what the most popular terminology includes: “Ask a librarian,” “Ask,” and “Help” (Bao, 2003; Dorris, Malloy, & Wallace, 2009; Mu et al., 2011). After identifying and discovering the reference links, users will encounter different technologies employed for reference services including email, phone, text and more.

TYPES OF VIRTUAL REFERENCE SERVICES

The literature contains studies focusing on one technology employed for distance reference service in libraries. Profit (2008)'s small scale survey is on text messaging reference in libraries and Francoeur (2001) reports on libraries' operational chat services including the tools and software products utilized to provide chat service. The literature also includes comparisons of multiple different technologies employed for distance reference services by libraries.

Surveys analyze usage of increasing numbers of technologies including email and chat (Dee & Allen, 2006); email, chat, and phone (Mon et al., 2008); email-only reference, synchronous reference, and no virtual reference (Mu et al., 2011); email, chat, and text (Dorris et al., 2009); email, reference forms, forums, video conferencing, and chat (Bao, 2003); and finally email, chat, text, and video conferencing (Chow & Croxton, 2014). Clearly virtual reference services are popular but none of the studies above are conducted on a large scale.

A very comprehensive, well-known, and large scale survey is conducted by the United States Department of Education's National Center for Education Statistics. This study, referred to as the American Libraries Survey (ALS) has been conducted since 1966 and on two year intervals since 1988. The ALS gathers data beyond virtual reference, also counting human resources (staffing, benefits), library expenditures, collections, gate count, library hours, services such as interlibrary loan, circulation, assistive technology for users with disabilities, and information literacy. In 2008, the ALS collected data on email or web-based reference (Phan, 2009). In 2010 and 2012, the survey expanded to include chat reference using commercial services, instant messaging applications, and short message services or text messaging (Phan, Hardesty, Hug, & Scheckells, 2012; Phan, Hardesty, & Hug, 2014). The findings indicate that 75% of the academic libraries supported virtual reference, 24% provide text message reference and 27%–59% provided chat. This large range for chat reference service is one dissimilarity between the ALS and the study reported in this article. This difference might be due to the questions used in the survey.

The ALS has some ambiguity in the questionnaire about commercial chat versus instant messenger chat. The instructions that accompanied the 2012 ALS questionnaire include examples of virtual reference services, dividing products into two categories: commercial chat service and instant messenger chat (Phan et al., 2014). This distinction might have been made for the advanced features available within the “commercial services”. For the purposes of the study reported here, all four of the examples (QuestionPoint, Tutor.com, LibraryH3lp, and Meebo) would be considered chat reference; instant messaging describes a scenario where the user cannot communicate with a librarian without first downloading and installing software, creating an account, and finally signing on to the IM system. The reference to Meebo (Phan et al., 2014), a now defunct technology, also makes the most recent 2012 data, appear older than it actually is.

In spite of some similarities in data collection between ALS and the study described in this article, key differences exist. Since remote reference is not the focus of the ALS, it does not provide as many details such as the vendors used for chat reference, or usage of newer technologies for reference including knowledge bases or video chat conferencing programs. Therefore, this article's study compliments the ALS by broadening its scope and depth in virtual reference.

SAMPLE SIZING AND RESEARCH METHODOLOGY

Another difference between the ALS and this study is the methodology. The ALS is a questionnaire sent to directors or deans of academic libraries and since it is conducted on a two year cycle, the results are published two years after the data collection. The ALS surveys are self-reporting, which is different from website examinations of actual utilization of remote reference technologies used. Both are prone to error, so the use of two different data collection and reporting strategies can verify and support each other. The strength of the ALS is its inclusion of a large number of libraries — exactly 3793 (85% of the population) in 2012, 3689 libraries in 2010, and 3827 in 2008 (Phan, 2009; Phan et al., 2012, 2014).

Other studies collected data about virtual reference with website examinations. However, they are on a much smaller scale or without the use of random sampling (Bao, 2003; Dee & Allen, 2006; Dorris et al., 2009; Francoeur, 2001; Mon et al., 2008). Bao (2003) reports a stratified sample of 143 libraries. Stratified samples can be just as efficient as random samples. Francoeur (2001) employed a very overachieving convenience sample (272 libraries) including surveys on library listservs, literature reviews and web searches. Some samples are limited to more sophisticated libraries as they are gathered from top lists, such as the top 100 public libraries (Mon et al., 2008) and top 100 universities (Mu et al., 2011). The sample studied by Dorris et al. (2009) and Dee and Allen (2006) are limited to health sciences libraries. Therefore their findings could only be applied to the participating libraries of those studies.

INSTITUTIONAL CHARACTERISTICS OF LIBRARIES USING VIRTUAL REFERENCE

While reporting on the use of virtual reference, only a few studies examine the type of libraries providing the service. To quickly get a

sense of how remote reference service varies in different types of libraries, it is advantageous to sort the libraries by different institutional characteristics. For example, some studies compare academic versus public libraries but do not do any data mining or statistical analysis of the characteristics of either sort of library (Chow, Burris, Bridges, & Commander, 2011; Francoeur, 2001). Mon et al. (2008) sorts public libraries by the population size of the town served. Dorris et al. (2009) classifies health science libraries by academic, health center, hospital, government, and association. Other institutional characteristics have an effect on the decision to provide virtual reference services.

Studies with comparisons to institutional characteristics as reported in this article are the Academic Libraries Survey (Phan, 2009; Phan et al., 2012, 2014) and Bao's (2003) study. The ALS presents their data by institutional characteristics: level (highest degree), size (FTE enrollment), Carnegie classification, and public versus private. The ALS considers for profit and not-for-profit institutions both as private institutions. The ALS allows for the data to be downloaded or viewed for peer analysis including a number of characteristics: state, geographic region, library expenditures, circulation, volumes held, staffing, and student enrollment statistics (National Center for Education Statistics, 2014). The ALS lets the numbers speak and does not analyze which types of libraries are more likely to provide which type of service.

Bao (2003) classifies six different types of libraries based on their parent institution (i.e., doctorate-granting public universities, doctorate-granting private universities, master's public universities, master's private universities, baccalaureate public colleges, baccalaureate private colleges). No other study since Bao's (2003) virtual reference study includes an analysis revealing what type of university is most likely to provide each type of reference service. Some of his findings are consistent with the study reported in this article such as public institutions are more likely to provide virtual reference than private institutions. This research described in this article is unique because there are no comparable studies in goals, scale, scope, and methodology that have been done previously. The findings from this study can be extrapolated to the targeted population (North American college and university libraries) as the random sample provides an unbiased and accurate snapshot of the 2013 landscape of distance reference services in academic libraries.

METHODOLOGY

The targeted population in this study includes all the four-year colleges and universities in the United States and Canada. For this purpose, the authors chose *Peterson's Four-Year Colleges 2013* as the population base because it is the most comprehensive listing of four-year colleges and universities in the two countries and more likely to represent the population for this study (Webster, 2012). A total of 2583 entries are entered in the alphabetical list of institutions at the end of *Peterson's Four-Year Colleges 2013*. The authors numbered each entry sequentially and used a random number generator to generate random numbers between 1 and 2583 (Haahr, 2012). Institutions were selected based on the matching numbers between those generated by the random number generator and the numbers listed sequentially on the list. It is customary for *Peterson's Four-Year Colleges* to list the multiple campuses of the same institution as separate entries. In the event that the random numbers included repeat entries of the same institution on the list, only the first listing of the college or university was included in the sample. As a result, a total of 362 institutions were selected. This is 14% of the target population (see Appendix A).

The randomness in sample selection guarantees the unbiased representation of the findings about the population under the study. A 14% sample size produces findings that represent the real population with a confidence interval or margin of error at ± 5 and a 95% confidence level. In non-statistical terms, because of the random sampling techniques, the findings from this study can be extrapolated to the population with 95% of the confidence within the range of ± 5. For instance, if 47.5% of the sample is found to provide chat reference, the generalization can be made with 95% confidence that the percentage of libraries that provide chat reference services should be between 42 to 50% in the real population. A confidence level of 95% and a confidence interval at ± 5 are a commonly accepted practice in research.

The information gathered includes whether or not: 1) the library provides or advertises reference on the main webpage and the terminology used to advertise the reference services; 2) the library provides chat and related information such as chat box location, chat provider (in-house vs. consortia), and the vendor or program used; and 3) the library provides other forms of virtual reference through email, phone, text messaging, instant messenger, video chat conferencing, interactive knowledge base, and others. The detailed definition and data collection rules are fully documented and discussed (see Appendix B). Using these data collection rules, the authors then examined the library websites of the 362 institutions in the sample for instances of virtual reference service and used an Excel file to record data (see Appendix C).

The authors also gathered information about the institutions from *Peterson's Four-Year Colleges*, including the number of undergraduate students, annual comprehensive cost (tuition and room/board), the highest degree offered, and the type of institutions (private, public, and for profit). When such data was not found in *Peterson's Four-Year Colleges*, the authors referenced the institutions' websites for information. Other sources used for institutional data includes the *College Navigator* from the National Center for Education Statistics (National Center for Education Statistics, 2013) and *Collegedata.com*. For Canadian colleges, the data was found from the website of the Association of Universities and Colleges of Canada (Association of Universities and Colleges of Canada, 2013). As *Peterson's* often does not include the cost for Canadian colleges, this was a great resource for this study.

The data was first analyzed by simple mathematical tabulation. Then, Microsoft Excel statistical tools including ANOVA (analysis of variance) and regression/scatter plots were used to identify possible relationships between reference-related activities on the Web and the characteristics of parent institutions such as annual cost, the number of undergraduates, highest degree offered, and the type of colleges/universities. ANOVA is a statistical method to compare two or more groups for significant differences so it was chosen for use when a variable's data has a numerical value (i.e., cost, total number of undergraduates) versus data easily categorized and tallied (i.e., three types of institutions and four highest degrees offered: associates, bachelors, masters, and doctorate). The existence of significant differences is indicated by the value under "F" (known as F statistic) if it is larger than that under "F crit" (known as F critical value) in ANOVA. The regression, scatter plots, bar charts and pie charts are also used for visual representation of findings.

FINDINGS

MISSING DATA

The findings are based on data collected from the library websites of the 362 institutions in the random sample. Twenty-one out of the 362 institutions are considered missing for various reasons. Twelve out of the twenty-one libraries are not accessible by the public as they are hidden behind a login. Five libraries do not have a web presence even though their parent institutions maintain a presence on the Internet and four institutions do not have websites and neither do their libraries. Therefore, 94.2% of institutions in the sample are accessible for data collection, while 5.8% are not. This 5.8% of the data is considered missing, which is not uncommon in research (Howell, 2012; Osborne, 2013, p. 105).

CHAT REFERENCE

This study finds that 172 libraries (47.5%) in the sample provide chat reference service, while 169 (46.7%) libraries do not (Fig. 1). The top five

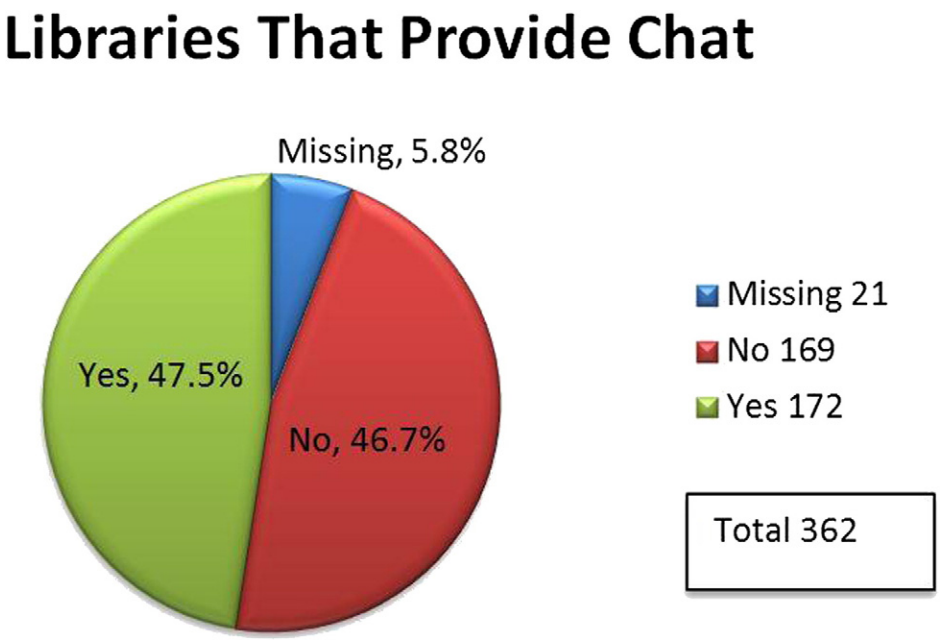


Fig. 1. Libraries that provide chat.

chat web-based/software products used by libraries in the sample include LibraryH3lp, QuestionPoint, LibChat, Zoho, and KnowItNow24/7 (Fig. 2). LibraryH3lp is used on seventy-one library websites, QuestionPoint on thirty, LibChat on twenty, Zoho on ten, and the remaining forty-two libraries use a different technology to provide chat reference services such as LiveChat, Zopim, LivePerson, Tutor.com, and Oracle. A few libraries also use two chat products at the same time.

Fifty-nine libraries (16.3%) placed the chat widget box on the main library webpage, while 113 libraries (31.2%) placed the chat widget box on a subpage of its website (Fig. 3). The authors define chat reference service on the main webpage as those libraries with a chat box presented directly on the library's main webpage or a pop-up chat box upon click.

Of the libraries that offer chat reference services, 125 (72.7%) libraries use in-house staffing (most likely the reference librarians) and 34 (19.8%) offer chat reference via a consortium effort. A consortium is a cooperative of libraries, organized usually regionally or statewide. The consortium works together to staff the chat reference service allowing for longer hours of coverage and more libraries served. A patron asking a question via a consortium effort may not realize he/she is chatting with a librarian outside of his/her parent institution. Thirteen libraries (7.6%) have both a locally staffed chat program and consortia chat. In this case, the consortia chat service adds to the locally staffed chat reference services for after-hours, extended coverage (Fig. 4).

Fig. 5 is a summary of relationships between chat reference and institutions' characteristics. Analysis of variance (ANOVA) is used to detect significant differences between the two or more groups. Generally "F" (F statistic) is compared with "F crit" (F critical value). If "F" is larger than "F crit", most probably there is a difference between the two groups with different means. In this case, ANOVA revealed significant differences between the group of libraries that offers chat reference service and the group that does not in terms of the undergraduate population size as "F" at 57.3 is larger than "F crit" at 3.8 (Fig. 5.1). The average number of undergraduate students for the libraries that offer chat

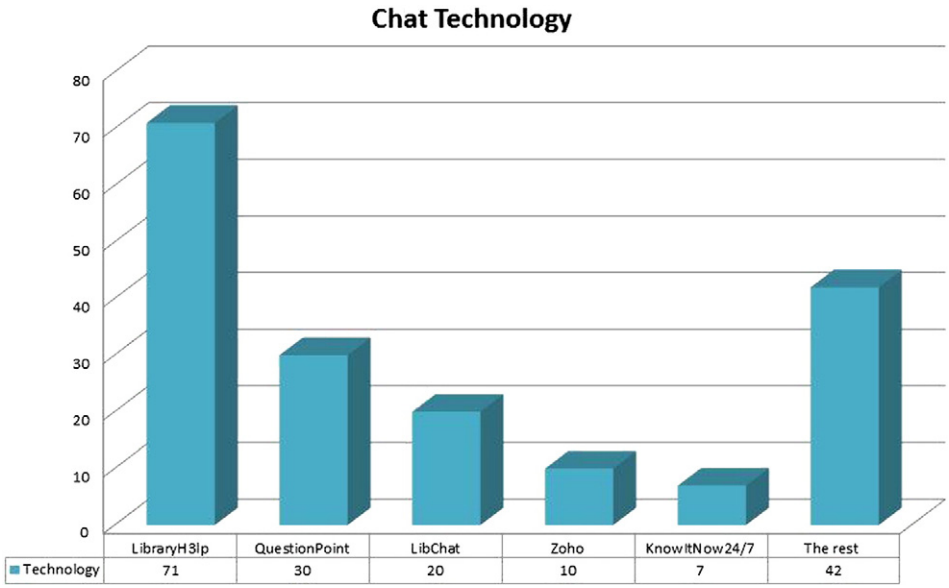


Fig. 2. Top five chat programs.

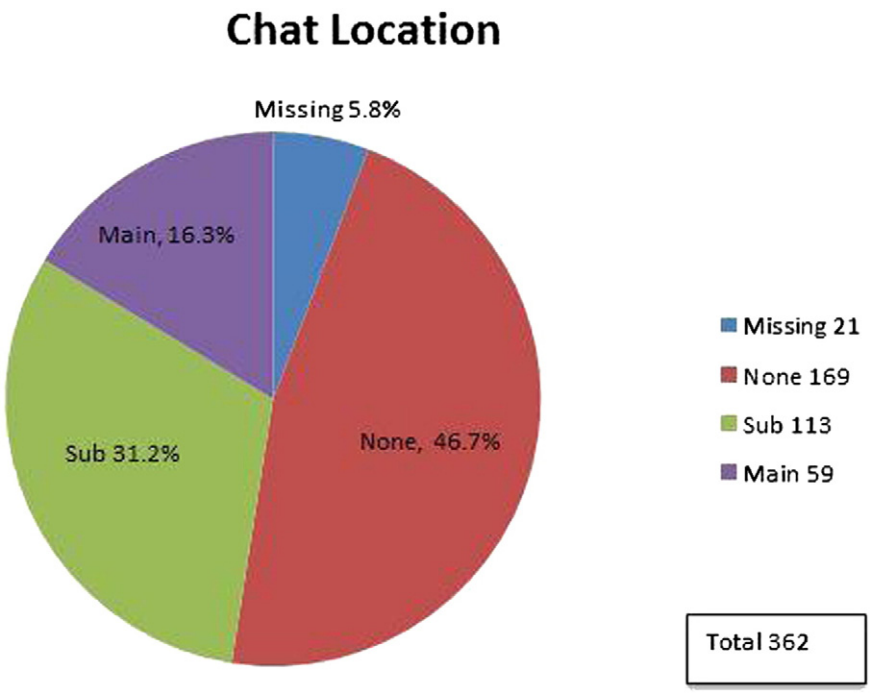


Fig. 3. Chat location.

reference service is 8448, while the average number is 2395 for those that do not offer chat reference service. The institutions with more undergraduates are more likely to offer chat reference than those with fewer undergraduate students. However, ANOVA does not find a significant difference in the comprehensive cost (tuition plus room and board) between the two groups as "F" at 2.4 is smaller than "F crit" at 3.9 (Fig. 5.2). Nevertheless, it is noted that the average cost for the group that offers chat is slightly higher than that of the group who does not, $26,794 vs. $24,264. The result from the regression analysis also indicates a relationship between the chat reference groups in terms of the highest degree offered (Fig. 5.3) and institution types (Fig. 5.4). The regression line in Fig. 5.3 is based on the percentage of libraries that offer or do not offer chat reference service in each group by the highest degrees offered. Fig. 5.3 shows that the groups with more advanced degrees tend to provide chat reference service more than those that offer lower level degrees. Fig. 5.4 further shows that public institutions are more likely to provide chat reference service than private and for-profit institutions. The regression line in Fig. 5.4 is based on the percentage that offers or does not offer chat reference service in each type of institutions.

OTHER TECHNOLOGIES FOR VIRTUAL REFERENCE

This study also includes other technologies libraries use to deliver virtual reference including instant messenger (IM), text, interactive knowledge base, video chat, email, and telephone. Instant messenger

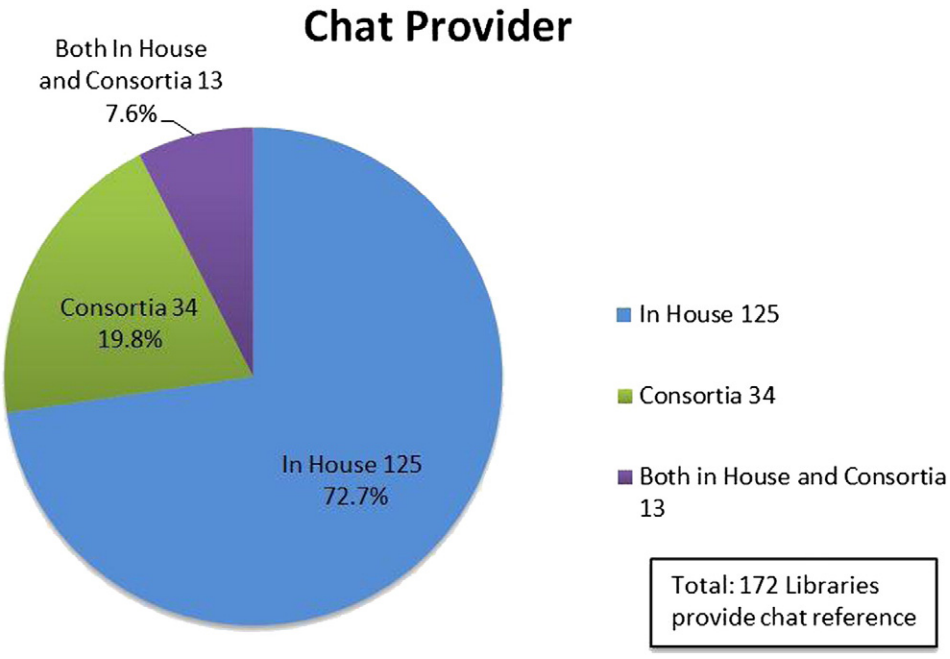


Fig. 4. Chat providers.

Figure 5.1 ANOVA: Chat / Number of Undergraduates

Groups	Count	Sum	Average	Variance
Chat	172	1453177	8448.70349	81909112
No Chat	169	438693	2595.81657	19312169

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.92E+09	1	2920122291	57.38375	3.44487E-13	3.869036
Within Groups	1.725E+10	339	50887618			
Total	2.017E+10	340				

Figure 5.2 ANOVA: Chat / Cost

Groups	Count	Sum	Average	Variance
Chat	172	4608609	26794.238	259939821
No Chat	169	4100632	24264.095	186765946

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	545696473.4	1	545696473	2.4396666	0.119234	3.869036
Within Groups	75826388456	339	223676662			
Total	76372084929	340				

Fig. 5. Chat and the institutions' characteristics.

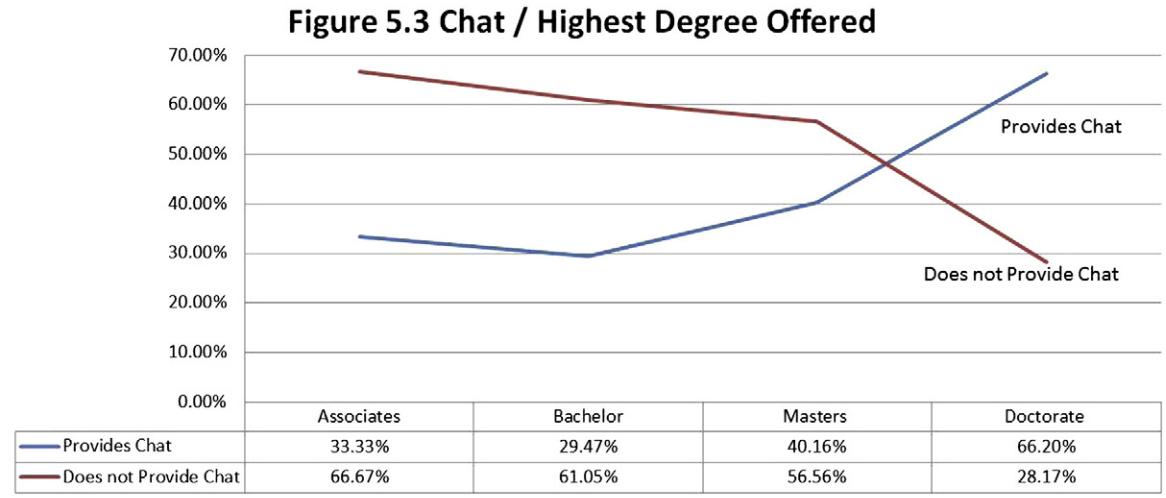
allows for the same real time communication as chat reference service and has the same staffing needs but is differentiated by the necessity of both the librarian and the patron to install the client and have an account/screen name to communicate. Additionally, instant messenger programs have fewer advanced options than the web-based chat programs. Only 24 (6.6%) libraries in the sample provide IM reference service, making it a less popular technology for virtual reference. IM includes different clients; most popular are Yahoo, AIM, Google Talk, and MSN (Fig. 6). Most libraries in the sample offer two or more IM service, most likely this is to be able to connect with users with whatever IM service they prefer.

The knowledge base, sometimes labeled interactive FAQ (frequently asked questions), is software with dynamic content where a user can ask a question and get a pre-prepared response; and if no such response matches the query, an expert will answer the question as soon as possible, occasionally almost synchronously. The question and answer can be added to the knowledge base available for future patron query searches. Forty two libraries (11.6%) in the sample have a knowledge base on their website. A knowledge base is not a library specific technology, though one vendor does provide a very popular product designed expressly for libraries. LibAnswers from Springshare leads the market and is the most popular knowledge base program in the sample (Fig. 7). This study also finds that some libraries use a knowledge base as the destination when a user clicks on the link leading to reference services. For instance, “Ask a Librarian” link may lead to a knowledge base.

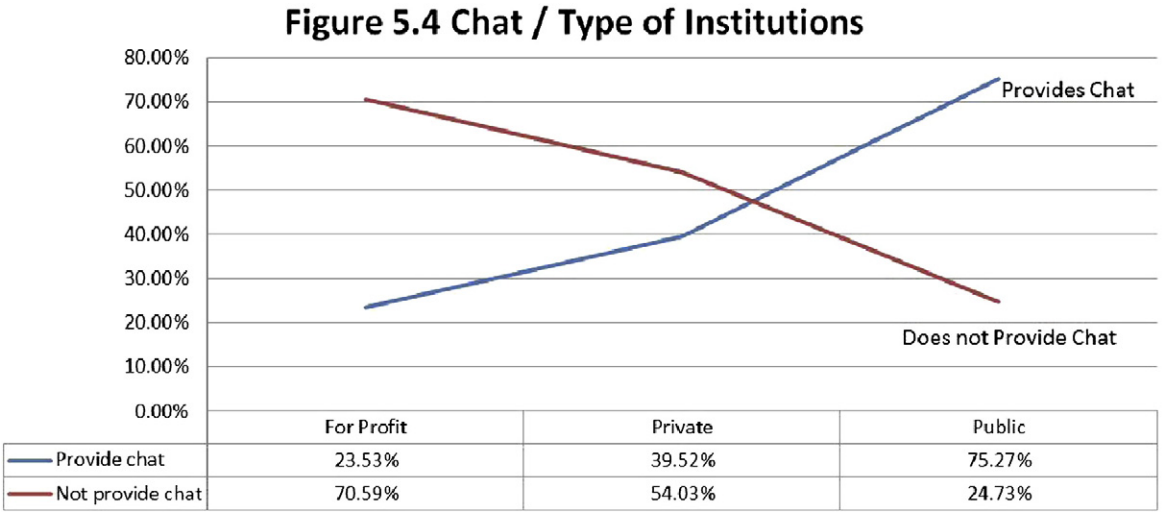
Text, also known as SMS (short messaging service), when used for reference service allows users to send a text message on a mobile phone to a librarian and receive a response. There are two possible models of text reference service. One model is device-based where a mobile phone with a texting plan is shared among reference librarians. Another model allows the librarian to use a web-based application to send a reply to a patron's mobile phone. In the second model, often times the librarian is utilizing the same online or software based program as employed for their chat reference service (for instance using Mosio or the integration of Twilio and LibraryH3lp). The study finds eighty-six libraries (23.8%) using text for reference service (Fig. 8). It is difficult to distinguish which model libraries (device-based vs. online/software based) employ and data is not collected about the top texting technologies, nor the usage of the model either.

Email reference service includes web forms and the listing of an email address specifically for the reference librarian(s). Even though this is not a new technology, email reference service is still a very popular service among library users, so the authors reviewed libraries that provide an email address and form mails for research help. About 236 libraries (65.2%) provide email specifically directed to reference librarians for research help. About 36 libraries (9.9%) do not provide any email address or email form to users. Some libraries list the parent institutions' email address only and some only provide the library's email address for general inquiry (see Fig. 9).

This study includes telephone reference service in its scope. According to the 2010 Guidelines for Implementing and Maintaining Virtual Reference by Reference and User Services (RUSA), the telephone is not a technology typically considered as virtual reference. On the other hand, it is not exactly a face-to-face reference service either. The authors made a decision to include the telephone in the study because it is still a communication technology used for reaching remote library users. This study found 215 of the libraries (59%) provide a telephone number on their website specifically for research help. Eighty of the libraries (22%) provided the telephone number for general inquiry and twelve



	Associates	Bachelor	Masters	Doctorate
Provides Chat	33.33%	29.47%	40.16%	66.20%
Does not Provide Chat	66.67%	61.05%	56.56%	28.17%

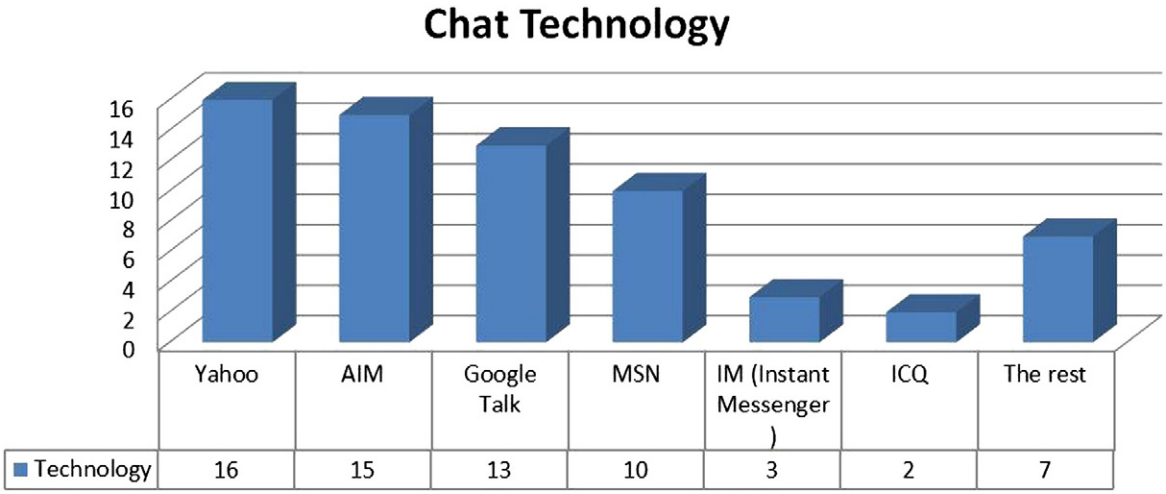


	For Profit	Private	Public
Provide chat	23.53%	39.52%	75.27%
Not provide chat	70.59%	54.03%	24.73%

Fig. 5 (*continued*).

(3%) only provide a telephone number for their parent institution. Thirty eight (10%) of the libraries do not list any telephone numbers and lastly, as stated before, 5.8% of the data is considered missing data as these libraries have no web presence and therefore no phone number on the web.

Video chat is very popular among Internet users, but not so with libraries. The authors found only two out of the 362 institutions employing Skype, a software program allowing for synchronous video communication. One college library advertises Skype on the library's website to provide distance reference service for international students.



	Yahoo	AIM	Google Talk	MSN	IM (Instant Messenger)	ICQ	The rest
Technology	16	15	13	10	3	2	7

Fig. 6. Popular IM technologies.

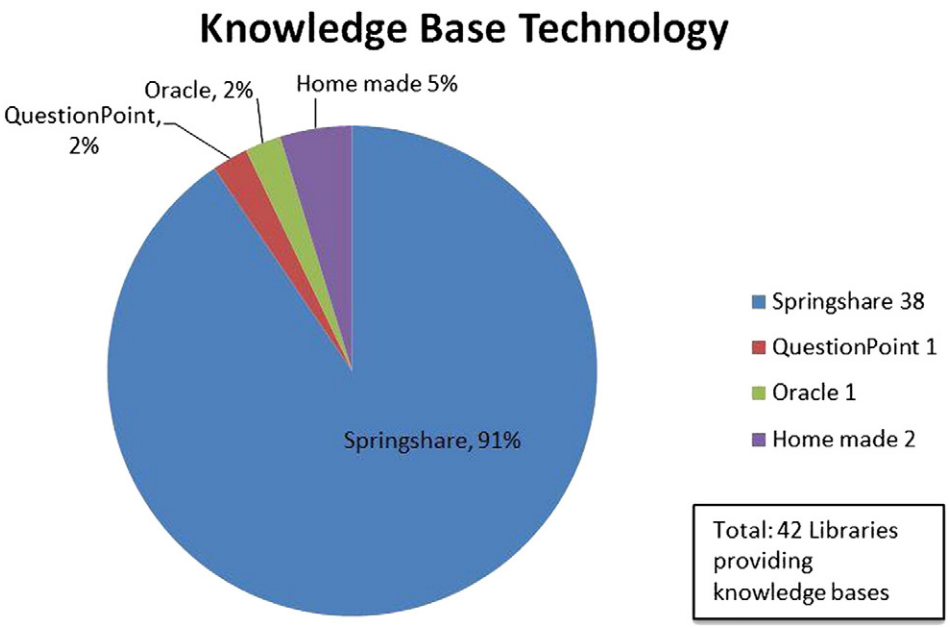


Fig. 7. Knowledge base technologies used by libraries providing knowledge bases.

In the second case, a reference librarian lists his Skype ID in his contact information. In spite of these welcoming efforts by a few librarians, video chat is not being used as a reference service.

REFERENCE ON THE MAIN WEBPAGE

Reference on the main library website includes the listing of reference service (i.e., telephone numbers or email addresses), a chat widget box, or a direct link to a website with reference services information. The study finds that 246 libraries (68%) link to or list reference service on their libraries' front webpages, while 95 (26.2%) do not (Fig. 10). This 26.2% offer virtual reference services on one or more subpages of their websites. The language for advertising reference service on the main webpage is not the same among the libraries but similar. The most commonly observed phrase is "Ask a Librarian" which is used 123 times by the libraries in the sample. The language most often serves as a link directing the patron to another webpage with chat, text messaging, phone numbers, and email for reference librarians, or directly to a chat box or a knowledge base. The less frequently used terms include "Chat", "Ask Us", "Need Help?", "Research Help", and "Contact Us".

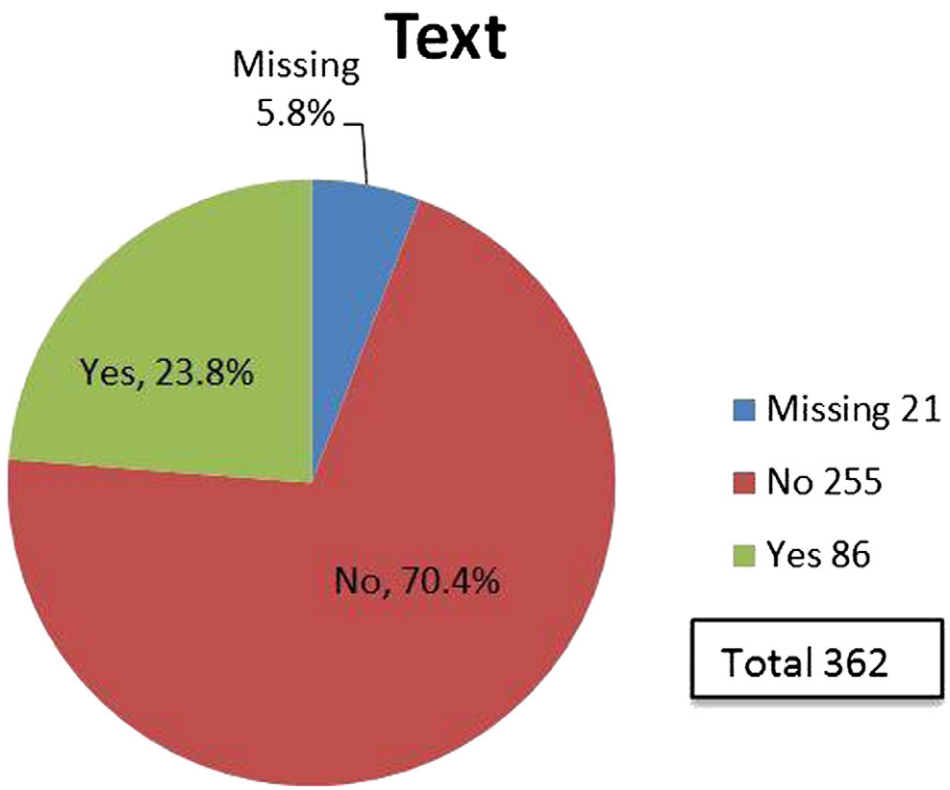


Fig. 8. Libraries that provide text.

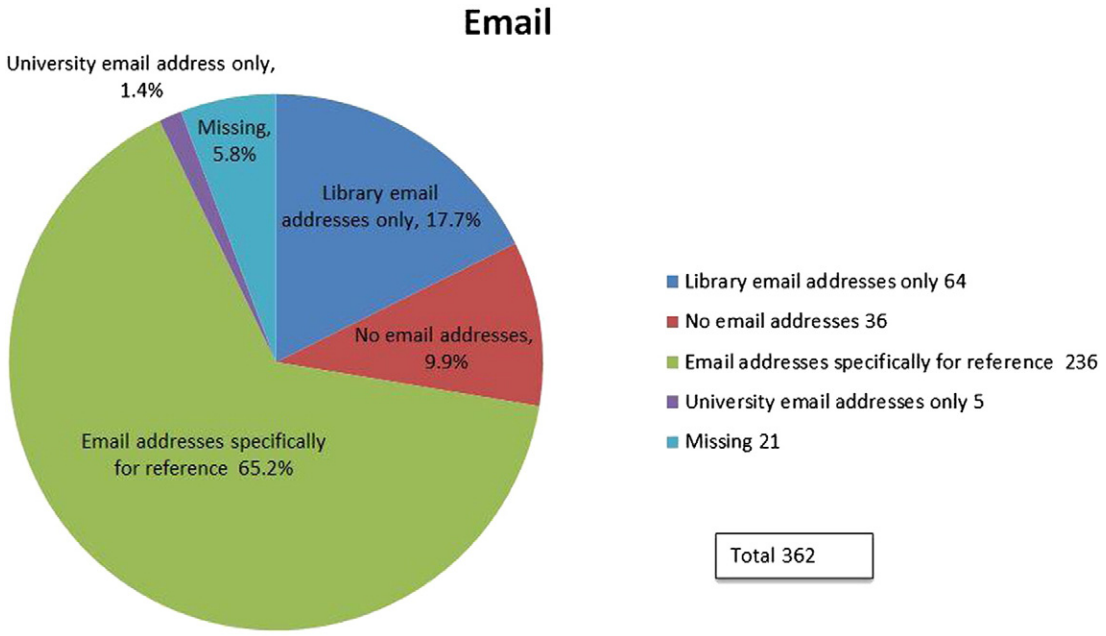


Fig. 9. Libraries with email reference service.

ANOVA indicates a statistically significant difference between the college libraries that offer or do not offer reference services on the main webpage in relation to the annual cost and the number of undergraduate students (Fig. 11.1 and 11.2). Evidence seems to indicate that the libraries whose parent institutions have a higher cost and a larger number of students are more likely to place reference on the main webpages than those whose parent institutions have a lower cost and smaller numbers of undergraduate students. The average annual costs for the institutions whose libraries place reference services on the main webpages is $27,026 and $21,675 for the libraries that place reference service on a subpage of their websites (Fig. 11.1). Furthermore, the average number of undergraduate students is 6927 for the libraries who offer reference on the main webpages and 1974 for the group who does not offer reference on the main webpage (Fig. 11.2). Regression also shows a possible relationship between the institution type and highest degree offered with the prominence of reference services on the libraries' main webpages (Fig. 11.3 and 11.4). Public colleges and universities seem to be more likely to offer reference service on their libraries' main webpages than private and for-profit institutions (Fig. 11.3). The institutions that offer higher degrees are also more likely to place reference on the main webpages although the regression shows a drop at the bachelor's degree and some irregularity (Fig. 11.4). In sum, the statistics indicate that the decision to provide reference on the main webpage vs. a subpage of its website is related to an institution's annual cost, number of undergraduate students, highest degree conferred, and institution type.

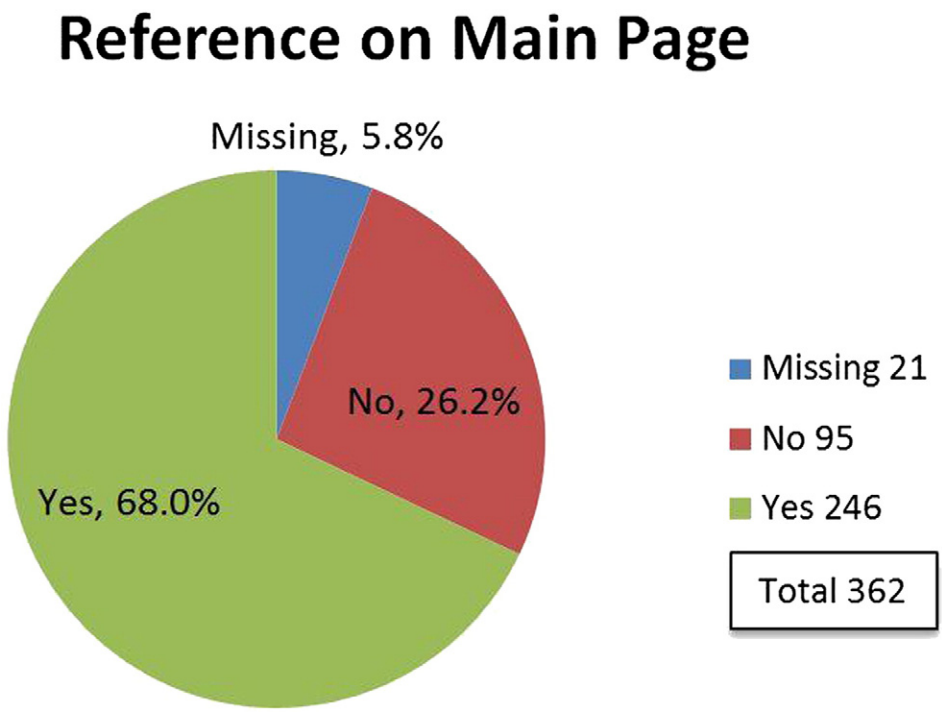


Fig. 10. Reference on main webpage.

Figure 11.1 ANOVA: Reference on main page /Cost

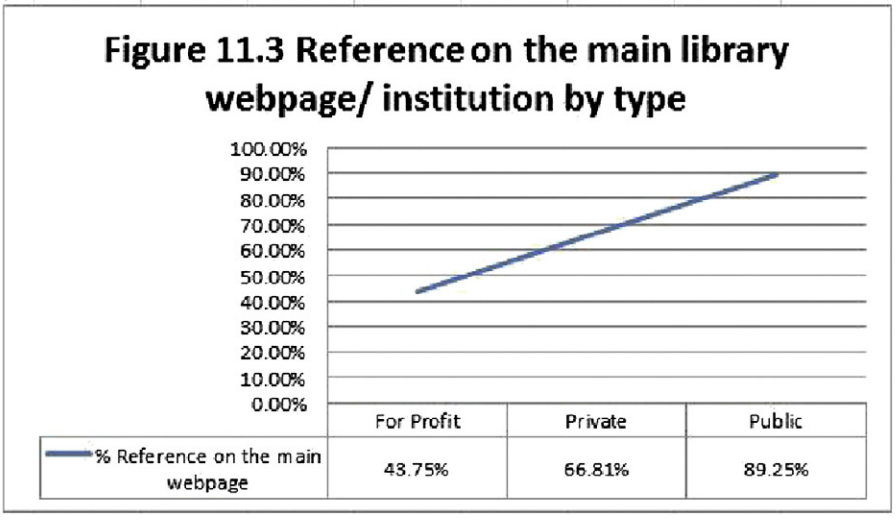
Groups	*Count*	*Sum*	*Average*	*Variance*
On main page	246	6648568	27026.69919	250389512
Not on main page	95	2059212	21675.91579	138936956

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1962181041	1	1962181041	8.9399216	0.00299404	3.869
Within Groups	74405504335	339	219485263.5			
Total	76367685376	340				

Figure 11.2 ANOVA: Reference on main page / Number of undergraduate

Groups	*Count*	*Sum*	*Average*	*Variance*
On main page	246	1704255	6927.865854	67940090
Not on main page	95	187615	1974.894737	19621687

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1681264040	1	1681264040	30.825088	5.7082E-08	3.869
Within Groups	18489760738	339	54542067.07			
Total	20171024778	340				



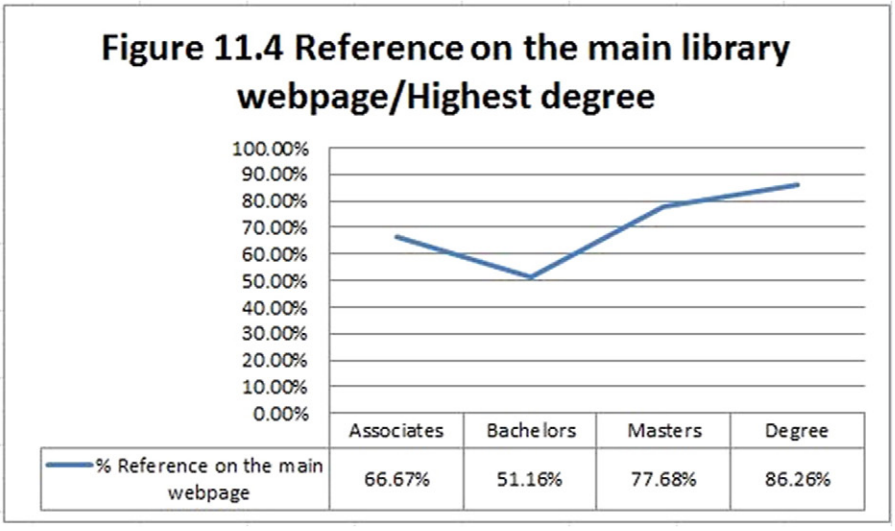


Fig. 11. Reference on main webpage and the institution's characteristics.

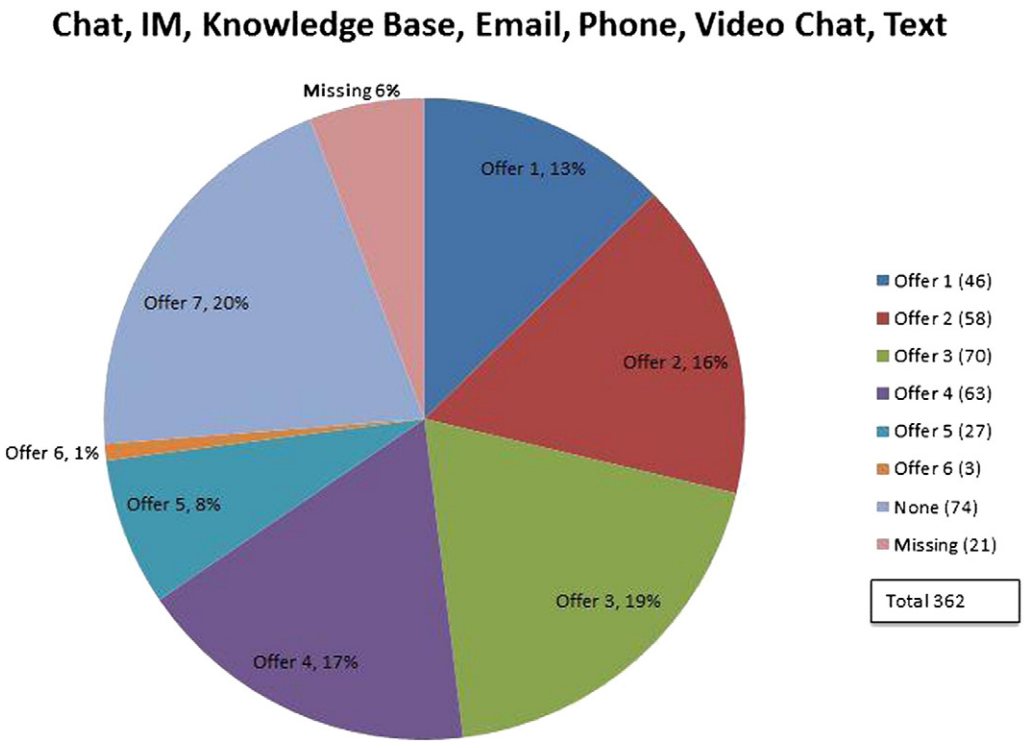


Fig. 12. Libraries by the number of technologies used for remote or virtual reference services.

TECHNOLOGICAL SOPHISTICATION

A total of seven types of technologies are identified as tools delivering remote and virtual reference services including chat, IM, knowledge base, email, telephone, video chat, and text. A library that offers more types of technologies is considered to have a higher level of technological sophistication than those who use fewer technologies for the purpose of this study. The libraries in the sample are grouped by the number of technologies they use for virtual reference (Fig. 12). Most libraries providing virtual reference fall into the groups that offer two to four types of technologies. Only three libraries offered six types. No library offered all of the seven types of technologies.

Fig. 13 shows what technologies libraries are likely to use when they conduct remote reference. Email is the most popular way to provide remote reference for those who only offer one type of technology followed by chat (Fig. 13.1). For those who offer two remote reference services, email and telephone reference services are popular (Fig. 13.2). For the libraries that offer three remote reference services, email, telephone, and chat are the chosen technologies (Fig. 13.3). Libraries will add text reference service when they offer four technologies (Fig. 13.4). Among the groups that offer five types of reference services, email, telephone, chat, text, and knowledge base are the selected types (Fig. 13.5). The group using six types add instant messenger (Fig. 13.6). Video chat is not popular at all with only one library advertising it for overseas students and one reference librarian at another university listing his Skype ID with his contact details.

When dividing libraries into groups by the level of technology sophistication, ANOVA indicates a difference among institutions at different levels of technological sophistication in terms of cost and number of undergraduate students (Fig. 14.1 and Fig. 14.2). When "F" statistic is larger than "F crit" value in ANOVA analysis, a group difference is very likely to exist. A comparison of "F" statistic and "F crit" value in Fig. 14.1 and 14.2 respectively shows the former is larger than the latter, thus confirming such a possibility. The differences are more visible among the groups concerning the number of undergraduate students and level of technological sophistication ($F = 11.15$ vs. F critical value $= 2.12$). However, the average of cost and number of undergraduate students from each group listed in column "Average" do not increase in proportion to the number of technologies used for remote and virtual reference. It seems that libraries affiliated to institutions with more students and higher costs tend to use three to four technologies. Despite the existence of group differences, the increased use of technologies does not necessarily denote the increased number of students or higher cost.

Fig. 14.3 and Fig. 14.4 are based on the use of any technology regardless of the total number of technologies employed in unison with the type of institutions and highest degrees offered. The numbers collected simply identify the percentage of libraries that use technologies for virtual reference services for each group. The regression line shows some possible relationships between the use of technology and the highest degree offered or type of institutions. More public universities use technologies for remote and virtual reference, and so do those that offer more advanced degrees.

DISCUSSION

Virtual reference is not a new concept. Reference and User Services Association, a division of the ALA, originally prepared their guidelines for virtual reference in 2004 (Reference & User Services Association, 2010). Both synchronous and asynchronous reference services are encouraged and are deemed valuable services in reaching out to the large academic community. The Association of College and Research Libraries' Standards for Distance Learning Library Services discuss the access entitlement principle stating all users of academic libraries are entitled to the library services and resources of the institution, regardless of their location. These standards list reference assistance and direct human access as essential services provided to distance students (ACRL, 2008). The past decade witnessed a huge increase in distance learning, and virtual reference supports this new trend. These formats of delivery of services are especially suited to the learning habits of the online learner who might be too busy to come to campus, and also to the so called "digital natives": the young undergraduate students who grew up in a fast paced convenient world amidst the Internet and social media. The proliferation of electronic resources has also increased the need for virtual reference. Therefore virtual reference is an important service that libraries must find ways to provide. The findings from this

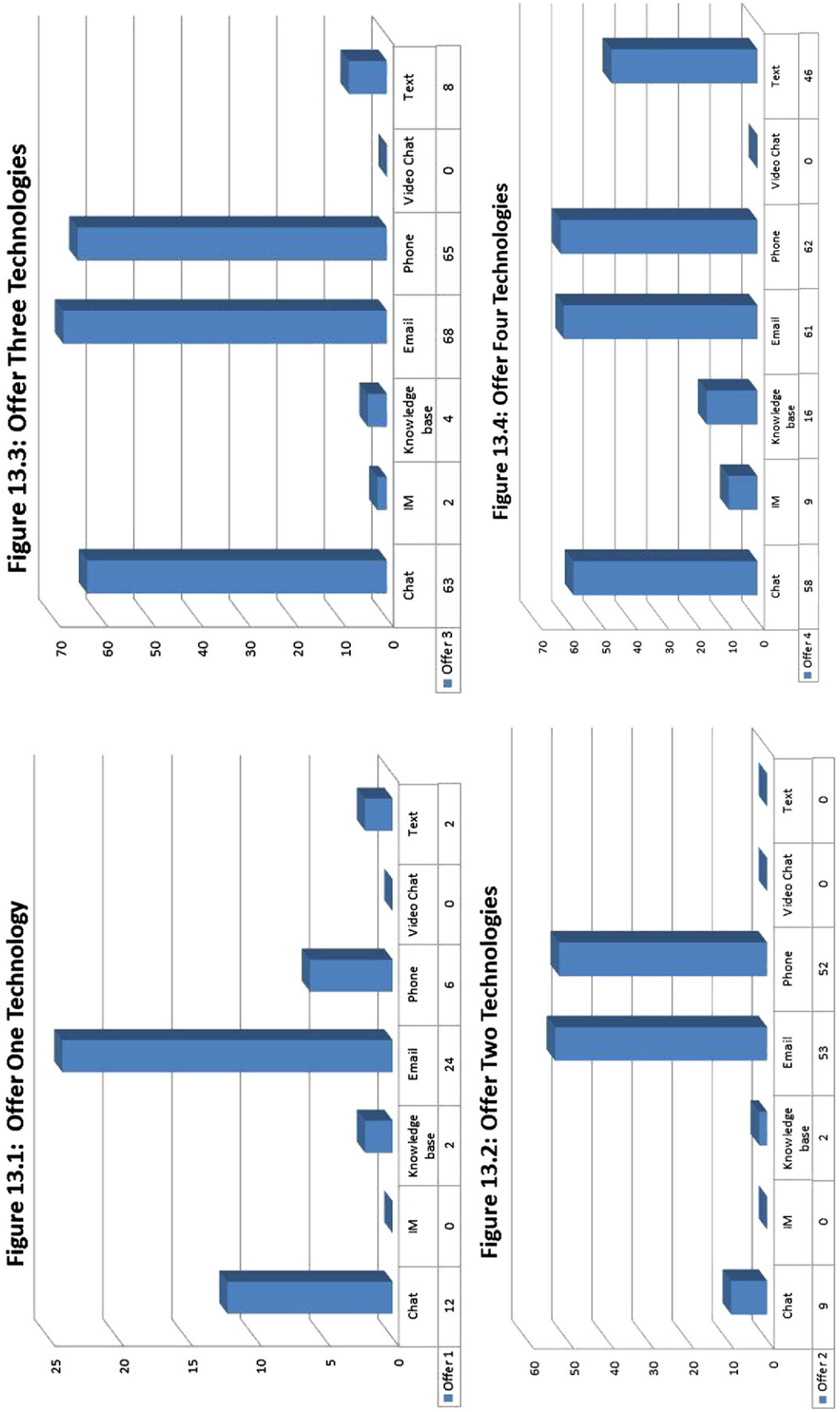


Fig. 13. The popular technologies for virtual reference.

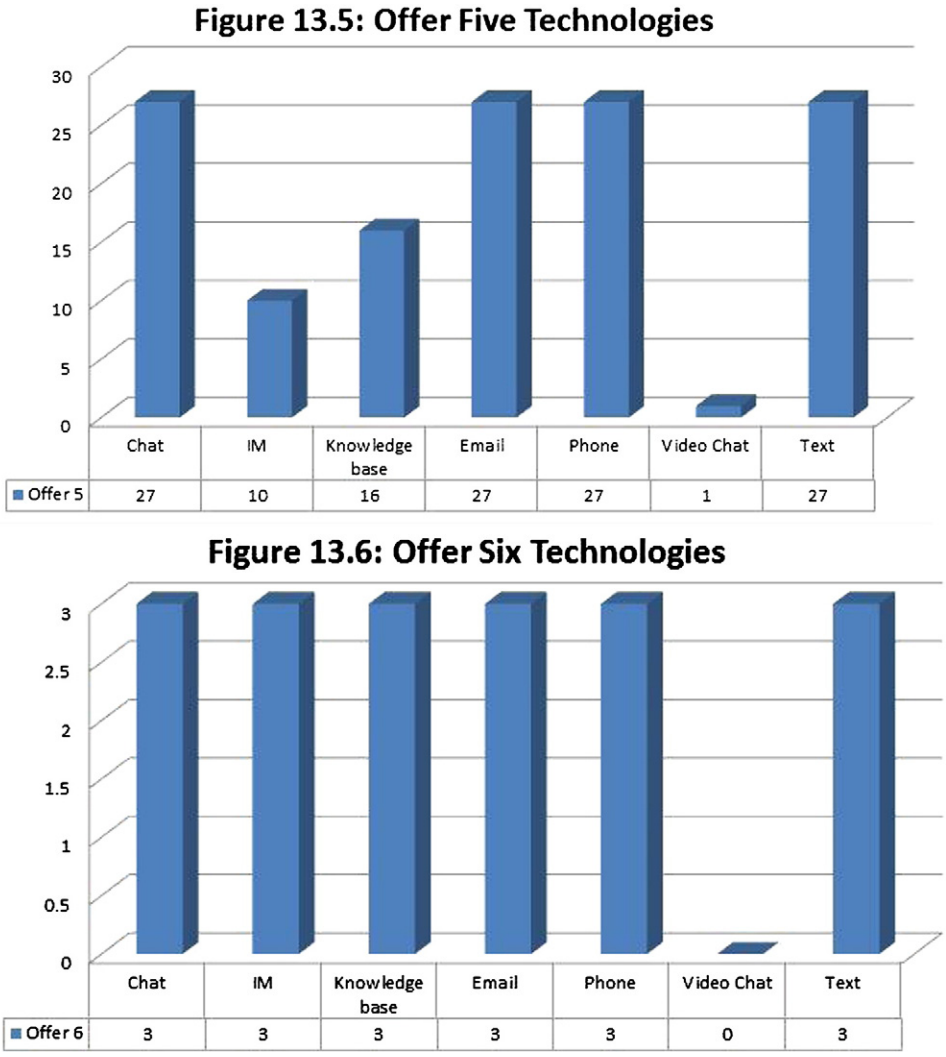


Fig. 13 (*continued*).

study are significant in shedding light on current practices of virtual reference by academic libraries. Few previous studies have looked into correlations between means of virtual reference and parent institutions' characteristics. Knowledge of the scope of existing practices provides a basis for evaluation of both the past and current trends which can lead to improved services.

The virtual reference tool most important to this study, live chat, is an excellent way to connect with users. The technology of synchronous communication extends reference service beyond the library walls and hours. The benefits for users are invaluable. Most of the chat programs are cloud-based, affordable, and simple to use. On the other hand, chat reference service is labor intensive to maintain and both staffing and training may pose obstacles, especially with shrinking library budgets and hiring freezes. One proposed solution to these concerns is the use of collaborative reference services via consortia. However, recent research found a difference in reference delivered by consortia and local libraries (Miller, 2009). The reference service by local hosts is of higher quality and more in line with the local standards. Some libraries moved chat reference from consortia to local libraries because they view chat as an excellent way to build relationships with their faculty and students.

Our study found that the decision to provide chat service is related to the size of the student population, highest degree offered, and the type of institution. The explanation for those findings can be manifold. It could be that institutions with more students and higher degrees also have more financial support and more librarians to maintain chat reference programs. Many large universities are also public institutions. Because public institutions serve a large clientele, their libraries may keep more stringent standards for services. Those revelations confirmed the general impression that larger academic libraries have the resources to provide more or better services including virtual reference.

Regarding the use of multiple technologies for remote and virtual reference, most libraries in the sample fall into the group with three technologies: telephone, email, and chat. For those with four technologies, text or SMS is the most likely added service. The study finds statistically significant differences among the groups between the number of technologies used and the cost/number of undergraduate students. However, there is no discernible trend to indicate that technological sophistication increases in proportion to the rise in annual cost and the number of undergraduate students. Libraries in the groups with higher tuition cost and more students generally stay with three or four technologies for reference service but public colleges and universities are more likely to use multiple technologies for reference service than private or for-profit institutions regardless of tuition cost. Evidence also indicates that the use of technologies for reference is somewhat related to degree offerings with institutions offering advanced degrees being more likely to use them. These findings seem logical as libraries affiliated to institutions with higher cost and more students can afford more technologies. Also, advanced degrees require greater research support and technical expertise so virtual reference technologies can play an essential role in sustaining good services.

Figure 14.1 ANOVA: Offer Technologies / Cost

Groups	Count	Sum	Average	Variance		
offer 0	74	1592822	21524.61	1.35E+08		
offer 1	46	1270127	27611.45	1.81E+08		
offer 2	58	1335444	23024.89	2.23E+08		
offer 3	70	1895625	27080.35	2.39E+08		
offer 4	63	1754498	27849.17	2.84E+08		
offer 5	27	797973.5	29554.57	3E+08		
offer 6	3	57396	19132	4.15E+08		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	2.82E+09	6	4.7E+08	2.136735	0.048846	2.125753
Within Groups	7.34E+10	334	2.2E+08			
Total	7.62E+10	340				

Figure 14.2 ANOVA: Offer Technologies / Number of Undergraduates

Groups	Count	Sum	Average	Variance		
offer 0	74	112297	1517.527	10013442		
offer 1	46	131304	2854.435	27955337		
offer 2	58	228553	3940.569	31694986		
offer 3	70	623907	8912.957	93469288		
offer 4	63	534278	8480.603	72799801		
offer 5	27	224201	8303.741	59209461		
offer 6	3	37330	12443.333	2.53E+08		
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3.37E+09	6.00E+00	5.61E+08	1.12E+01	2.37E-11	2.13E+00
Within Groups	1.68E+10	3.34E+02	5.03E+07			
Total	2.02E+10	3.40E+02				

Figure 14.3 Technologies/Type of Institutions

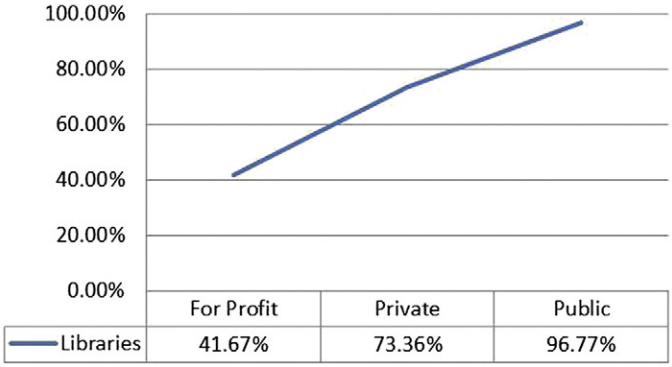


Figure 14.4 Technologies/Highest Degree Offered

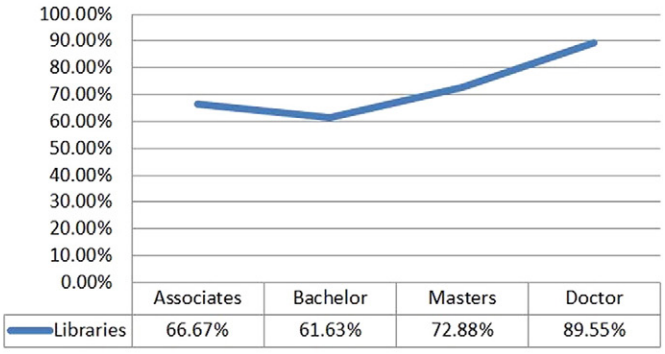


Fig. 14. Use of technology and institutions' characteristics.

Regarding the prominence of reference services, there are many advantages to placing reference service on the main library webpage. After all, libraries are service providers. It is a heart-warming experience for many users to be greeted by a reference librarian on the web when they need help. Our study found that 63 to 73% of academic libraries place reference service on the front webpage. It is an interesting discovery that the decision to place the reference service on the main webpage by libraries may be related to an institution's annual cost, the size of the student body, highest degree offered, and the institution type.

Why do those differences and relationships exist? Are those institutions more service oriented than others? The answer will be more than a simple "yes" or "no". It is expected that institutions charging a higher tuition and enrolling more students generally have more financial resources to provide better services and have access to more technologies. Naturally user expectations will be high which will motivate the libraries to develop services to support them. If the provision of chat reference service, reference advertised on the main page, and more remote reference options are all indicators of good services, those institutions with more students, higher cost, and advanced degrees are doing a better job in remote and virtual reference services.

LIMITATIONS OF THE STUDY

The primary source for the targeted population, *Peterson's Four-Year Colleges*, does not always contain all the needed data for this study. For instance, a small percentage of colleges and universities only have their names and contact information listed. The authors had to locate the data elsewhere and sometimes there are discrepancies across different sources about institutions. Some information in the book may not be up to date. For instance, the cost in *Peterson's* is a mixture of those from 2011/12 and 2012/13 academic years. Those may cause the findings to be slightly less accurate. Missing data is another obvious problem even though it is just 5.8%.

CONCLUSION AND RECOMMENDATIONS

Virtual reference is an excellent way to help and connect with students and faculty. With virtual reference services, librarians can reach out and provide research help to users at their time of need regardless of time and location. As distance learning has proliferated tremendously in the past ten years, we can no longer assume that our students can drop by the library. However, with virtual reference, we can continue to support all students equally. While virtual reference is a natural match for, and supports, distance learning well, it is also perfectly suited for the learning style of the young undergraduate students, a generation that grew up with the culture of the Internet and social media. Virtual reference allows the library to serve students wherever and whenever they are doing classwork, and makes the library an integral part of their academic world.

Virtual reference services, like other 21st century instructional services, are also important selling points in recruitment, and serve as indicators of quality education. However, our study indicates that libraries in the smaller and less expensive institutions are at a disadvantage in service offerings. Virtual reference is labor intensive and some programs require technical expertise and incur cost. Limited by smaller financial resources, and facing the decreasing budgets common to most academic libraries currently, smaller academic libraries have severe challenges in providing equal or comparable services to those provided by libraries in large and/or more expensive institutions.

Therefore, it is worthwhile to explore the ways that libraries can overcome some of the obstacles and find solutions for improving reference services on library websites. Regardless of the type or size, all academic libraries must find ways to cope with the shortage of staff and budget cuts and yet provide the best service as they can against all odds. In doing so, creativity and innovation are required. Libraries with limited funding or staffing do have options for providing virtual reference. For example, LibraryH3lp is very affordable as pricing is available by a student FTE (the starting price is $180) (LibraryH3lp, 2014). Additionally, Libraryh3lp has a generous free trial period of 90 days. Zoho offers a free chat option; it only allows for one web embedded chat widget, so it is recommended that libraries advertise chat with a visible icon on their homepages, guides, and databases and point to the widget embedded in one website (Zoho, 2014). While these two and other affordable web-based applications exist, libraries may desire some of the advanced features in the more expensive chat software programs such as cobrowsing and screensharing. Fortunately there are free online tools that can be used in addition to chat to make it more robust. Screensharing tools such as screenleap.com and join.me allow for spontaneous screensharing with a remote user and no requirement for the user to log in or download a client. Therefore, while chatting or talking on the phone with a remote user, the librarian can initiate a screensharing session to facilitate the transaction. Join.me also includes web conferencing tools. Web conferencing is ideal for distance reference appointments but has a learning curve. However, as more online learners become familiar with web conferencing and the chatting tools available with learning management systems, librarians can embed themselves within courses and effectively reach users there.

Since technology is becoming more user-friendly and affordable, libraries can have the tools needed but this still does not necessarily solve the problem of staffing. Sharing resources is one way to maintain excellent services and organized consortia chat reference programs can save staff time. Another option is avoiding chat reference altogether in favor of other technologies such as a knowledge base as the main help tool. Stielow discusses problems associated with chat such as "quickened responses" and "sloppy grammar" and observes that the "informal nature of chatting may occasionally encourage patrons to confrontational stances" (Stielow, 2014a). Stielow followed up on this in a discussion on the Distance Learning Section listserv (dls-l@ala.org) in favor of using LibAnswers, a popular knowledge base tool, and email instead of chat. He found that this combination works well as his institution serves students all over the globe, and email or LibAnswers provides time to ensure quality control and reflection in responses, all with the benefit of a preserving a "paper trail" (Stielow, 2014b). His recommendation of LibAnswers gives a good solution to the staffing issue surrounding live chat. While the knowledge base is costly (between $599 and $1099/year), this tool can provide instant feedback for library users (Springshare, 2014). This study found only forty two academic libraries using a knowledge base, but the service is growing in popularity. Over 1000+ institutions are using LibAnswers (LibAnswers Community, 2014).

Further research recommendations include repeating the survey but also including community colleges. Using *Peterson's guide* as a source of our sample precluded this option. It would also be helpful to survey the librarians at each institution to discover why decisions on technology and software were made, as well as their rationale for choices in placement and promotion of reference services. The findings of this study allow a view of the current practice of remote reference services, and its possible relationships to other factors beyond the libraries. Since the American Libraries Survey includes many more data points, it would be useful if their future questionnaires could expand more in questions on virtual reference to include knowledge bases and possibly video conferencing. Even though video chat was not a popular tool in 2013, it might be more common place in the near future. The conversation on the best platforms as exemplified by Stielow, will continue and it is wise to monitor this trend. It is worthwhile to explore virtual reference services as they compare to other factors of a parent institution, such as the ratio of libraries' services to student FTE, the number of distance users, and include the number of online courses vs. on-campus courses. Since online courses will draw in more distance users, libraries will need to be adequately staffed and funded to provide extended virtual reference services. Staying on top of technologies will help librarians find new and affordable ways to deliver reference services. Only through excellent services can libraries prove their relevance to the missions and goals of their institutions in the digital age. The world is moving more online, and so are the libraries. Librarians should be at the forefront of this change by embracing it.

APPENDIX A

Abilene Christian University
Adelphi University
Adrian College
Alberta Bible College
Alice Lloyd College
Alverno College
American Baptist College of American Baptist Theological Seminary
American Sentinel University
Anna Maria College
Apex School of Theology
Argosy University-Seattle
Art Academy of Cincinnati
Art Center College of Design
Athabasca University
Auburn University
Azusa Pacific University
Baker College of Allen Park
Baptist Bible College
Baptist College of Health Sciences
Baptist Missionary Association Theological Seminary
Bard College
Bastyr University-WA
Bauder College
Becker College
Bellevue University
Belmont University
Benedictine College
Berkeley College-New York City Campus
Bethany Lutheran College
Bethesda University of California
Bishop's University
Bob Jones University
Boricua College
Boston Architectural College
Boston Baptist College
Bowdoin College
Brenau University
Briar Cliff University
Bridgewater College
Brigham Young University
Broadview University-Layton
Brown Mackie College-Albuquerque
Bryan College
Bryant & Stratton College-Amherst Campus
Butler University
California Baptist University
California College of the Arts
California Miramar University
California State University, Fullerton
Calumet College of Saint Joseph
Canisius College
Cardinal Stritch University
Carlos Albizu University
Carnegie Mellon University
Carroll University
Case Western Reserve University
Central Bible College
Central Connecticut State University
Central Michigan University
Centura College
Charleston Southern University
Chester College of New England
Christian Brothers University
Christian Life College
Cincinnati Christian University
City College of the City University of New York
Clemson University
Cogswell Polytechnical College
Colgate University
College of Mount Saint Vincent
College of Mount St. Joseph
College of the Atlantic
College of Visual Arts
Colorado Mesa University
Colorado State University-Pueblo
Hampden–Sydney College
Hampton University
Hanover College
Harrison College-Indianapolis
Hartwick College
Harvey Mudd College
Hebrew College
HEC Montreal
Heritage Christian University
High Point University
Hillsdale College
Hollins University
Hope College
Huston–Tillotson University
Illinois College
Illinois Institute of Technology
Instituto Tecnologico y de Estudios Superiores de Monterry
Inter American University of Puerto Rico, Aguadilla Campus
Ithaca College
ITT Technical Institute-Miami
Johnson State College
Jones International University
Kansas City Art Institute
Kean University
Keiser University, Miami
Kent State University at Tuscarawas
Kutztown University of Pennsylvania
La Salle University
La Sierra University
Lafayette College
Lakeview College of Nursing
Lane College
Lasell College
Le Moyne College
LeTourneau University
Lewis & Clark College
Lincoln Culinary Institute
Lincoln Memorial University
Loma Linda University
Long Island University-C.W. Post Campus
Louisiana State University in Shreveport
Loyola University Chicago
Loyola University Maryland
Lynn University
Macon State College
Mannes College The New School for Music
Marietta College
Marshall University
Martin University
Massachusetts College of Pharmacy and Health Sciences
Master's College and Seminary
McPherson College
Medaille College
Medcenter One College of Nursing
Medgar Evers College of the City University of New York
Memorial University of Newfoundland
Menlo College
Mercyhurst College
Mesivta Tifereth Jerusalem of America
Mesivta Torah Vodaath Rabbinical Seminary
Metropolitan State University
Mid-America Baptist Theological Seminary
Mid-America Christian University
Mid-America College of Funeral Service
Miles College
Millikin University
Mills College
Minnesota School of Business-Lakeville
Mississippi State University
Missouri College
Molloy College
Monmouth College
Monmouth University
Montreat College
Moore College of Art & Design
Roosevelt University
Royal Military College of Canada
Rutgers, The State University of New Jersey, Camden
Saint Leo University
Saint Martin's University
Saint Paul's College
Salem State University
Santa Fe University of Art and Design
Sarah Lawrence College
School of the Art Institute of Chicago
Shasta Bible College
Shepherd University
Siena College
Simon Fraser University
Skyline College
Slippery Rock University of Pennsylvania
South College-Asheville
South Texas College
South University (FL)
Southern Baptist Theological Seminary
Southern Methodist College
Southern University at New Orleans
Southern Virginia University
Southwestern Adventist University
St. Catharine College
St. Francis College
St. Gregory the Great Seminary
St. John Fisher College
St. John's University
St. Louis College of Pharmacy
St. Olaf College
St. Petersburg College
Standford University
State College of Florida Manatee-Sarasota
State University of New York Downstate Medical Center
State University of New York Upstate Medical University
Stevens Henager College
Strayer University-Virgina
Sullivan University
Summit Pacific College
Sweet Briar College
Syracuse University
Tabor College
Tele-Universite
Telshe Yeshiva-Chicago
Tennessee State University
Tennessee Temple University
Texas A&M University-Commerce
Texas Southern University
Texas Tech University
Texas Woman's University
The Art Institute
The Boston Conservatory
The College at Brockport, State University of New York
The College of New Rochelle
The College of St. Scholastica
The Culinary Institute of America
The King's College
The Restaurant School at Walnut Hill College
The University of British Columbia
The University of North Carolina at Pembroke
The University of Virginia's College at Wise
Thomas Aquinas College
Thomas Edison State College
Touro College
Transylvania University
Trevecca Nazarene University
Trinity College
Trinity College of Florida
Trinity International University
Trinity Western University
Troy University
United States International University
United Talmudical Seminary
Universidad del Este

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APPENDIX A (*continued*)

Columbia College of Nursing	Morehead State University	Universidad Metropolitana
Conception Seminary College	Mount Royal University	Universite de Moncton
Concordia University	Mount St. Mary's College	University of Alaska Southeast
Concordia University, Nebraska	Mount Vernon Nazarene University	University of Arkansas at Pine Bluff
Concordia University, Texas	Mt. Sierra College	University of Arkansas-Fort Smith
Coppin State University	National Labor College	University of Bridgeport
Daemen College	National University College	University of California, Irvine
Dalhousie University	Neumont University	University of Chicago
Daniel Webster College	New Charter University	University of Hawaii Maui College
Dartmouth College	New Orleans Baptist Theological Seminary	University of King's College
Davenport University	New York City College of Technology of the City University of New York	University of La Verne
Denison University	Newberry College	University of Maine at Fort Kent
Depaul University	Newman University	University of Manitoba
Dickinson College	North Carolina Agricultural and Technical State University	University of Maryland University College
Dixie State College of Utah	Northern Kentucky University	University of Massachusetts Boston
Doane College	Northern Michigan University	University of Memphis
Dominican College	Northern State University	University of Miami
Drake University	Northland College	University of Minnesota, Morris
D'Youville College	Northwestern Polytechnic University	University of Mississippi
East Carolina University	Northwood University, Michigan Campus	University of New Hampshire at Manchester
Eastern Nazarene College	Ohio University-Lancaster	University of Northern British Columbia
Elmira College	Ohio valley University	University of Northernwestern Ohio
Emory & Henry College	Ohr Somayach/Joseph Tanenbaum Educational Center	University of Oklahoma
Eston College	Oklahoma Baptist University	University of Phoenix
Everest College-Lakeland	Pace University	University of Pittsburgh
Fairleigh Dickinson University, Metropolitan Campus	Pacific Lutheran University	University of Prince Edward Island
Fisher College	Paine College	University of Saint Francis
Florida Christian College	Parsons The New School for Design	University of South Carolina
Florida College	Paul Quinn College	University of South Florida Sarasota-Manatee
Florida Hospital College of Health Sciences	Penn State University Park	University of Southern California
Florida Southern College	Piedmont International University	University of the Southwest
Fontbonne University	Pioneer Pacific College	University of Washington, Tacoma
Fort Valley State University	Pittsburg State University	University of Wisconsin-Whitewater
Franklin Pierce University	Pitzer College	Ursuline College
Franklin University	Point Loma Nazarene University	Utah State University
Freed-Hardeman University	Point Park University	Vancouver Island University
Gainesville State College	Prairie View A&M University	Vanderbilt University
Geneva College	Randolph College	Vatterott College
Georgia College & State University	Ranken Technical College	Villanova University
Georgia Institute of Technology	Rasmussen College Eagan	Virginia College at Birmingham
Globe University-La Crosse	Remington College Honolulu Campus	Virginia Polytechnic Institute and State University
Goddard College	Resurrection University	Wartburg College
Gonzaga University	Rice University	Wayne State University
Grand Canyon University	Ringling College of Art and Design	Woodbury University
Greensboro College	Robert Morris University Illinois	Yeshiva University
Griggs University	Rochester Community and Technical College	

APPENDIX B

Ref on main page	• Y = The library has reference service related information (chat, ad, phone, email). This excludes reference books/resources. We are looking for a chat box, an email address, a phone number, hours, knowledge base or a detailed link for reference. • N = The library does not have any form of reference service related information on their webpage. This answer includes those linked to resources only books or e-resources even if they used terminology similar like "Research Help" — unless it is clear that "Research Help" includes connecting with a professional for help.
Form of advertisement on main page	Here you list what is on the main page in terms of reference related info. Is it a link? What is the link named? (get research help, Ask a librarian, etc.). Is it the phone number, email, chat box, or description of desk service and hours? N = No advertisement or advertisement does not include language that implies one can ask a question or get help. Terms that have been excluded include "Staff Directory"; "About the library"; and "Staff."
Chat	• Y = Library has chat. Chat is defined as a web based widget/box that does not require the user to have a client or account. • N = Library does not have chat
Chat box location	Where does one find the actual chat widget? • Main = on front of library website • sub = ad or link home page — actual box one click • dig = more than 1 click — i.e. clicked on reference/service, and then found chat box • N = no chat box
Chat Tech	List the software the librarians are using to chat (LibraryH3lp, Mosio, Springshare, Live Person, QuestionPoint, Askaway, etc.) N = no chat
Chat Provider	Who is staffing the chat software? Is it in house? When extended reference hours are available through a consortia or perhaps paid service, beyond the university's librarians, this is usually explained to the patron. L: Librarians in house P: Pool reference together (i.e. in a consortia) N: no chat BOTH: There are some librarians that participate in a consortia for after hours.

APPENDIX B (*continued*)

Instant Messenger [IM]	• Y = The library lists IM accounts. Instant message accounts require the user to have an account to communicate. • N = The library does not have IM accounts
IM tech	List the technology utilized (AOL/AIM, Google Talk, Yahoo! MSN! Jabber, etc.) N = No IM
Knowledge Base	• Y = The library has a knowledge base. This is defined as interactive FAQ. A user submits a question and it is announced publicly and stored for users to search in the future. (i.e. Springshare's LibAnswers) • N = No knowledge base
Knowledge Base Tech	Technology used for the knowledge base (i.e., Springshare's LibAnswers, Piazza) N = No knowledge base
Email (includes forms)	• Y = There is an email address for the reference desk or askalibrarian • L–Y = Library email address present — not specific to reference. We used L–Y for staff directory listing even if a reference librarian was listed because it is not clear to a student if that is the person you contact for research help. However, if there is a personal email address but advertises for Contact Specific Librarian for help, then we said Y for yes. • N = no email address for either library or reference.
Phone	• Y = There is a phone number for the reference desk • L–Y = There is a phone number but not specific to reference • N = no email address for either library or reference
Video Chat	• Y = The library provides some sort of video chat • N = No video chat
Video Chat Tech	Technology used for video chat (Skype, Google Hangout, etc.). N = No video chat

Text (or SMS)	Y = The library has a text # for reference help
	N = The library does not have a text #

Total Library hours	Count of the total library hours per week in April 2013
Total Ref Hours	Count of the total reference hour per week in April 2013 (if advertised) N = hours are not listed
Total Chat Hours	Count of the total chat reference hours per week in April 2013 (if advertised) N = hours are not listed n/a = library does not have chat

Policy

1. In the Random sample, when we encountered multiple campuses/libraries for one university, we kept only the first instance and deleted the rest assuming that most use the same chat services or reference related services.
2. Since #1 excluded many libraries and reduced our sample size, we finished reviewing all the libraries in our current sample and then we tallied the numbers of the library types (from Petersons) to have a balanced ratio.
3. When we reviewed the hours pages, we counted hours for the main library. If that could not be determined, we choose the branch of the library with the longest hours. We use the wayback machine (archive.org) to ensure we reviewed hours during the semester.
4. If no library website is found, we placed it in a sheet called missing libraries to return to at a later time to double check before adding it to the missing libraries list.
5. If there are 2 library websites, we chose the one with the real information, over the about us generic page.
6. A subject specialist is not included as research help. The idea is that an uninitiated student might not understand that he/she could ask a generic question of the subject specialist.
7. When reference information was found by digging through a library's website, we did not include yes on “Ref on main page”. For example, in one college the reference desk phone number was found when searching for “About the library” and it was placed under hours. Even if there is other general contact information on the page, it must specifically advertise help.

APPENDIX C

1. Random Number
2. Name of Institution
3. Institution's Website
4. Library Website
5. Cost
6. Type (Public/Private/For Profit)
7. Number of Undergraduates
8. Highest Degree
9. Entry Difficulty
10. State
11. Reference on the main page? (Y or N)
12. Form of advertisement on main page
13. Chat Reference? (Y or N)
14. Chat reference widget/box location (main webpage or subpage)
15. Technology used to provide chat reference
16. Chat Reference Provider (librarians in house or consortia)
17. Total Chat Reference hours per week (if advertised)
18. Instant Messenger reference? (Y or N)
19. Technology used for Instant Messenger reference (i.e. AIM/Yahoo/GoogleTalk)
20. Knowledge base used for reference queries? (Y or N)
21. Technology used for Knowledge Base

22. Email listed for reference? (Y or N or L–Y)
23. Telephone listed for reference? (Y or N or L–Y)
24. Video Chat for reference? (Y or N)
25. Technology Used for video chat reference
26. Text (SMS) reference? (Y or N)
27. Total Library Hours per week
28. Total Reference Hours per week
29. Other innovative reference
30. Notes

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