Chapter III

LITERATURE REVIEW
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According to Busha and Harter the purpose of review of literature or literature search is to attempt to identify, locate and synthesize completed research reports, articles, books and other materials about the specific problems of a research topic. It helps the researchers to know about other research projects in a similar field, to narrow or describe research problem and relate research topic in the context of larger canvas. For the present study, a systematic review of the literature on the digital reference service and related concepts has been conducted. A keyword search under digital reference services has been done in Google, Google scholar search engines and also is searched on shodhganga and shodhgangotri websites for the related topic. For the purpose of literature review following works are studied.

3.1 Digital Reference Service

1) Buckland, Michael K. (2008) presents research article on Reference library services in Digital Environment. This paper draws on work partially supported by the institute of Library and Museum services National Leadership Grant for Libraries. This paper describes Digital Reference Library Service today like 9 to 5 problems, Visit to Virtual Reference Library, also describes semantics of reference service. Researcher concludes the need to develop structures appropriate to digital technology, to the users’ needs, and to the users’ work environment. Evolving technology in the digital environment invites an increased attention on empowering the library users and on optimizing reference library service as a whole.

2) Chandwani, Anita. (2006) presents research article on an overview of Digital Reference Services. This paper highlights how new era of traditional reference services is developing as a natural solution to keep pace with comprehensive technological environment. It discusses about basic concepts, elements of digital reference service and gives in detail modes, the advantages, limitations and describes various digital reference services carried out by several libraries and commercial organizations.

Author concludes with the future of Digital Reference Services. In which she states that future of reference service will be based on digital collections and communication links through web. The reference librarian and reference service in the
future will act as centre of information world, if the library is well equipped with
computer, internet and CD-RAM.

3) **Dollah, Wan Ab. Kadir Wan and Singh Diljit.** *(2009)* present research article on
Reference Services in Digital Environment. This paper describes the concept, format
and background of digital reference services. It also focuses on issues, trends, and
challenges in digital reference, besides discussion on technological developments in
digital reference services. The benefits and limitations of DRS are also highlighted.

4) **Guha, Tamal kumar.** *(2004)* presents research article on the human face in virtual
library digital reference service. Article briefs about the activities of the digital
reference service, its present scenario. The importance and functionalities of the
service are highlighted. It also focuses on DRS overview, advantages, how it works,
present status, etc.

Researcher concludes that digital reference gives the library a set of powerful
mechanism to serve the users. With increasingly ever-present internet connectivity,
and with-out of box network solutions, simply having a presence online is easy. He
doesn’t insist library transformation completely to online entity, but rather to have
its online virtual services to meet the high standards of quality which the library is
expected to provide all the time of the ages.

5) **IFLA Digital Reference Guidelines** are published with purpose to promote digital
reference best practices on an International basis. Libraries in different countries may
have different traditions of public service, which both affect their current reference
practice and their patrons’ expectations. But it is also important to recognize that new
technologies will enable librarians to redefine the scope of their public services. These
guidelines attempt to create some common standards from diverse traditions in the
hope that this will allow the worldwide community of librarians to freely explore the
possibilities.

Some of the issues raised in these guidelines may warrant additional
consideration and expansion issues such as the management of change. These
guidelines address the needs of library administrators as well as practicing librarians.
6) **Lankes, R. David. (2004)** commissiones white paper for the international conference and name of paper is the Roles of Digital Reference in a Digital Library Environment. This white paper presents the background of digital reference movement, highlights current work and research in the area and provides some examples of how digital reference can be integrated into digital libraries.


7) **Lankes, R.D. and Shostack, P. (2002)** present research article on the necessity of real time: fact and fiction in digital reference systems. Researchers focus on current discussions and trends in digital reference. They use data from the AskERIC digital reference service to demonstrate that asynchronous services are not only useful and used but may have greater utility than real time systems. They emphasize need of co-existence of real time systems and asynchronous systems in case of digital reference service. It is posited that different questions and different user will require different forms of interactions.

8) **Magamma, M. (2013)** in his study ‘Digital Reference Service in Engineering College Libraries: A case study of Visakhapatnam’ explores websites of all selected engineering college libraries and compares digital reference service provided by these libraries. The study reveals that all the ten selected engineering college libraries are providing online / digital services including library website, web-OPAC, subject portals, web databases, collaboration with national, international network and links to e-resources. In case of digital reference service, the reference desk, e-mail reference service, ask a librarian, question point, online chat, FAQ, web based user education and search engine, bulletin board services are provided by engineering college libraries.

   The researcher concludes that the majority of selected engineering college libraries are deeply involved in the organization and management of e-resources to
provide various digital reference sources to their users under intranet as well as internet environment.


10) Monn, Lorri and Joseph W. Janes. (2003) analyze “thank you” Study for user satisfaction with digital reference service. They study Internet Public Library (IPL), a virtual library on the internet which has been in existence since March 1995. They analyze 558 internet public library digital reference transcripts that had received “thank you” from users and 250 transcripts that did not receive “thank you” message for total of 810 digital reference interactions.

They conclude that the thank you study raises intriguing Questions about the results that might be found in extending this analysis to other digital reference services. They found an overall “thank you” rate of 15.9% for questions answered within the Internet public Library in 2002.

11) Moran, Carrie. (2010) presents research article on the utility of Digital Reference Services in Academic Libraries: An Annotated Bibliography. This annotated bibliography focuses on the utility of digital reference services in academic libraries. This paper examines what types of digital reference services are provided in academic libraries and determines how these services are utilized by users. The articles used were from 2003 to 2010. For the purpose of this bibliography, Digital reference service was defined as any service provided to users that can be accessed remotely. In summary of findings researcher mentioned various authors and their research articles on digital reference service, with varied conclusions.


Previously answered question gives rise to annotations as information resources and it gives rise to question – do these annotations become a collection in
their own right? Information resources used virtually to answer these questions are part of collection? While studying second question, he discussed they must be created both responsively and proactively. Both issues must be made on a case-by-case basis, by each digital library and its associated digital reference service.

13) Sharma, Sumati; Kumar, Ashok and Singh, Mohinder. (2004) present research article on Digital Reference service. The paper highlights how the new face of service is evolving as a natural solution to keep pace with the multifaceted technological environment. It discusses the basic concepts and essential elements of reference service and gives in detail the advantages, limitations and the technology base about the various established and emerging forms of digital reference. It also focuses on some forms of digital reference services.

14) Singh, Diljit. (2004) presents research article on Reference services in the Digital Age. This paper describes some of the emerging digital reference services, including e-mail, web forms, text based chat services, Web-camera based services, ask-a-service, digital robots and collaborative services. Future of digital reference services is also explored. Also describes the emergence, concept and practices of reference service in the digital age with a focus on digital reference services.

This research article explains changing role of librarians, reference services, digital age, and emergence of digital reference. In digital reference he describes asynchronous transactions like e-mail, web form, ask-a-service, etc. synchronous transaction like chat reference, chat reference using web contact software, video conferencing, digital reference robots and collaborative digital reference services.

15) Smith, Linda C. (2002) prepares white paper for the Digital Reference Research Symposium. Attention has naturally been focused on the education needed by those individuals who are to provide digital reference services. Little has been written about education and training for digital reference services. Discussed in white paper the roles filled by the human librarian will include knowledge of wide range of information sources in print and digital form as part of an information landscape. Education for digital reference services must prepare the human librarian to supplement what the user can accomplish.
16) **Vijaykumar, Manju and Vijaykumar, J.K. (2005)** discuss research article on Digital Reference Services: Libraries online 24/7. This paper discusses the methods in online reference service and the role of reference librarian in the digital environment.

Researchers describe library reference service, virtual/digital reference, planning for DRS, delivery of DRS like e-mail, web forms, chat reference, collaborative networks etc; quality facets for DRS. Authors conclude with real time online reference holds enormous potential for revolutionizing the way users find and use reference services. Internet skills are becoming very much important for all the library professionals. In India several libraries have started online reference services using e-mail and ask-a-librarian services but real online reference services should be the focus of us to reach out to the millions of users outside the library walls and serve the community at large.

### 3.2 Virtual Reference Service

1) **Beaton, Barbara. (2012)** discusses research article on new technologies for virtual reference: A Look at Skype and twitter. Paper examines the potential of Skype and twitter, popular social media in many ways for enriching virtual services of Michigan University.

Out of 186 libraries participating in this survey, 88% began to use Skype for reference service within past two years and indicated that this technology is still in the exploration. The vast majority of libraries using twitter continue to use it as a communication and public relations mechanism- twitting about resources, services, events or community information.

2) **Bullard, Kristen A. (2003)** submits paper on Virtual Reference Service Evaluation: An application of unobstructive research methods and the virtual reference desk’s facets of quality for Digital Reference Service. This paper focuses on the quality of virtual reference service in public institution classified by Carnegie classification as Doctoral/ Research intensive and extensive universities. Ten Universities’ websites were evaluated for facets of quality such as accessible, publicize, clear response, policy, privacy and access.

The findings in study include the implications for VR standardization utilizing the VR Desk’s facets of quality for digital reference. One area that VR seems to have
achieved some consistency is accessibility as demonstrated through hours of operation. The current version of the VR Desk document, however, does need to be revised to better fit the specialized capabilities and limitation of VR Service. The newness of VR method provides ample opportunities for experimentation.

3) **Gibson, Craig and Mandernach, Meris. (2013)** presents research article on Reference Service at Inflation point: Transformations in Academic Libraries. This research project investigates whether academic libraries are developing new models of research services supporting faculty and students at their institutions, models that transform transaction based reference services.

In result, many libraries mention progress. All of libraries indicate decline in face to face reference services, though some had seen an increase in chat/e-mail questions. Some libraries handle chat /e-mail question on the desk, while others handle it from offices while one library set separate desk.

Researchers conclude that most of the libraries are being asked to demonstrate a return on investment for service as well as determining subject specialist impact within each department.

4) **Luini, Christina. (2012)** presents a study on virtual reference service: A case study of Question Point utilization at the Gallagher law Library. This paper examines the use of OCLC’s Question Point (ASK US) reference service by the Marian Gould Gallagher Law Library. It considered types of patrons who use the service, where they access the service from, and content of their questions.

Analysis shows that only 23% of the inquiries Gallagher receive via its Question point web form come from primary users group. Questions received from secondary user group make up over three fourths (77%) of inquiries received through the Question point. Researcher thinks the reason behind less usage of Question point by primary users as- possible that reference needs are satisfied through traditional live reference service, or may be that students are unaware of it or don’t find it easy to access, or they may prefer other forms of virtual reference like chat etc.

Similarly high usage has several implications. Each reference transaction with secondary user takes valuable time and resources away from its primary patrons. Geographic proximity of user to the library is not most important factor in determining whether user visits the library or relies on the virtual reference service.
5) **Maharana, Bulu and Panda, K.C.** explores websites of all the IIT’s and IIM’s libraries to identify and assess the present state of virtual reference services provided in the libraries of above premier institutions. In Research article on Virtual Reference Service in Academic Libraries: A Case study of the libraries of IIMs and IITs in India they reveal following major findings

i) Only 2(15.4%) IITs are providing Reference Desk or Help Desk service.

ii) Reference Service through e-mails are being provided by only 7(53.9%) libraries in different form such as TOC Alerts, Ask a Librarian, Question Point, customized news to users, latest library additions etc.

iii) Video conferencing as a real time reference service being facilitate in 6(46.1%) libraries, however only 3(23%) libraries introduced Online Chat facility as a mode of real time reference service. Two libraries also provide Instant Messaging Service.

iv) The study revealed that all the libraries provide links to their collection of e-journals, e-databases and OPAC. However links to e-books provided by 7(53.9%), patents 4(30.76%), e-theses 1(7.7%), standards 6(46.15%), FAQ 11(84.6%), and open access 6(46.15%) libraries.

Researchers conclude that virtual reference service are being developed and implemented at libraries across the country. If virtual reference service is to evolve as bonafide library and information service, librarians need to engage in ongoing assessment and evaluation of those services.

### 3.3 Online Reference Service

1) **Eke, Helen Nneka and Ekwelem, Vincent Onyeaeholam. (2014)** examine the availability of online reference services (ORS) in libraries in Nigeria. They conclude that ORS is advertising as being able to reach patrons at any time of the day or night at any location in the world. The investigators concluded that the validity of the results and the strength of the ORS as an instrument of information assessment are enormous, and further discussed the most difficult aspect of the evolving world of electronic technology is the cost. Libraries are really struggling with the overwhelming cost of both technology infrastructure and up gradation of hardware and software.
3.4 Digital Library

1) Chowdhury, Gobinda G. (2002) presents research article on Digital Libraries and Reference services: Present and future. This paper focuses on the current state of research in personalized information services in digital libraries. It analyses some representative definitions or digital libraries in order to establish the need for the personalized services. Then it provides a brief overview of the various online reference and information services currently available on the web. The paper also briefly reviews digital library research that specifically focuses on the personalization of digital libraries and the provision of digital reference and information services. Lastly, the paper states some new areas of the research that may be undertaken to improve the provision of personalized information services in digital Libraries.

2) Han, Lifeng and Goulding, Anne. (2003) presents research article on Information and Reference Services in the Digital Library. This article describes the Paradigm of information and reference services in the digital Library. Authors suggest three leveled system that supports users information needs.

On the first level, technologies, resources and services are integrated into the digital Library. On the Second level, information professionals provide induction and training courses to educate users to use the digital library. On the third level, reference librarians are waiting for users questions at the reference desk, on the telephone, via email or an interactive system etc.

This paper also discusses role of the reference librarian at each level. Finally digital reference services, a new means delivering services, is also briefly reviewed. The authors emphasize the need of a systematic process to support user’s information needs in the digital library.

3.5 Web Based Library Services

1) Bhatnagar, Anjana. (2005) studies web-based library services including OPAC, Gateways, Portals, Subject Portals, Electronic Journals, Online databases, search engines, Subject directories, and new web based library services such as virtual library tours, Ask-a-Librarian, Real time services, Bulletin boards, web based user education, web forms.
Indian libraries have realized importance of web based library services and some institutions like CSIR, ISRO, DRDO, DAE, ICAR, SIRNET, NICNET, NISSAT, INFLIBNET, MHRD and IIM libraries are actively working continuously to improve the present situation. Web based library services will become more widespread and sophisticated as the web becomes common place throughout the world especially in e-world. Librarians may play a leadership role in providing better web based library services to their current technosavy users.

2) **Borasky, Danielle.** (1999) examines services offered by libraries via their web sites in “Analysis of web-based Library Services.” Web based library services at fifteen academic libraries in North Carolina were evaluated using combination of content analysis and questionnaires.

   The results show that most libraries offer basic text based services as descriptive information about library, some libraries offer web-based access to OPAC, few libraries offer online request forms and bibliographies, while some offer advanced service such as digital collection and cross departmental services. Study also indicates that libraries dedicate staff resources to web services in variety of ways. This study didn’t presented clear relationship between institution resources and the quality or scope of web based service.

3) **Chinta, Nagabhushanam.** (2013) studies web-based OPAC Services in India. Web OPAC is a library catalog on the web or intranet. The major limitation of online catalogues investigated is that most of the libraries not even have library page and lack of federated search facilities. The users generally prefer to go to web search engines rather than to library catalogues. This is the matter of concern for librarians and they must work to bring users back to the library for immediate information needs. The introduction of the library portals with the features of web-based OPAC is the ultimate solution to the problem. Web-based OPAC Service is one of the key roles in e-resource services.

4) **Contreras, Paula; Klimczyk, Linda and Probst, Laura K.** (2004) presents expansion of web-based library services in large research libraries: A Penn state case study and aim of their study was to meet changing needs and expectations of their
users. The Penn State University Librarie’s building suite of web-based services, including synchronous and asynchronous reference.

They observe that their users submit complaints and questions about network access problems through this service. Library users across the country prefer to be self-sufficient in using library. Findings suggest that the user interfaces on their web pages are not intuitive and that they must improve the usability of their web-based services.

5) Nagarkar, Shubhada. (2011) Studies web based reference services to Bioinformaticians: Challenges for Librarians, and in this she describes how personalized reference services for bioinformaticians are being developed using a portal https://sites.google.com/site/reftobioinfo/.

Researcher finds that scientists are satisfied with the information they get and the time saved, while librarians face a number of challenges when developing this type of personalized services. Librarians have to work closely with the scientists as a team member to understand their information needs as well as conduct information literacy programs for scientists. Librarians’ traditional services can be delivered via web and “ref to bio info” is proof of the same.

6) Madhusudhan, M. and Nagabhushanam, V. (2012) presents research article on use of web-based library service in select University libraries in India: A Study and examine how some of the University libraries provide web access to their collections and user support for that access and the problems faced by users in accessing web-based library services.

Findings show that many of surveyed University libraries are yet to exploit full potential of the web forms and lagging behind in effective use of library website. Few libraries offer innovative web- based library services in different section. The major suggestions were updating the web pages frequently, content based book services, facility to upload content by users, higher bandwidth and wireless connectivity, institutional archives, digital literacy programs and more web-based tutorials for users, etc.

Their findings show that more than two third libraries have dedicated or partial website, more than half libraries have direct hyperlink on the university homepage, web OPAC is significant service offered by libraries, 13.15% libraries have e-mail reference, 2.63% has chat reference.

8) Husain, Rashid and Ansari, Mehtab Alam. (2006) presents research article on “From Card Catalogue to Web OPAC.” This paper describes what is OPAC, describes about OPACs and Web OPACs technology in libraries and also explains various features, applications and advantages of Web OPACs. Article also focuses on Card catalogue Vs. OPAC, Web OPAC.

Researchers conclude that OPAC is interactive search module of an automated library management system. Thus lot of cataloguing work due to availability of web OPAC is reduced. Web OPAC improve the quality, speed and performance of the services offered by the libraries. Inter library loan becomes easier with the use of e-mail and web. Users can see the collection and issue status of each document of the library.


A Survey carried out, investigated the use of World Wide Web for user education in 68 UK university libraries. Three quarters of the libraries surveyed make use of the web for this purpose. The web is used as a supplement to current existing user education, to enhance independent, student centric learning and reach part-time and distance learners. Only 10% of user education is delivered solely via the web but it will grow in future. One more important finding was that greater use is made of web for information skills training than for library induction. Authors suggest that web based instruction is unlikely to completely replace traditional method but it can be used as supplementary and extended provision.

3.6 Subject Gateways and Search Engines

1) Heron, Susan and Hanson, Ardis. (2003) presents research article on From Subject Gateways to Portals: The Role of Metadata in Accessing International Research.
This paper discusses that use of metadata formatted in uniform way, using thesauri and authority files, aids users in efficient retrieval. Thesaurus of subject terms enhances searching precision, eliminating false leads. There is critical need for new approaches to the problem of information overloads. There is growing demand for searching aids. Author’s names represented in a variety of ways on his/her publications, variant spelling, updated term; evolving geographic entities can lead to missed sites when keyword indexing is only access.

2) Poonkothai, R. and Ganesan, A. (2008) has done comparative study between subject gateways and search engines. Subject gateways doing for internet information resource what librarians do for books. Using a Subject gateway instead of a general search engine can result in the return of more genuine and relevant web pages from our search. Subject gateways are undoubtedly very useful internet search tools. While they are more limited in the extent of their coverage than search engines, they are valued by users for the higher quality and relevance of their results.

### 3.7 Institutional Repositories

1) Enabling Open Scholarship (EOS) Publishes paper on Open Access Institutional Repositories: A Briefing paper. In this paper they conclude that institutional repositories are digital collections of outputs created within a university or research institution. Purpose of repositories may vary but they adhere to internationally agreed set of technical standard that means they expose the metadata. There are almost 1300 repositories around the world.

Institutional repositories contain peer reviewed journal articles and conference proceeding, research data, Monographs and books and other content types. Repositories will form a permanent and critically important part of the scholarly communication process. Google and other web search engines index the content of repositories; anyone with internet access can find themselves arriving at an article or dataset in university or research institutions’ repository via a web search. To reduce cost, deposit activity should show a reasonably steady pattern throughout the year.
3.8 Library and Information Services in e- environment

1) Owen, Victoria and others (2008) discuss a research article namely E-books in Research Libraries: Issues of Access and Use. The Canadian Association of Research Libraries (CARL) task group on e-books undertook to consider and to make recommendation to the CARL copyright Committee on issues of access and use of e-book in research libraries.

They conclude that there is a danger that research libraries are adding e-books to their collection using agreements that significantly reduce user’s rights. There is some urgency to improve this situation before it becomes a de facto standard. The task group on e-books makes two recommendations to the CARL Copyright Committee: to create or endorse a statement of principles for licensing e-books and to create a model license for Canadian research libraries.

2) Vatnal, R.M; Prakash, K. and Mathapati, G. C. (2004) explains research article on developing library and information services for e-learning environment. This paper focuses on the issues of developing e-learning system, its requirement and its implication in e-learning.

The authors describe e-learning term with web based learning; computer based learning and virtual classrooms etc; needs of e-learning, patterns of it, virtual university etc. They also describe various library services in e-learning environment such as access to information resources, consultation services, reference services, inter-library loan and consortia sharing, issue in learning, etc. Authors conclude that in e-learning process the future of libraries will emerge as active bridge between the learners and information, e-learning supported by the advent of digital library will be greatly significant and crucial in higher education and research.

3) Walters, William H. (2013) discuss research article on E-books in Academic Libraries: Challenges for Acquisition and Collection Management. This bibliographic essay examines the difficulties associated with the selection, licensing, acquisition and management of e-books in academic libraries. This paper discusses recent research and practice in the United States and the United Kingdom. Although essay emphasizes the challenges associated with e-books.
The Researcher concludes with issues like recent studies have highlighted number of difficulties—
i) Only half of print books acquired by academic libraries are available as e-books.
ii) Many academic e-books are released three to eighteen months after the corresponding print editions.
iii) E-books publishers have taken advantages of the changing digital environment to weaken the legal framework that has traditionally favoured libraries and their patrons.
iv) For scholarly titles, the cost of producing and providing access to e-book is no lower than the cost of producing and distributing a printed volume.
v) Preservation of e-book is also difficult because it requires long-term maintenance of several distinct elements, etc.

3.9 Electronic Document Delivery

1) Kinslow, Carmela describes research article on Bridging the Gap: Electronic Document Delivery and networked information services. In this paper researcher described how their library changed from traditional services to new electronic age services.

   Researcher presents journey of library from print service, creative ways to meet variety of new research needs. Previously libraries can’t purchase all the resources then come internet, on-line search service like LEXIS, then growth of network resource sharing, and then Kresge law library joined the best known library network OCLC, then implementation of ARIEL, then UMI ARTICLE clearinghouse document delivery system.

3.10 Question Point

1) Qobose, Edwin and Mologanyi, Boipuso (2015) present a case study of utilization of Question point at University of Botswana Library, examines the use of “Ask a LIBRARIAN”. They conclude Question point is powerful OCLC product that provides online reference service in a cooperative environment. The usage of Question point at Botswana Library is getting low due to lack of awareness, inadequate training. University of Botswana needs to review Question point in context of web 2.0.
3.11 Chat and Instant Messaging


   Researcher says this bibliography is not at all comprehensive. As the title describes, it is really selected set of resources. Researcher attempted to gather resources, primarily articles published from 2000 about chat and IM as vehicles for reference services. Most of key authors conducting research and study in the area of chat and IM are represented in this bibliography. Researcher assumes that this bibliography should serve as starting point who is interested in learning more about this technology for library services. Topics covered are to chat or not to chat, user preferences, what they ask and how we answer, etc.

2) Desai, Christina M. and Graves, Stephanie J. (2006) present research article on Instruction via Instant Messaging Reference: What’s Happening? This case study analyzes one Instant Messaging Reference Service to determine what extent instruction is or can be offered in this medium and whether patrons want or expect it.

   Researchers find results that patrons overwhelmingly welcome instruction and that it is provided in a large majority of cases, using variety of the bibliographic instruction techniques. The way the question is framed, however, affects the likelihood of instruction to some extent. And they concluded, this study indicates that librarians should make habit of practicing instruction in IM reference even when patrons don’t appear to be asking for it.

3) Flanagin, Andrew J. (2005) presents research article on IM online: Instant Messaging use among college students. This study examines the most prevalent motivations for using IM within what is currently among the largest demographic groups utilizing this tool, college students.

   As a result, four factors were merged like social entertainment, task accomplishment, social attention, and to meet new people. Results also suggest important difference among technologies. Face to face communication was by far the most useful and most versatile channel for need satisfaction. E-mail was rated low on need satisfaction. College age respondents in this study exhibited a high capacity for
multitasking in IM Conversations. Within short lifespan IM has become a central communication tool within this population.

4) **Jennigs III, Raymond B. and Others (2006)** present research article on a study of Internet Instant messaging and Chat Protocols. This article presents an overview of IM protocols as exemplified by three popular systems AOL IM, Yahoo Messenger Microsoft Messenger. They study features and functions, system architecture, session distribution, user authentication, data transfer, etc.

   Result show that most IM systems use client server architecture. AIM used BOS server, MSN use asymmetric architecture, while YMSG uses symmetric architecture. AIM and YMSG uses users name and password for authentication while MSN uses Microsoft passport system. AIM and YMSG both use binary representation for their headers. YMSG has single level structure of fixed length fields.

5) **Ronan, Jana and Turner, Carol. (2002)** compile and publish A SPEC kit at Association of Research Libraries (ARL) on topic Chat Reference. A SPEC Survey on chat reference was distributed to the 124 ARL member libraries in July 2002. Sixty six libraries (53%) responded to survey. Goal of survey was to explore pervasiveness of chat reference in ARL member libraries and to provide overview of technologies being used, usage patterns and practices in areas of personnel, policies and procedures, evaluation and collaboration.

   Researchers find that 54% respondents indicate that chat reference or live online reference is a new dynamic library service. Total of 67 ARL member libraries now offer some type of chat reference service. Most of these services are very new. The number of services almost doubled in less than a year, spreading from 29% to 54%.

6) **Steiner, Sarah and Long, Casey. (2006)** present research article on what are we afraid of? : A survey of librarian’s opinions and misconceptions regarding Instant Messenger. Researchers discuss in general librarians’ opinions of IM are mixed and at times even combative.

   25% of libraries represented in survey offer IM and 28% are planning to offer as a virtual reference option. Based on issues about IM and chat, it is clear that both are still struggling to win full acceptance as virtual reference service. Negative
experiences with commercial chat products, concern about staffing, hours, difficulty of adjusting to the communication style of chat and IM users, all prompt librarians question to the value of services. Study confirms IM is growing in academic libraries in spite of issue around it.

### 3.12 Voice over Internet Protocol (VoIP)

1) **Feroz, S. And Dowland, P.S.** addresses a research article on Security and Risk Analysis of VoIP Networks. This paper describes all major issues related to VoIP Security and provides detailed technical information about Voice over Internet Protocol (VoIP). The focus of this paper is to highlight, discuss and introduce security issues relating to VoIP networks, given the expansion in the usage of VoIP within large corporations. This paper also describes current threats and future security measures related VoIP. The researchers concluded that in order to meet user requirements and to satisfy user needs for reliable operations over VoIP, some sorts of guidelines are needed.

2) **Jalendry, Sheetal and Verma, Shradha. (2015)** present a research article on A Detail Review of Voice over Internet Protocol (VoIP). Voice over Internet Protocol (VoIP) is a new method of communication. This technology allows users to make telephone calls over an IP network. This paper describes Voice over Internet Protocol (VoIP) to a level that allows discussion of security issues and concerns. It is a technology that allows users to make telephone calls over IP network. Finally, researchers concluded with the discussion on the feasibility of providing VoIP over challenging satellite links.

3) **Singh, Rahul and Chauvan, Ritu. (2014)** present research article on a review paper: Voice over Internet Protocol. This paper describes Voice over Internet Protocol (VoIP) to a level that allows discussion of security issues and concerns. It is a technology that allows users to make telephone calls over IP network.
Researchers conclude that security for VoIP system should begin with solid security on internal network. Conducting risk analysis of each component and process will identify the vulnerabilities and threats. Striking a balance between security and the business needs of the organization is key to the success of the VoIP deployment.

3.13 Chat bots
1) Allison, DeeAnn. (2011) present research article on “Chatbots in the Library: is it time?” This paper is about adapting artificial intelligence technology for reference services. Chatbots (also known as conversational agents, artificial conversation entities or chatterboxes) are computer applications that imitate human personality. A Chatbot is interactive responding in sentences that track the conversation in a way that is meaningful to humans.

Academic libraries in US have been slow to adopt chatbots. The University of Nebraska Lincoln chatbot is the first to go into production. The chatbot, Pixel began development in the fall of 2010. It is impossible to predict what chatters will say to pixel and because they know they are chatting with bot, they will say things they would never say to human.

3.14 Video Conferencing
1) Sedgwick, Monique and Spiers, Jude. (2009) study the use of video conferencing as a medium for the qualitative interview in which they propose to present experience of using videoconferencing technology to collect experimental data from undergraduate nursing students and preceptors in Western and Northern Canada during rural hospital based preceptorship.

The recommendations made in this paper about using videoconferencing as a medium for conducting indepth qualitative interviews include using a high bandwidth connection such as super net or web conferencing and evaluating, whether the type of information being sought is likely to be shared in situations other than in-person face to face conditions. Higher bandwidth connections generally results in greater satisfaction with the videoconferencing experience.

It also presents disadvantages such as highly sensitive information can’t be shared over videoconferencing, interaction might be influenced by bandwidth of connection.
3.15 Bulletin Board

1) Ramaiah, CK (1995) presents the study of bulletin board system for Libraries. This article gives overview about electronic BBS, the infrastructure required to set up BBS and their applications in general.

   Researcher suggests BBS should be attractive, user-friendly, advertising, and informative and should provide up to date information. Researcher concludes that numbers of BBS are available on national, international networks throughout the world. BBS software vendors claim that majority of their customers (about 80%) are from business or government and only about 20% are hobby or entertainment users. BBS software packages are available in UNIX, MS-DOS, Shareware, Freeware, etc.

3.16 Customer Contact Centre

1) Murphy, Sarah Anne and Cerqua, Judith. (2012) study and present research article on implementing the customer contact centre: An opportunity to create a valid measurement system for assessing and improving a library’s telephone service. In which they explain that a customer contact centre offers academic libraries the ability to consistently improve their telephone, e-mail and Instant Messaging Services.

   They conclude that by consolidating telephone, e-mail and IM service in one location, Ohio State’s Research and Reference Staff gained the opportunity to share best practices across service formats, improved ability to provide consistent service. They also introduced practical methodology for developing a valid measurement system to assess employee’s handling of contact centre’s telephone calls and subsequent training needs.

3.17 Web 2.0

1) Chua, Alton Y.K. and Goh, Dion H. (2010) study web 2.0 applications in library websites. Divided equally between public and academic, 120 Libraries websites from North America, Europe and Asia were sampled and analyzed using three step content analysis methods.

   The findings suggest that the order of popularity of web 2.0 applications implemented in libraries is blogs, RSS, instant messaging, social networking services, wikis and social tagging applications. The libraries in North America lead significantly in the adoption of web 2.0 applications compared to their European and
Asian counterpart. The presence of web 2.0 applications was found to correlate to the overall quality of library websites.

2) **Dora, Malikarjun and Maharana, Bulu. (2008)** present research article on A-Lib 2.0: new avatar academic libraries with web2.0 applications. In which they explain how web 2.0 tools could be applied in academic libraries to convert them as A-Lib2.0. They also study various web 2.0 tools such as RSS (Really Simple Syndication) Wikis, blogs, flickr, IM Messenger (chat reference), etc. and its application and cases. Library 2.0 is not to replace traditional philosophy and service whatever library has but it’s about enhancing and extending its services into new areas.

3) **Hazra, Sheuli. (2015)** explores research article on application of web 2.0 in library services: Are we ready? In which researcher examines the evolution of web from static HTML based entity to AJAX based dynamic and participative web, called 2.0. Researcher also discusses some web 2.0 applications such as blogs, digg, flickr, Jumpcut, Library Thing, Mashups, MySpace and Face Book, Paperback swap, etc. They also conclude that automated and digital library services are rapidly becoming web 2.0 competent library services. New tools are trying to integrate different information space on the fly in real time and thereby assuring rich experience to users.

4) **Ramos, Marian S. and Abrigo, Chritine M. (2011)** present paper on Reference 2.0 in action: An Evaluation of the Digital Reference Services in Selected Philippine Academic Libraries. This paper presents the current status of digital reference service among selected academic libraries in the Philippines by figuring out how information service is provided using IM and Social networking sites.

   Clearly findings show that full potential of reference service 2.0 has not yet been maximized. When it comes to reference services in academic libraries, students and faculty members have chosen to go online, Ask-a-Librarian, web forms, e-mail and face book. IM and face book were found to be the most useful tools in finding relevant information. The paper further explores the different aspects of IM and face book reference service: statistics, content of the questions and quality of the answers, reference interview and the user’s awareness and preferences.
5) **Sheikh, Mohd. Imran (2011)** studies impact and application of web 2.0 in libraries: A case study of 12 National libraries of the developed nations. In his study he found that RSS (83.66%) was the most commonly used technology while IM was the least used one with only five libraries (41.66%). More than 65% of libraries (8 out of 12) utilized blogs and half of libraries employed podcasts. The primary purpose of RSS was “new books” (66.66%). More than half of libraries used blogs for “library Services”. The study also reveals that top three purposes of podcasts were advice on library skills, guidance with resources, and library orientation tours. It is clearly stated that Instant messaging (IM) was mostly used as a tool for virtual reference service in terms of chat services. The concept of web 2.0 is still being established.

### 3.18 Social Media

1) **Jadhav, Vilas G. (2014)** describes application of social networking services (SNS) for library collaboration: An exploratory study and examined academic librarians perspectives on using social networking services for library collaboration.

   Research Findings show most frequent social networking services on which librarians held an account was face book, next come Linked IN, MySpace, Library Thing, second life and twitter. Only about half of the librarians under study used SNS on a daily basis. Librarians are very much aware about the use of social networking for library services.

2) **Taylor and Francis. (2014)** publish white paper on use of social media by the library for current practices and future opportunities. Their research program comprises focus group in the UK, USA and India; ten telephone interviews with thought leaders from library community, a twitter party, online survey (497 respondents) and desk research.

   According to this survey over 70% of libraries are using social media tools, 60% had social media account for three years or longer, 30% of librarians are posting at least daily. Face book and twitter remain most popular channels currently, but range of channels being used is expanding rapidly, such as You Tube, Pinterest, Snapchat.

   Libraries use social media for range of objectives such as promotion, collection management, outreach, etc. But use of social media for enhancing teaching
and learning is currently lower priority, but this will likely became an important activity in the near future. Most librarians feel strongly positive about the potential for social media to help increase engagement between users and library staff and services.

3.19 Mobile Internet

1) **Donner, Jonathan and Walton, Marion. (2013)** describe research article on “Your phone has internet- why are you at a library pc? Re-imaging public access in the mobile internet era” which focuses on teenage users of public internet access venues (PAVs) in low-income neighborhoods of Cape Town.

   In findings they say free use (as in library) supports more resource intensive goals (requiring storage space, time and bandwidth) and stable media production. Paid use (such as a phone) supports time-sensitive goals, interpersonal communication and low bandwidth media use. Librarians and other PAV operators outside of those in for profit cyber cafe may benefit from specific training and encouragement oriented towards the opportunities presented by the mobile internet. With proper skills, PAV staff could help users save time waiting for shared resources and encourage them to get more out of the internet in their pocket.

2) **Nazi, Ayoob; Ghasempour, Sakineh and Asgari, Leyla. (2014)** discuss research article on “A Feasibility Study of Mobile Services Implementation in National Library and Archives of Iran: User’s trends”. This study seeks to reveal the opinion of the users of national library and archives of the Islamic Republic of Iran (NLAI) about library services based on cell phones, to recommend new services for this library.

   Findings of the study show that 68% of respondents supported the use of mobile phone in library and did not recognize it as being a disruptive factor. Among several proposed services, over-due day reminder with 76% was the most favorable service. Providing audio tours of the library with 33% had the lowest interest. Totally, in 79% of proposed services, respondents consent was more than 50%. From the viewpoint of 55% of respondents, mobile based reference services were a suitable and inevitable service. Reference service Via SMS with 55% and through library website with 9% preferred.
3.20 Works Cited


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