

DIGITAL REFERENCE SERVICE IN ACADEMIC AND RESEARCH LIBRARIES: AN OVERVIEW OF SIX GOVERNMENT SPONSORED INSTITUTIONS IN BANGALORE, KARNATAKA

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***Abstract** - This paper emphasizes the significance of Digital Reference Service in Academic and Research Libraries. It reveals various types of DRS provided in Central Government sponsored six premier Academic and Research Institutions in Bangalore, Karnataka (Indian Institute of Science, Indian Institute of Astrophysics, Indian Statistical Institute, Jawaharlal Nehru Centre for Advanced Scientific Research, National Institute of Mental Health and Neurosciences and Raman Research Institute). This paper highlights present status of DRS services offered in the libraries. It outlines the initiatives taken by the Libraries under study. It also states collaboration with other Institutes and Organizations, involvement in consortia's. Present strength of their e-content like e-books, e-journals, e-archives, e-bibliographies and search engines.*

Keywords – Digital Reference Service, e- resources, e-messaging, e-consortia and Instant Messaging.

1. Introduction

Reference Service is one of the important services offered by libraries, especially in academic libraries user satisfaction will always depend on quality reference services provided in the libraries, due to advancement in Technology new terminology added to it that is Digital Reference Service. Digital reference is a service by which a library reference service is conducted online, and the reference transaction is a computer-mediated communication. It is the remote, computer-mediated delivery of reference information provided by library professionals to users who cannot access or do not want face-to-face communication. The word "reference" in this context refers to the task of providing assistance to library users in finding information, answering questions, and otherwise fulfilling users' information needs. Reference work often but not always involves using reference works, such as dictionaries, encyclopedias, etc. This form of reference work expands reference services from the physical reference desk to a "virtual" reference desk where the patron could be writing from home, work or a variety of other locations

2. Objectives of the Study

Nowadays Digital Reference Services gaining popularity especially in Research, Special and Academics Institutions such as IISc, NIMHANS, JNCASR, here faculty, students and researchers heavily depend upon the instant, fast and easy delivery of information sources. In this regard the main aim and objective of the this study is to scrutinize and identify the present stage of Digital Reference service offered in the libraries of centrally sponsored six premier research institutions of Bangalore, Karnataka, like IISc, IIAP, ISI, JNCAR, NIMHANS, and RRI.

- To showcase the present status of Digital Reference Service being provide in the libraries under study.
- Careful identification of strength, present status and short comings of existing reference services provided in the libraries under study.
- Comparing of various Technologies and modes of Digital Reference Services available in the institutions under study.
- Systematic evaluation of DRS under suggested guidelines made by different National and International associations such as IFLA and ALA.

3. Methodology

Success of any Research mainly depends on careful selection of suitable methodology. For this purpose to carry out present study, websites of all the Institutions under study were explored to identify and assess the present state of digital reference services provided in the libraries of the above premier institutions. Thus the data obtained were analyzed, tabulated and interpreted for a systematic evaluation of the strength and weakness of VRS in the libraries included in the study.

4. Institutes Website

Indian Institute of Science	http://www.library.iisc.ernet.in/home.aspx
Indian Institute of Astrophysics	http://www.iiap.res.in/facilities/library
Indian Statistical Institute	http://www.isibang.ac.in/~library/
Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)	http://lib.jncasr.ac.in/homepage/
National Institute of Mental Health and Neurosciences	http://nimhans.ac.in/library-and-information-centre
Raman Research Institute	http://www.rri.res.in/library.html

5. Software Requirement for Digital Reference Service

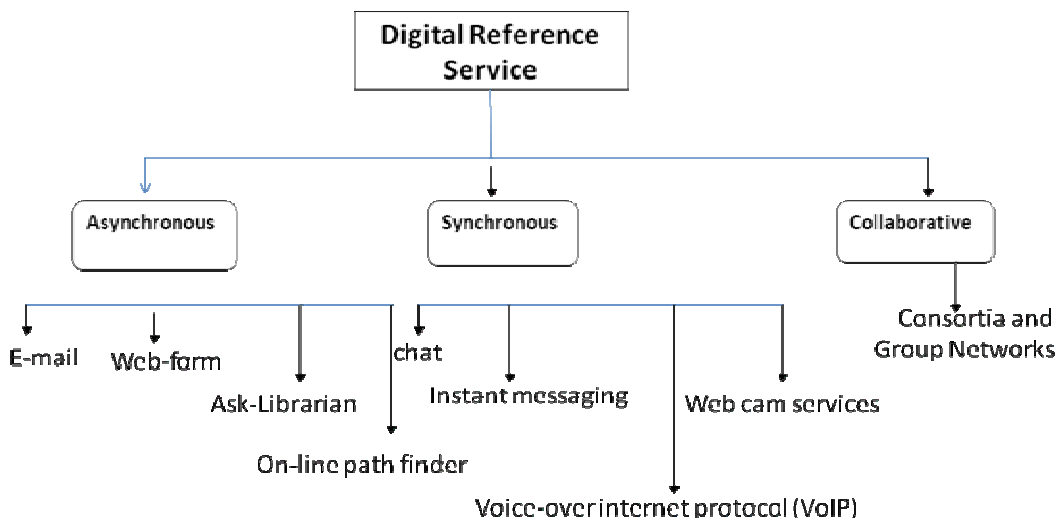
Digital Reference service software programs offered by libraries are often unique, and tailored to the individual library's needs. However, each program may have several distinct features.

- Online chat or instant messaging.
- Electronic mail.

- Short Message Service (SMS).
- Scripting of common messages and responses.
- "Pushing" or sending Web pages or documents.
- "Collaborative browsing" of Web pages so that librarians and students (outside the library) can share Web screens.
- Remote patron authentication in conjunction with EZProxy software to enable students to access electronic resources off-campus.
- Reference session transcripts that permit follow-up information to be sent to students' offline.
- Report generation for continuous assessment.

6. Types of Digital Reference Services

There are three types of digital reference services, namely, Asynchronous, Synchronous and Collaborative digital reference services.



Source: (Sharma, Kumar and Singh; 2005; p.983)

6.1 An asynchronous digital reference service is a service characterized by communication in one direction at a time. A library user may use a web-based e-mail, web form, ask a librarian service and online path finder to enquire about his or her information needs from a librarian

6.1.1 E-mail reference service – This is a simple, cheapest and cost effective service in which transaction involves back and forth exchange of information. User sends the query in the form of a message and receives an answer at a later time. User can ask a question even when the library is closed. Libraries give reply by e-mail, fax or phone as he finds it convenient.

E-mail service is one of the easiest ways of communication to an individual or with institutions; from the study it reveals that all the institutions under study answers user reference questions by

e-mail, but the time taken to answer and numbers questions asked by the users varies from institution to institution. Jawaharlal Nehru centre for Advanced Scientific Research had slight edge over other institutions while responding to user quires, but load of questions is little below than Indian Institute of Science

6.1.2 Web form or Query form Service In web forms the user fills out an online form on the libraries websites. It structures the user's request in such a way that helps the user in providing additional supply of information that will specify his/her request. The query thus structured is submitted to the respective library and the person replying these will post an e-mail reply to the user immediately.

Web forms are created for digital reference services in order to help the patron be more productive in asking their question. This document helps the librarian locate exactly what the patron is asking for. Creation of web forms requires design consideration. Because web forms substitute for the reference interview, receiving as much information as possible from the patron is a key function.

Aspects commonly found within web forms:

- A return email address to send the answer to the question.
- The question being asked.
- The type of question.
- What sources have been consulted by the patron?
- How the patron is planning to use the information.
- Location of the patron (are they a library patron?).
- A name to personalize the interaction.
- A date by which the information is needed.

Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) Library Helpdesk

This online helpdesk system is meant to streamline queries related to library services and resources. They encourage all library users to post their queries to this helpdesk system. Queries related to request for journal article, books chapters, etc. may be posted. General enquires and access issues of e-journals may also be reported here.

Every support request is assigned a unique ticket number which you can use to track the progress and responses online. For your reference they provide complete archives and history of all your queries and resource requests. A valid email address is required to submit a ticket. There are two options

1. Open a new Ticket- Expect as much detailed information as possible from the users to assist and to update a previously submitted ticket, please login.
2. Check Ticket status- Which provides archives and history of all your current and past support requests complete with responses.

Indian Institute of Astrophysics- Recently IIA Library blog has been launched and this way IIA would like to connect with library users through this blog regularly. They have a plan to include the current topics with their websites and alert services in addition to provision of

information on demand. The entries displayed in the reverse chronological order, facilitates the visitor to see the newest content first. This blog also solicits comments from IIA colleagues which will be shared with everyone who logs in.

A pathfinder is a bibliography created to help begin research in a particular topic or subject area. (Pathfinders are also referred to as subject guides, topic guides, research guides, information portals, resource lists or study guides). Pathfinders produced by the Library of Congress are known as "tracer bullets". What is special about a pathfinder is that it only refers to the information in a specific location, i.e. the shelves of a local library.

Pathfinders are guides designed to help users find information on a particular topic. With more and more information available in electronic format and on the web, online pathfinders are becoming increasingly popular.

Indian Institute of Science there are some bibliographic data bases which provide links to Mathscinet, Web of Science and SciFinder Scholar.

IIAP given provision to two world's major bibliographic tools such ARIBIB-ARI Bibliographical Data Base for Astronomical References and ULAS Union list of Astronomy Serials.

Indian Statistical Institute is offering bibliographic services to the Research community from time to time. The bibliographies compiled and supplied to the particular required user on request.

NIMHANS provides links to some of the useful databases such as Indian Citation Index (needs first time free registration), ISID (Institute for Studies in Industrial Development), Molecular Biology Database Collection (2005 update).

Raman Research Institute has link to access National Union catalogue of scientific serials in India and Astronomy Libraries Union Catalogue of serials.

A synchronous reference services "allow librarians to answer requests in their own time, after having conducted all necessary research, which might enhance the accuracy and completeness of replies" (Schachaf & Horowitz, 2008, p.127). A synchronous service is described as 'real-time', with an immediate response to the query. It is a two way communication between a library user and a librarian over the Internet. The tools used for this communication are, among others, chat, instant messaging, Voice-Over Internet Protocol (VoIP) and web cam services (Berube, 2003; Dollah & Singh, 2002; Nicholas, 2011). With synchronous services, real time communication takes place between a library user and the librarian sitting in a library and using interactive technologies; e.g., a library user clicking a button on a web page to exchange messages with a librarian and getting feedback on their question instantly.

Collaborative Networks Many libraries and organizations have recognized the benefits of providing digital reference service through collaborative services. Some regional library consortia are offering member libraries the opportunity to share reference questions with each

other using the internet and other technologies. The collaborative Digital Reference Service (CDRS), operated by the library of congress, is an international network of libraries, consortia, museums, Ask a services that uses a help desk system to route questions to appropriate institutions based on member profile {10}.

Indian Institute of Science- is a member of AICTE-INDEST consortia, this enables link to access following databases periodicals from different publishers Science Direct, Springer Verlag, IEEE, ACM Digital library IEEE, ASCE & ASME, Applied science Technology Plus, ABI Inform, JCCC for INDEST, MathSci Net, COMPENDEX & INSPEC, Sci Finder Scholar, ISI Web of Science. American Chemical Society, American Institute of Physics (AIP), American Physical Society (APS), Cambridge University Press Journals, CSIRO Publishing, Emerald, IEEE/IEE, IOP Science, J-Gate Custom Content for Consortia, Nature Publishing Group, Science Direct, Springer, Taylor & Francis, Web of Science, Wiley-Blackwell Journals, World Scientific Publishing.

Indian Institute of Astrophysics Library is a member of National Knowledge Resource Consortium which was launched recently. Through this consortium, all the libraries of DST are provided online access to additional journals of various publishers, in addition to the regular subscribed journals of each library. From April 2009, the following database of journals from different publishers can be accessed online from IIA campus at Bangalore, CREST at Hosakote, Vainu Bappu Observatory at Kavalur, Solar Observatory at Kodaikanal and Indian Astronomical Observatory at Leh & Hanle.

Indian Statistical Institute- ISI Library collaborated with LISA (Library and Information Science Abstract), ISA (Information Science Abstract) and Union Catalogue of India, useful sources available in these Institutions can be accessed ISI users.

Jawaharlal Nehru centre for Advanced Scientific Research (JNCASR) - is member of web of science. Web science is an ideal single research destination to explore the citation universe across subjects and around the world. Web of science provides access to the most reliable, integrated, multidisciplinary research connected through linked content citation metrics from multiple sources within a single interface.

National Institute of Mental Health and Neurosciences- Library is a member of Shodhganga (INFLIBNET) is a reservoir of Indian Theses, The Shodhganga@INFLIBNET Centre provides a platform for research students to deposit their Ph.D. theses and make it available to the entire scholarly community in open access. The repository has the ability to capture, index, and store, disseminate and preserve ETDs submitted by the researchers. NIMHANS Library recognized as a Participating center in HELLIS Net working. It is also a member of NICNET (National Informatics Centre Network).

Raman Research Institute- Many e-journals can be accessible under FORSA/National Knowledge Resource Consortium.

Links to e-Resources- Publication in digital form is called e-resources, consisting of text, images, or both, readable on computers or other electronic devices. Although sometimes defined as "an electronic version of a printed Material". The growing popularity of electronic information resources and the increasing demand of information seekers have necessitated the present day libraries to acquire e-resources.

Indian Institute of Science- The library Online Catalogue database has more than 1.50 lakh records of books (Bibliographic Information) and information about 1,72,000 back volumes of periodicals. Using LIBSYS OPAC, users can search the Library Online Catalogue by Author, Title, Subject, and keywords. Also, the users can know the latest additions of periodicals and books and the status of a document (whether on shelf or on issue). Reservation of a book can be done Online.

The following database of books from different publishers can be accessed online, Springer, Elsevier, Computing reviews, CRCnetBASE, LNCS (Springer), SIAM, Morgan & Claypool, Annual Reviews, AIAA Papers, Cambridge, INTECH OA Publisher and NCBI Bookshelf. and e-journals of major publishers AACR Journals, ACS Journals and Archives, AIP Journals, AIAA Papers, ASM Journals, Cell Press Journals, Duke Math Journal DMJ100, Elsevier Trend Journals, Ergodic Theory and Dync Sys., GeoScienceWorld, IoPP Journals, J STOR, Nature Group of Journals, OUP Life Science, OUP Math & Physical Science, Royal Society Publishing.

Indian Institute of Astrophysics- Institute provides one of the best e-books and e-journals collection for relevant subject most commonly, AIP Conference Proceedings, ASP (Astronomical Society of Pacific), Astrobiology: The Search For Life In the Universe, The Astronomical Almanac 2015, Biographical Memoirs of the National Academy of Sciences, Cambridge University Press E-books, Challenges In Stellar Pulsation, EAS Publications Series, Encyclopedia of Astronomy and Astrophysics, JSTOR General Science Collection, Lecture Notes in Physics, PNAS(Proceedings of the National Academy of Sciences), Proceedings of the International Astronomical Union (2004 to Current), Proceedings of Science(PoS), SPIE Digital Library, SPIE eBook collection Springer e-books Physics & Astronomy collection (2011 to 2013 copyrighted).

Indian Statistical Institute- This acts as a gateway of online open access Reference sources in Science and Technology. A click on any of the above subject tabs will lead to a web page displaying the category of reference resources that are included in this zone such as Dictionaries, Encyclopedias etc. A second click will take the user to the door of reference resource from which actual information can be found.

A federated search facility is also provided. Any additional source if known to the user may please be submitted through the 'Share a Link' option. You can also use this option to inform the ORZ team of dead links. Through the link users can access to e-books and e-journals of following subjects Physics, Chemistry, Biology, Mathematics, Statistics, Engineering and Technology.

Jawaharlal Nehru centre for Advanced Scientific Research- More than twenty five publishers e-journals are available in FULLTEXT on IP based authentication, some of the famous were American Institute for Physics, Science Direct, Nature protocols, Royal Society of chemistry Journals, Derwent Patent Index etc.

National Institute of Mental Health and Neurosciences- Some of the e-book subscribed by the NIMHANS are Springer Behavioral Sciences E-Books (Subscribed 390 e-Books), Thieme eNeurosurgery, American Psychiatric Publishing Textbook of Psychiatry, 5th ed. (Full text), E-BOOKS, Directory of Open Access Books, American Libraries (more than 1,651,000 Books), Google Books , Canadian Libraries (more than 318,000 Books), Project Gutenberg (more than 33000 Books), Universal Digital Lib. (Million Books Project), Community Books (more than 94,000 Books), Open Access Publishing in European Networks - OAPEN (About 1000 titles), Biodiversity Heritage Library (more than 46,000 Items), UC Press E-Books, 1982-2004 (more than 500 Public Access), UN University Full-Text Publications, Children's Library (more than 2800).

Some of the e-journals are E-JOURNALS Bentham Science Publishers (250 titles), HighWire Press, Hindawi Publishing Corporation (more than 200 titles), Public Library of Science (PLoS), PubMed Central, Trials.

Raman Research Institute- To carryout research activities, in this regard RRI allows its users to access following e-books, Annual Reviews, Astronomical Almanac Reviews Online, Cambridge University Press, RSC, Spring Lecture Notes in Physics and e-books from other publishers.

8. Access to database- An online database is a database accessible from a network, including from the Internet. It differs from a local database, held in an individual computer or its attached storage, such as a CD. For the system or software designed to currently, there are several database products designed specifically as hosted databases delivered as software as a service products. These differ from typical traditional databases such as Oracle, Microsoft SQL Server, Sybase, etc. Some of the differences are:

- These online databases are delivered primarily via a web browser.
- They are often purchased by a monthly subscription.
- They embed common collaboration features such as sharing, email notifications, etc.
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Indian Institute of Science- Here there are several kinds of databases can be accessed, some of the important are Scientometric Database- JCR on web and Essential Science Indicators and Bibliographic Database are MathSciNet, Web of Sience and SciFinder Scholar.

Indian Institute of Astrophysics- Provides access to following databases, Astronomical Data Archives, Astrophysics Archive at LANL, Urania (Universal Research Archive of Networked Information in Astronomy), ADS (Astrophysics Data System), ADC (Astronomical Data Center), CDS (Centre de Donees astronomique de Strasbourg), NED (NASA/IPAC Extragalactic Database), SIMBAD (Set of Identifications, Measurements, and Bibliography for Astronomical Data), Solar and Upper Atmospheric Data Services, SPIRES.

Indian Statistical Institute- Users of ISI can access following Databases online JSTOR, MathSciNet, Science Direct, SpringerLink, IEEE Explore and EBSCO Host.

Jawaharlal Nehru centre for Advanced Scientific Research- The databases made available to its users are ISI Web of Science, SciFinder, ChemSpider and Reactome.

National Institute of Mental Health and Neurosciences- Literature search services. Under this scheme the library users search for available literature on a given topic and provide reference as well as abstracts of research articles from the following databases. External users can access following database on a payment of nominal fee. EMBASE- Neurosciences, EMBASE-Psychiatry, Neurosciences Citation Index, PsychLit, MEDLINE (through on-line with NICNET from NIC, Delhi), ExtraMED.

Raman Research Institute- RRI made arrangement to access following databases for the benefit of their users, SciFinder, Web of Science and Springer Protocols.

E-print Archives- In general, archives consist of records that have been selected for permanent or long-term preservation on grounds of their enduring cultural, historical, or evidentiary value. Archival records are normally unpublished and almost always unique, unlike books or magazines for which many identical copies exist. This means that in fast growing pace of literature libraries are not in a position to provide place for these useful collections, by using available technologies libraries can keep this unique collection in an electronic form, e- archives are quite distinct from libraries with regard to their functions and organization, although archival collections can often be found within library buildings and giving access it remotely considered as wonderful service to reading community

Indian Institute of Science Library is a regular subscriber of Books and periodicals, Institute have an enormous collection of old books and journals and saved a lot of them from the scratch. Some of the book and journal collections include those published in year 1800 or before. To preserve these rare and precious documents, Institution made an arrangement bring it in the form of digital content for the benefit of the future community.

Indian Institute of Astrophysics- Indian Institute of Astrophysics traces its origin back to an observatory in Madras set up in 1786. The Institute has naturally inherited the library and records of the observatories at Madras and later at Kodaikanal. This collection of archival records has grown over the years to include more than 5000 items in various formats such as manuscripts, photographs, maps, films, awards, hand-drawn sketches, pictures and instruments. IIA holds the copyright for most of these items, hence has set up a physical display of these in the Archives.

Indian Statistical Institute- Personal Collection of Dr. S. R. Rangathan books, his contributions to field and materials he received in the form of gifts had been preserved in the form of e-archives in ISI Library.

JNCASR DSpace Repository is a digital collection of archives that collects, preserves and distribute digital materials, DSpace repository acts as tool for preserving organization's legacy, it facilitate digital preservation of rare collections and scholarly communication.

NIMHANS- Institution has a separate department to maintain rare and important literature of Institutional documents, annual reports, critical behavioral papers and rare articles related to brain studies to preserve these important literature, qualified persons appointed only for this purpose.

Digital Repository of Raman Research Institute Contains archives of more than 800 precious resources such as rare books, Journals, the collected papers of C. V. Raman, Audio and video contents of some of the famous personalities, Prof. Satish Dhawan's Collections, RRI in house meetings and lectures and historical records of the Institute (Annual Reports and Newspaper Clippings). Digital Library of India, Digitized Mathematics Books (Fulltext search), Einstein Archives, Gallica (Bibliothèque Nationale de France), Internet Archive, LiNuM (Digitized Mathematical Books).

Online Referral Service- The active process of linking a person with a need or problem with a service which will meet the need or solve the problem. It is nothing but guiding users to documents which are not available in the library, it may be available in any other information centers or directing the users to the document which are not available.

Indian Institute of Science- Books/Journals (not available with IISc) may be obtained from other libraries on request. Separate cards of major libraries in Bangalore are provided on request basis to faculty and students. The list of libraries coming under this service. Tata Institute of Fundamental Research (TIFR, IISc Campus), National Aerospace Laboratories (NAL, Bangalore), Indian Space Research Organisation (ISRO, Bangalore), Raman Research Institute (RRI, Bangalore), Central Power Research Institute (CPRI, Bangalore), University of Agricultural Sciences (UAS, Bangalore), Bangalore University (BU, Bangalore), Indian Institute of Management (IIM, Bangalore), National Institute of Mental health and NeuroSciences (NIMHANS, Bangalore), Indian statistical Institute (ISI, Bangalore), Hindustan Aeronautics Limited (HAL, Bangalore).

The library offers DDS to the students and researchers from other research centers and universities on special request. Researchers can send complete reference of the document they need through e-mail (libn@library.iisc.ernet.in) to the respective Librarian. This service offered on cost basis without violating copyright law.

Indian Institute of Astrophysics- Institute users can access to the Library of Congress Online Catalog is the main access point to the Library's collections. Some links also provides specialized catalogs and tools that provide access to additional LC resource.

Jawaharlal Nehru centre for Advanced Scientific Research is member of J-Gate is an electronic gateway to global e-journal literature. Launched in 2001 by Informatics India Limited, J-Gate provides seamless access to millions of journal articles available online offered by 13,326 Publishers. It presently has a massive database of journal literature, indexed from 45,636 e-journals with links to full text at publisher sites. J-Gate also plans to support online subscription to journals, electronic document delivery, archiving and other related services.

National Institute of Mental Health and Neurosciences Users of the institution have facility of access following library and Information centers digital collections under referral service. Analytical Sciences Digital Library (NISCAIR), Ashoka Trust for Research in Ecology and the Environment, Cochin University of Science & Technology (CUSAT), Indian Agricultural Research Institute (IARI), Indian Institute of Technology, Bombay (IITB), Indian Institute of Astrophysics, Indian Institute of Horticultural Research (ICAR), Indian Institute of Management Kozhikode (IIMK), Indian Institute of Science, Bangalore (IISc), IIT Kanpur (Indian Institute of Technology Kanpur), Indian Institute of Technology, Delhi (IITD), Indian Statistical Institute, Bangalore Centre (ISI), Indira Gandhi Institute of Development Research, Indira Gandhi National Open University (IGNOU), Indira Gandhi Institute of Development Research (IGIDR), Information and Library Network Center (INFLIBNET), Madurai Kamaraj University (MKU), Mahatma Gandhi University, Management Development Institute (MDI), National Centre for Catalysis Research (NCCR), NISCAIR Online Periodicals Repository Pandit Deendayal Petroleum University (PDPU).

Raman Research Institute- Raman Research Institute faculty, staff and students have facility of referring following publishers and Research Institutes e-books and e-journals, Annual Reviews, Astronomical Almanac Online, Cambridge University Press E - Books, RSC E-Books, Springer Lecture Notes in Physics E-books from other Publishers.

Online Search Engines Service- Search engines are programs that search documents for specified keywords and return a list of the documents where the keywords were found. A search engine is really a general class of programs, however, the term is often used to specifically describe systems like Google, Bing and Yahoo, search that enable users to search for documents on the World Wide Web.

Indian Institute of Science users have the freedom the accessing search engines like Search engines, NDLTD, Oaister, Ebookee, complete planet, O'Reilly's CD bookshelf, WebBrain {15}.

Access to Departmental Libraries- In research Institutions area of study is vast, research will be carried out in depth, this necessities creation of different branches or subjects, some institutions have made arrangement to open libraries for the respective departments. In this regard Indian Institute science has open up departmental libraries for the benefit of the user community. Some of the main departmental libraries in IISc are Bioinformatics Library, Material Engineering Library, Electrical Engineering Library, CES Library, CSA Library, SERC Library, NBHM Library, Digital Library and Mathematical Library.

e- access to Thesis and Dissertations- A thesis or dissertation is a document submitted in support of candidature for an academic degree or professional qualification presenting the author's research and findings. In some contexts, the word "thesis" or a cognate is used for part of a bachelor's or master's course, while "dissertation" is normally applied to a doctorate {16}.

A dissertation or thesis is a scholarly publication reflecting the results of your research and academic pursuits, your document makes a statement about you and the quality of your research. In case of E- thesis or Dissertation which are brought out in digital form, can be accessed from remote areas. In this case all institutions under study facilitate the users to access thesis and dissertation, research carried out by the researchers of their institutions {17}.

Conclusion

Digital Reference Services are the latest addition to libraries, especially in academic and research Institutions taken for study, fortunately, techniques and technologies used to provide DRS by above institutions is somewhat better, to meet international standards more work needs to be done in terms of training to staff about latest technologies, getting best technology available in market, fast and specific way of dealing reference questions of the users are the areas which needs immediate action (18).

DRS offered in the institutions under study is varies, Indian Institute of Science which is premier research institute in India, offers Departmental access, search engine, Pathfinder, Bibliographic service and access to e-resources etc, somewhat covers most of the service come under DRS. Indian Institute of Astrophysics covers most of the services of DRS it needs improvement in providing access to Search engines, departmental access and bibliographical Collections. JNCASR provide best e-mail and web-mail service to the users, but it needs further advancement in other areas of DRS. Raman Research Institute had good collection of e-books and Journals, but lacks access to search engines, collaborating with other institutions and involvement in Consortia. NIMHANS has a good collection of thesis and Dissertations; it needs improvement answering user reference questions. Indian Statistical Institute maintained good collection of e-archives of some important personalities in the field; involvement in consortia's can make improvement in the digital collections.

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