CHAPTER-3

REVIEW OF LITERATURE
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Review of literature on the subject and related aspects of the present research is an essential component in forming the research. It enables to understand the magnitude of the subject and research and to know the lapses if any. The present research on use of electronic information resources is a user based study. There are innumerable user studies on the use of conventional information resources. It is scanty related to electronic information resources.

The academic libraries all over the world are facing new challenges. Economic recession, soaring prices and apathy are certain reasons for seriously diminishing the physical bases of many colleges and University libraries. The information technology brought certain electronic devices as an addition for information processing storage and retrieval in the library environment. Knowledge on the use of such technology resources is an essential for the library management. Some of the researchers made an attempt in this direction to certain extent. This is an attempt to review search studies to strengthen the present research work.

LIBRARY DEVELOPMENT

Konnur and Bandi observed that "many academic libraries have over the years consistently added new services and the opportunities to meet the needs of the users to the point of adding a whole electronic services dimensions, wide discounting the least significant service areas. Further emphasized on reshaping the vision of college librarianship and adopting new concepts and principles to guide library management especially in the light of what is happen in higher education. At the same time the international network of information and exchange is increasing connection within and across disciplines and conducting new forum. The quest for scholarly
information has expanded significantly and is now coupled with derivatives for shift and further services. There is also growing number of information providers outside libraries and academic libraries are deeply involved in global area. The time has come to re-evaluate service models that have functioned for years and identified creativity-based new solutions to old problems and achieve them. Thus, the roles of college libraries in this 21st century are evolving as learning organizations. Enhanced cooperation between the college libraries and the campus computing contest few years ago have provided significant opportunities for improvement in services it was also supported.

NETWORKS

Jagtar Singh² stated that networking of these libraries will further facilitate the development of a globalization and libraries. Mohammed Ramjan noted that rapid implementation of information technology in our society has changed and continued to change in all areas of our life. Digitalization of information technology has become an indication of a country wealth level.

The digital library services have been a desktop resources to the remote users Arnold Hirshon³. A report on several library consortia have been set up in India over the last few years, to obtain site licenses and enable desktop internet access to scholarly e-resources like e-journals and databases. Prime examples include the Department of Atomic Energy (DAE) Consortium, INDEST consortium under the MHRD (Ministry of Human Resources) initiative covering leading academic institutions like IISc (Indian Institute of Science), IITs (Indian Institutes of Technology), IIMS (Indian Institutes of Management) and NITs (National Institute of Technology); and CSIR (Council for Scientific and Industrial Research) consortia covering about 40 national laboratories. INFLIBNET with UGC (University Grants
Commission) support, is another major initiative covering Universities. These consortia efforts have enabled reducing the information gap between the resource rich and resource deficient among the participating libraries by providing equal access to information.

Library consortia standards and protocols that concern the librarians most in a library consortia environment as per Tamal Kumar Guha and Jagadish Arora which is beyond licensing electronic resources these are like Metadata Standards or Resource Description Standards - AACR2 and Dublin Core; Resource Exchange Standards - MARC, CCF; Protocol standards for Resource Discovery Z39.50; and Standards for Interlibrary loan ISO10160/10161

There are several emerging standards, which have been developed to facilitate the interchange of data in a distributed environment. Such standards make it possible to perform seamless searches across several distributed resources, which have been implemented on different platforms. This capability could be used:

The networking made to access to the information globally by remote users Murthy reported that revolutionary change occurred in the electronic world with the invention of high storage/computing devices and high-speed networks. This enabled the information to be created, manipulated, disseminated, located and stored with increasing ease. More and more information is produced as "born digital". It is very easy to get any information, wherever it resides. There are no standard systems and filters for publishing the information through web. It is very difficult to judge the author's capability of writing the particular information and most of the information is not updated frequently and deleted without prior notice. It is
very important to find out a mechanism for retrieving the relevant information because excellent information also resides.

Networking the libraries is the order of the day. Sanjay Kumar Singh explained that there is a world wide demand for broadband communications, which is ever increasing at a fast rate. A data communication network basically consists of two main components viz. i) Wide Area Network (WAN) and ii) Local Area Network (LAN). These two networks are distinguishable from each other by the physical area they encompass. A WAN is used for inter-city, inter-country or inter-continental communication. On the other hand, a LAN is used for connecting computers in a building, a university campus i.e. over a comparatively smaller area. Inter-continental traffic is carried either through satellite links or through under sea submarine cables.

Wide area network popularized for remote linking with library resources. Still there are certain problems to address with in Indian environment Tom Defanti. A wide area network can be established through i) satellite communication, ii) terrestrial communication or iii) a mix of these two. Satellite communication is best suited for remote and inaccessible locations and has many plus points. But its biggest draw back is its inability to sustain very high data rates. Due to technological advancements, VSATs having high data rate capabilities are coming in market, but the main limiting factor is the non availability of sufficient satellite transponder capacity. Another problem with satellite networks is "Latency". A one hop network has a latency of about 240ms. More than 100ms of latency makes it difficult for e-scientists to do interactive visualization, simulation steering and collaboration.

A backbone network is the national transport network connecting various towns and cities in the country Ashok Jhunjhunwada. India already has extensive fiber based backbone network, mostly belonging to Bharat Sanchar Nigam Limited (BSNL). Many private companies have also started
establishing their own fibre networks. Presently these networks are using Synchronous Digital Hierarchy (SDH) and or Wavelength Division Multiplexing (WDM) technologies. WDM products are still quite expensive through their costs are likely to come down by next few years. WDM technology multiplies the capacity of fibre by 10 to 40 times or even more. But since so much capacity is not required in the country today, most operators have postponed using it. SDH technology provides communication typically at 204 Gbps on a fibre, though 10 Gbps communication has now started to be used. In future, when the demand grows, Dense Wavelength Division Multiplexing (DWDM) technology can be adopted which will enable a single fibre to carry Tbps of information.

Wireless communication gaining momentum all over the world Russ Housley and William Arbaugh. Wireless local area networking has taken the world by storm. Wireless local area networks (WLANs) have quickly become extremely popular. People are avoiding expenses and delays associated with wired networks. The IEEE 802.11 series of standards define WLANs. They are providing increasingly higher access speeds with each generation. Initially wireless stations had a top speed of about 1 Mbps; today, wireless stations have a top speed of 54 Mbps. Security is a major problem with WLANs. Anyone with a radio receiver can eavesdrop on a WLAN and similarly anyone with a transmitter can send messages to a WLAN.

In the wireless communication data security is a problem Terry Schmitt and Anthony Townsend. The IEEE 802.11 standard defines a data confidentiality mechanism known as Wireless Equivalent Privacy (WEP). Encryption mechanism is used in WEP but still it is not found foolproof yet. It was the establishment of the 802.11b standard by the IEEE that set the stage for mass market development of WLANs. A consortium of manufacturers renamed 802.11b as “Wi-Fi (for wireless fidelity).
Bluetooth is adding more strength to wireless communication. Wilfred Drew\textsuperscript{11}. Another wireless networking standard that has received a great deal of publicity is Bluetooth. Bluetooth, like 802.11b networks, operates at a frequency of 204 GHz. The problem with using Bluetooth is its limited physical range and bandwidth, about 30 feet with a bandwidth of 2 Mbps. (In contrast, 802.11b has a range wireless devices together such as allowing one's PAD to synchronise with once laptop or cell phone. Bluetooth is suitable for many applications but not for data networking purposes such as surfing the World Wide Web or accessing large files.

Wavelength decides the speed of the communication system as per Christopher C. Davis, Lgnor\textsuperscript{12}. The world wide demand for broadband communications is met in many places by installed single mode fibre networks. However, there is still a significant "last mile" problem, which limits the availability of broadband internet access. Fibre optic networks exist world wide. With implementation of dense wavelength division multiplexing (DWDM), the information carrying capacity of fibre networks has increased immensely. At least 10 Tbps capacities on a single fibre have been demonstrated as of early 2002. This would allow simultaneous allocation of 10 Mbps each to one million subscribers on a single fibre backbone. The problem is to provide these capacities to actual subscribers, who do not have direct fibre access to the network. Presently most subscribers are provided wired access to the network since fibre comes to Basic telephone provider's /ISP's station. Twisted pair wiring may give subscribers network access at rates from 128 kbps to 203 Mbps, and access through Digital Subscriber Lines (DSL) is limited to about 144 kbps. Cable modems can provide access at about 30 Mbps, but since multiple subscribers share a cable, simultaneous usage by many subscribers drastically reduces the data rates available to each. This bridging problem could be solved by laying optical fibre to each subscriber, but it will involve huge investment which subscribers will not be willing to pay.
The alternative to hardwire connectivity in words of Stuart Bames and Sid is that the wireless connectivity can be achieved either by RF links or by optical wireless links. RF spectrum is becoming increasingly crowded and demand for bandwidth is ever growing. Inspite of allocation of bandwidth in several gigahertz regions, subscribers get only modest bandwidth in densely populated areas. Limited frequencies are available for line of sight RF links. In directional microwave point-to-point links, there is an interference due to vicinity of RF antennae and their side lobes. In RF broadcast mode, all subscribers within a cell have to share the available bandwidth, cells have to be made smaller, and their base station powers are limited to allow spectrum reuse in adjacent cells. It limits the size of the network and the number of users. Optical wireless systems can be made highly directional; there are no undesirable broadcast side lobes, which exist in the case with RF links. Equivalent sized apertures of a microwave at 2 GHz has a diffraction angle about 100,000 times larger than a laser operating at 1.55um. Diffraction angle quantifies the magnitude of diffraction for an aperture of a particular size.

Remote login and access to data in the words of Gapan define the concept of remote access to the contains and services of library and information resources. Combining an online collection of current and mainly used materials in both print and electronic form, with an electronic network with provide access to and delivery from external world wide library and commercial information and knowledge sources. In this process a verity of search engines are used like Alta Visa, Excite, Yahoo, Hat Bat, Info Set, LOCIS, Web crawlers, Galaxy etc. in addition to this the library portals allow links amongst electronic resource stored on services dispersed geographically and distance locations. The portal sides are Gateways redirect a user to the holders of original Digital material.
Digital libraries are organized distributed information processing and retrieval systems. Rathinasabapathy\textsuperscript{15} observed that the concept of digital library is an outcome of the popular use of information technology. It is a library without walls which provides digital information environment in which all the information resources are available and performed through the use of digital technology. It is not merely equivalent to a digitized collection with information management tools but an environment to bring together collection, services and the people in support of the full life cycle of creation, dissemination, use and preservation of data and information. The physical features of digital libraries do not reside in a specific building since the scope is widespread and unlimited on user's desktop. The digital library system consists of resources of both text-based and non-text information such as photographs, drawings, illustrations, and works of art, numeric data, digitized sound, and moving visual images. A digital library if networked with other library networks such as local area network, metropolitan area network or wide area network and World Wide Web can be accessed world over by any one or anywhere.

Electronic publishing has been revolutionizing the format of the recorded knowledge. Electronic information services are attracting reader's attention in today's network environment. Manoj Kumar Sinha\textsuperscript{16} observed this changing scenario in library environment has arisen for the need and use of e-journals along with print version. Electronic journals bring new challenges before the library and information professionals to give full text access to scholarly publications both in print and electronic version to its end users.

Publication industry acquired revolutionary change in communication pattern Rajendran\textsuperscript{17} e-publishing will have a great role in making the libraries and information centers towards digital environment. E-journals and e-books would become very practical media of dissemination of information
in future. It may be a funny thing to see a student having a dozen of books in his packet along with e-book reader. A kind of 'mobile reading' could be realized in the coming generation.

INFRASTRUCTURE

Rajendran\textsuperscript{18} in his study opined that "India has a large educational system comprising thousands of colleges and hundreds of Universities along-with several Institutes of higher learning and Centers of Excellence. Higher education system is passing through lot of problems due to economic recession and cost-recovery concepts. The college and University libraries in India are faced with the challenges, price escalation and budget restrictions. The increasing growth in the enrollment of students and researchers, lack of proper and adequate infrastructure further aggravated the overall problems and challenges for the college and University libraries. This situation has paved the way for serious thinking on the capabilities to compensate for reduced budgets. E-subscription is one of the emerging toolkits of libraries to survive in the present circumstances.

DATABASES

The digital library software became more user friendly data handling rest Deepa Awasthi\textsuperscript{19} reported that the Dublin Core provides a common set of labels for information to be exchanged between data and service provider. This data is created with the help of DBMS/RDBMS Software. Database is to be created on the basis of merging standard metadata tags for journal, books and other documents with a set of 15 elements that can be associated with a resource title, creator, subject, description, publisher, contributor, date, type, format, identifies, source, language, relation, coverage and rights. Each of the 15 elements can be uploaded with the help of FTP (File Transfer Protocol). HTTP opened the world to information sharing at a new level by allowing any
WWW browser to communicate with any information server and to request and obtain information.

PROTOCOLS

Certain protocols like Z39.50 become more popular in the words of Harbin. Most of us have heard of Z39.50, the term appears frequently in library literature throughout the last ten years, especially concerning library information systems and data sharing. Some librarians may have detailed knowledge of Z39.50: what it is, how it is used and why it is important. However, for many of it remains a slightly mysterious buzzword (or buzz number) that vaguely comprehend Z39.50. Infrastructure had an important role in success of computerization of library work.

Johnson observed that "the major reasons for failure of library automation projects in many developed countries are that libraries along with funding agencies plan the automation in a very simple manner. Without sufficient knowledge of hardware software and other requirements several studies conducted different plants of the would revealed the attitudes of the library professionals to move towards technology. It is also becoming essential to includes Electronic Resource sharing on one of the course compliments of formal library education.

INFORMATION TECHNOLOGY

The development of economy and wealth influenced by the information technology using at present. In the words of Mahatir Bin Mohammed, former Prime Minister Malaysia has very rightly said that "in the information we are living in there today, no wealth developed country that in information-poor and no information-rich country that is poor and undeveloped". We are witnessing tremendous growth in the human
knowledge due to the advent and applications of information technology in all years of human life. Technology has also provided the means of managing that knowledge through the strengthen cooperation recording collecting, storing, processing and dissemination of information.

Chayadevi\textsuperscript{23} found that the growing number of on-line databases and digital library initiatives in research libraries bear a testimony to fact that new information technologies are transforming the way of thinking about collections. Digital technology, being more about access then ownership, brings immediate benefit to library users.

The changing library information resources necessitated revitalize the thinking and practice in management Kumbar\textsuperscript{24}, Referred that no one would deny that this is both an exiting and challenging time to be in the field of librarianship. But this is also a time that necessitates innovative ways of thinking about services, collections, information access, and also our roles as academic libraries. With the ever-increasing potential of technology, it is continually challenged in the efforts to create a vision for the future that does not quickly become the past. Whether one is optimist about the future or not, it is important that regardless where one is all work together in supporting with other through these exciting and challenging times as libraries evolve into the libraries of the 21\textsuperscript{st} century.

The electronic information devices have become an alternative to the conventional hard copy documents fight against the raising price of information. Deepa Awasthi\textsuperscript{25} in her papers discussed measures for solving economic problem in some extent. She further advocated that the academic information provided must used information technology to facilitate speedy and efficient information delivery and make electronic information move generally, readily and flexibility accessible than its printing counter part. This
phenomenon has started proving to reach up to the fine expectations of multi users.

The rapid change in physical structure of the learning resources in the networking world is a boom to library. Maya verma\textsuperscript{26} opined that digitization is an electronic process of converging information from a print format to a digital format. Digital libraries are electronic libraries in which number of geographically distributed users can access the contents of large and diverse repositories of electronic objects. If the future libraries are to survive, they have to be switched over to electronic mode because the information is fast changing and mostly resources are born digitally. The mission is to create a universal library which will foster creativity and free access to all human knowledge. Librarian is no more simply a custodian of reading material, but is a collector and evaluator of information.

Information technology brought a revolution in processing and communication of information. According to Vibha Gupta\textsuperscript{27} the impact of information technology is seen as industrial revolution. The impact of IT has been so dominant that it has affected everyone be it economy, political, social and individuals at large. Information is a fundamental resource for social development and the progress of society. During the passage of years the mode of accessing information has changed. Technology in its broad sense is the main factor determining the development of information.

Mallikarjun and Suresh\textsuperscript{28} says that due to this information explosion or information pollution, the people are confusing about the information need, information access and information sources. With the impact of new technologies such as information technologies most people are interested in accessing the information through these sources because of faster accessibility.
The development of the society is based on the information that is using. Kazi Mostak and Nasiruddin Munshi viewed that in the present age of information technology, both information and knowledge have become essential ingredients due to multidimensional use and application in the society. They have also been playing and important role change and improve the current society for future vision. Organizing for its gainful use in social development interventions against the environment of information explosion all over in the world as become a highly continues issue that poses a great challenge for today's librarians and information professionals. The developed countries of the world have already realized the importance of knowledge and information and accordingly collected and organized them properly. No doubt, knowledge and information cannot be well managed until some organizations or professionals take the clear responsibility of it. Of course, library professionals are the right persons to shoulder this responsibility as a whole.

Networking made presence of information all over the world. Om Vikas opined that information and knowledge environment has been continued to be changed by the development of the internet and ubiquitous communication technologies. Information and knowledge and replacing capital and energy as primary wealth - creating assets, just as the later two replaced land and labor many years ago. In addition, technological developments in the 20th century have transformed the majority of wealth - creating work from physically - based to “knowledge - based” technology and knowledge and know the key factors in development of economy of the country. With increased mobility of information and global workforce, knowledge and expertise can be transported instantaneously around the world.

Importance of information is increasing day by day in the society. Ramshirish. In the present society, various terminological and lexical data
basis have been developed to help the professionals. However, the problem of data interchange/exchange across different platforms still persists.

The potentialities of information technology, together with economic concerns, have been forcing various organizations to go for digitization. Chopra\textsuperscript{32} predicts that this has also happened to libraries, whose primary value lies not only in their collections but also in their contribution to education through providing information services, facilities for e-learning and management of collected information, which they make easily usable and accessible to users. The design and development of web-based educational systems for people is happening in India also.

Web based resources have become increasingly important to the academic community where the thrust is on on-going research, time bound projects and consultancy. With information being added at a tremendous rate on the net it becomes difficult to find the required information easily. According to Kalyani Accanoor\textsuperscript{33} the expectations from the users are its services. From the library and the librarian’s point of view the services should reflect the user’s quest for information. Services are the strength of any library as they are no longer mere store houses. Reference service concerns with the internal and external resources through the internet and other networks. These services are provided not only personally but also through electronic means. Most users go for a Google search still thinking how could the search strategy be better. Most time the answers lie in their libraries without them knowing. A module e-ref desk on the lines of asks a librarian designed to answer such queries.

Information is the lifeblood of a knowledge-based economy. Raj Kumar Bhardwaj\textsuperscript{34} says that new information technologies and electronic communication facilities provide opportunities for libraries to play an even more prominent role in the support to teaching, learning and research than
before. The use of information technology in libraries will help in processing and providing the legal information to the users. It is becoming clear that the future in providing legal information will be in electronic format. Therefore, it is critically important to establish in the outset clear standards for publication over the internet.

Information technology has revolutionized the information handling activities in the academic libraries during the past few years. Cholin\textsuperscript{[5]} opined that the information society demands all the relevant technologies that are involved in information processing, consolidation, repackaging and retrieval be merged so as to evolve an integrated system capable of providing diversified services. In this direction the automation of individual University libraries is a first step, rather a pre-requisite for the development of such an integrated university library and information system. The promising trend in the development of information services with an effective networking of these libraries will facilitate the optimum utilization of information resources.

Hileima Devi and Purnima Devi\textsuperscript{[6]} viewed that information literacy is currently understood as embracing the ability to define a problem, find information to solve the problem, evaluate information and use it effectively. Information literacy as a way to move efficient access, evaluation and use of information should be taken into account and used for improving information end-users. In short information literacy means knowing information about information. Information literacy refers to a constellation of skills revolving around information research and use.

Information literacy is a pre-requirement to use information technology Vijaykumar\textsuperscript{[7]} opined that the idea of information literacy, emerging with the advent of information technologies. It has grown, taken shape and strengthened to become recognized as the critical literacy for the twenty-first century. Sometimes interpreted as one of a number of literacies, information
literacy is also described as the overarching literacy essential for twenty-first century living. Today, e-information literacy is inextricably associated with information practices and critical thinking in the information and communication technology environment.

Information literacy is the key component for the information age. Jaya Prakash and Krishnama Charya\textsuperscript{38} says every person has a fundamental right to information literacy and information access. It is a necessity for all students, staff and faculty to be accomplished information users. Information literacy is key characteristics of long learning and an essential element of higher education. Promoting information literacy skills at all levels of education is the collective responsibility of teachers librarians and administrators.

Despite some skepticism about the adoption of electronic books (e-books) in libraries, there has been substantial growth in e-book acquisitions and usage. Lynm Silipigni Connaway\textsuperscript{39} observed the e-books task force for the university of California digital library identified eight elements that are important to the evaluation of academic e-books usages. The elements are content, software and hardware standards and protocols, digital rights management, access, archiving, privacy the market and pricing and enhancements and ideal e-book features. There are currently several e-book models available to libraries that can be assessed and described in relation to the above mentioned elements or criteria. Using these elements, the net library e-book model will be described.

E-books are the raising hopes in the cost escalation era Subba Rao\textsuperscript{40}. The continued presence of electronic books or e-books have significantly affected the publishing industry in recent years. The growing popularly of the web and public acceptance of new e-book technologies is facilitating their spread. However, initial optimism about the growth of the medium has been
tempered by a measured uptake of the medium and the withdrawal of some e-book products from the market.

The object of Indian Institute of Technology is to prepare to suitable man power to the country. Singh\textsuperscript{41} opined that Indian institute of technology (IIT) kharagpur is the oldest of all the six IITs. It was established in 1950 and commenced its academic activities with the first batch of students admitted in July 1951. Later, it was incorporated under the Institute of Technology Act (No.5 of 1956) passed by the Parliament. This act was revised and the institute is now incorporated under the Institute of Technology Act, 1961. Initial technical assistance for its establishment was provided by UNESCO under the UN Expanded Programme of Technical Assistance and by United States under the point four programme. Specialized equipments were received under Colombo plan. IIT, Kharagpur is situated at the old Hijli Detention Camp (Jail) covering an area of 1,800 acres. Presently, it has 18 departments and 6 centres.

INTERNET

Internet changed the global scenario. Singh and Mohammad Nazim\textsuperscript{42} observed that information technology has transformed the whole world into a global village with a global economy, which is increasingly dependant on the creative management and distribution of information. Over the past decades the world has been experiencing significant changes in which the need to acquire, utilize and share knowledge has become increasingly essential. Now, in the 21\textsuperscript{st} century, the age of knowledge and information is in its higher gear.

Vimal Kumar\textsuperscript{43} felt that email is a friendly and cost effective technology for communication. Libraries effectively making use of e-mail for marketing the library products and services. Like any other promotional tools,
successes of e-mail newsletters are depending on content presentation, layout, quality of content and delivery time etc.

On-line is the present trend and aspiration of users to every information are service to be available on-line. Praveen Babbar and Seema Chandhok say that 21st century web savvy people believe that one day everything ever created by humans will be available online. Call it the myth or a truth it is the future of digital libraries. Because there is an unlimited real estate in cyberspace and because media can be digitized, we can fill cyberspace with all human knowledge and give every one access to it.

Mahendra N Jadhav observed that the World Wide Web is a huge repository of information and continues to grow at a rapid pace, constantly being augmented and maintained by millions of people. The library professional has progressed immensely in the last decade, and acquired the common skills to use the internet and other technology to collect organize and disseminate the knowledge, but still creation and maintenance of an interactive library website required technical expertise, money and time.

Web technology on the communication and information brought a sea change. Vijayakumar says that web technology has become pervasive in all walks of human life, be it research, business, entertainment or others. In other words, web technology is talk of the day and need of the hour in order to remain competitive. It is changing the way people think, work or run a business. On one hand web technology is changing the way in which the activities of work place are being carried out and on the other hand there are challenges like poor infrastructure, lack of knowledge and information on effective use of web technology. It becomes evident in such a situation to go for reassessment and reevaluation of the entire activities of work place where web technology is used to provide the library services.
Number of libraries and subject information providers as well as learned societies provides a variety of subject portals with high-quality information. Tamara Pianos\textsuperscript{47} observed that academic researchers often know the important websites for their specific subjects but it is very hard to keep track of all the information that is available through the internet. There is a need for orientation, harmonization, and the possibility of simultaneous searches to enable researchers to find important information quickly. The search for information should also lead directly to the desired document to speed up the process of information retrieval.

In the words of Yadav\textsuperscript{48} subject gateways is allowing links amongst electronic resources stored on services dispersed geographically on distant locations. The gateways sites redirect a user to the holders of the original digital material. A subject gateway can be defined as facilities that allow easier access to web-based resources in a defined subject area. The simplest types of subject gateways are sets of web pages containing list of links to resources. Some gateways index their lists of links and provide a simple search facility. More advanced gateways offer a much enhanced service via a system consisting of a resource database and various indexes, which can be searched and/or browse throughout a web based interface.

Paulraj\textsuperscript{49} observed that the digital library presents an opportunity for the traditional library and the librarian. Libraries and librarians have significant expertise to offer the creators of digital libraries, for example, skills in organizing information. Traditional libraries will not be replaced by digital libraries, certainly not in the near future and probably never.

The internet website is a reflection of the existing internal information management. Current and updated pages reflect an organization’s commitment to good communication to the external world. Anjana Bhatnagar and Vijaya Deshmukh\textsuperscript{50} says search engines are software
programs that search a database and report information that contains or is related to specified terms. A website’s primary function is providing a search engine for gathering and reporting information available on the internet or a portion of the internet. Some of the search engines used widely for educational purpose are Google, AltaVista, Yahoo, Satyam etc. The success of the Google search engine is mainly due to its easy-to-use interface. Educational search engines or web sites are collections of educational topics that have built-in search features to help educators find sites by keyword search. Using these search engines before trying general search engines is a great time saves.

Portals are primarily for interactive information with user. Rajendra Singh Bist\textsuperscript{51} writes as a web portal is a website that provides an entry point to the internet, and offers value-added services such as directories, searching, information news, and links to related website. Such portals have a significant role in structuring the way in which users, members and potential groups of people access the internet. It can also be viewed as a virtual reference library directing web surfers to desired destination. The term was initially used to describe mega-sites such as yahoo, Excite, MSN, Netscape, AOL etc, as they were used as a starting or central point for web surfing.

Internet is changing the library services and management. Suresh Jange\textsuperscript{52} says that the library and information centres are expected to reveal the world to serve the users with information regarding their services and special collections using the World Wide Web and as such the library managers acting as content managers in the internet world have to design the library web page to facilitate and supplement access to current information resources and services.

Abraham\textsuperscript{53} opined that information technology has ushered a new era of efficient data management with reliable and accurate exchange of
information through the INTERNET in the recent years. There has been a change in processing information and upgrading information exchange facilities. Such as Fax, Modems, Network PC, Wide Area Networks internet data transfer devices and so on. Today it is essential for information professionals to learn the skills of surfing the internet and know the tools and techniques for locating and exploiting the information resources in order to provide better information services. Right to information has drawn considerable attention in recent years. Modern society produces and uses information. It is indeed a difficult. If the information is to be accessible, it must be well organized the information transfer and the role of information dissemination in the electronic information age and highlights the recent advances of information technology and its impacts upon on-line databases and networks with reference to INTERNET in transmitting and delivering information.

World Wide Web is advanced advantage to the knowledge. Karisiddappa says information technology, in particular the internet and the web, have introduced a new society called network society where people can share information freely, anywhere, at anytime and in format across the globe. Information networks have become an essential element in the present global economy. Clear, rapid and effective communication that takes advantage of the networked information contexts of ICTs will be the central to students success. Students routinely produce decent papers without knowing much about research. The World Wide Web has made a lot of information available at one's fingertips, and this means that the students can get more of it for their papers, still without knowing much about research.

Haneefa studied the application of Information and Communication Technologies in special Libraries in Kerala and found that though the libraries had hardware, software, and communication facilities to some extent, ICT-based resources and services were not reaching the users to the expected
extent. The ICT based resource used by the largest percentage of the users was the e-mail. Most of the libraries were hampered by the lack of funds, lack of infrastructure and lack of skilled professionals to embark on automation of all library management activities and application of ICT.

**Al-Ansari** conducted a study of internet use by the faculty members of Kuwait University and found that majority has been using the computer and internet for more than five years. They use the internet mostly for, and give importance to, e-mail, search engines, and WWW resources mainly for communication, research, and publication. It has helped them to save time and gather updated information. Slow speed, lack of time, and lack of access from home are the major problems. Most of them are interested in improving the internet use skills through formal training.

**PRINT VS ELECTRONIC**

Choosing between the conventional print version and online digital resources, whether it is journal resource or book resource, it is the sovereignty of the users in a library. Taste differs. Though the advantages of online digital resources is beyond question, people in the fields of science and technology prefer the print version either in a higher-frequency or simultaneously.

**Tammy Siebenberg et al** in one of their studies found that, patrons will shift from journals available in print format to the same journals available in e-format. If a journal is available electronically, its use increases at the expense of comparable journals available only in paper (print version). If comparable journals become available in e-format, titles available only in paper will have a decline in use in deference to the e-journals. In addition, when a paper journal becomes available in e-format, use will shift from paper to electronic.
Wu Shilling investigated the use of electronic journals in University Libraries and found that nearly-half of the readers covered under the study were satisfied with e-resources of our university. The e-book did not substitute the traditional printed book. Use of book was found to be dominant in both formats. Readers selecting the printed and e-book occupy the greatest majority. They used the internet also. The way readers liked obtaining information is to skim the homepage of the library. The homepage had become the important window to give publicity and serve the outside. The use of reading on screen, non-familiarizing the structure and the retrieval method. Shows that the net condition and computer facilities are the main external factors.

Christianson and Aucoin studied the use of print and e-journals in Louisians state University and found that the library identified over 2,852 print/ e-book equivalents in its catalog. Use statistics for both formats were collected monthly for a year. A t-test of the difference in the pairs' circulation found a low correlation. E-book accesses followed the academic year. University press e-books garnered a smaller share of accesses relative to title count than those of commercial publishers. Differences in format preference were found by subject and classification. Acquiring an e-book thus means something different for patrons than acquiring its print equivalent.

Yue and Syring analyzed the use of electronic journals in the University of Nevada, Reno with a focus on the usage of the Elsevier online journal package and interlibrary loan (ILL) borrowing activities. They found that electronic journals are popular and extensively used. Their popularity continues to increase with time. Journal titles that have already been selected for print collections continue to be used in their electronic format. New journal titles in their online-only format, usually added to library collections in large quantity due to new acquisition strategies, also get used. Interlibrary large numbers of electronic journals and other online full-text content are
filling potential interlibrary loan requests; no library can have on hand every resource needed by an institution’s researchers. Academic libraries can provide new and innovative document delivery services in an effort to better accommodate the needs of their clienteles in the electronic environment.

Regarding the last of the points, it should be noted, that not only in India, even in developed countries, intercepting the user’s interaction with online resources to find out his need, choice, satisfaction or dissatisfaction is not up to the mark of the librarian’s interaction with his users in the traditional library.

Rehman and Ramzy⁶¹ conducted a study to find out whether the health care professionals at Health Sciences Center (HSC) of Kuwait University were not sufficiently aware of the electronic resources available and whether this had a bearing on the under-utilization of these resources. They reported that time constraints, lack of awareness, and low skill levels were among the primary constraints they experienced. A Large number of them proposed to conduct library orientation and training as effective measures to improve the use of online resources.

Liu⁶² studied the graduate students perceptions, preferences and use of diverse disciplines of San Jose State University in USA and found that the reading preferences and use of print and electronic resources vary among different disciplines, and graduate students seem to expect a hybrid of print and electronic resources and circumstances that affect the selection of use between digital libraries and traditional libraries.

Ferguson⁶³ made a study to examine the change of University of Hong Kong Libraries from a mostly print collection to a mostly electronic collection. He found that the change to a mostly electronic collection has been successful. It has brought new problems involved with keeping up with the
technological issues, Both students and faculty are pleased with the new collection. This change can make a large number of resources available to users at a reasonable price. There are, however, new jobs to do and new skills to learn.

USER SERVICES

The academic libraries are badly hit by the cost escalation. The users were the ultimate sufferers. Chandraiah\(^4\) referred that “The library users are expected to keep pace with the library development so that they can use the Electronic devises and system for information seeking”. But the conditions are to be different. Among the potential library users academic institutions occupied the primary position because of their information needs and experiences in using the library resources efficiently. They have to keep place in using the library technology for information processing and retrieval.

Digital libraries are intensively inspiring the users to go on-line for all types of information. Jafar Iqbal and Naushad Ali\(^5\) observed a digital library is a highly organized collection of electronic resources. The digital libraries provide the required documents directly to the users on the screen enabling the user to interact with digital information. The digital libraries enable persons from different sections of the society in accessing different kind of digital information and knowledge resources for different purposes.

Proliferation of electronic sources in reference departments has made them increasingly important in providing reference services to library patrons. In the words of Jeanie M. Welch\(^6\) these sources include the online public access catalog, electronic databases (both indexes and full-text databases), and the internet. Much has been written on evaluation of reference librarians in the traditional areas of reference desk services, the use of print sources, and bibliographic instruction. Discusses the establishment of guidelines for
assessment of reference librarians' effectiveness in providing service to patrons using electronic sources and methods of assessing individual effectiveness.

USE OF E-RESOURCES

Ibrahim conducted a study to measure the use and perception of the United Arab Emirates University (UAEU) faculty members on the usage of electronic resources. Reasons cited were lack of time because of the time needed to focus on teaching and lack of awareness to electronic resources provided by the library; ineffective communication channels and language barrier.

Al-Saleh in his dissertation of “Graduate Student’s Information Needs from electronic Information Resources in Saudi Arabia” indicated that only half of graduate students used the library’s electronic resources for their academic information needs. The study showed that most of the graduate students were deterred from using electronic resources, apparently due to experienced or perceived barriers.

Herring maintained that online resources are increasingly important to today’s scholars and researchers. Results indicate a growing reliance on electronic resources by scholars, a high occurrence of non traditional types of resources, and a relatively high use of interdisciplinary references.

Majid and Tan found that the use of databases, electronic journals and other electronic information sources was surprisingly low among the computer engineering under graduate students at Nanyang Technological University (NTU), Singapore. The study recommended that more aggressive campaigning is required for creating awareness about electronic information sources.
Dugdale\textsuperscript{71} studied the library services at the Bolland library, University of the West of England, Bristol in the UK and investigated the ways, in which students might be encouraged to use electronic resources and to develop important life long learning skills through the ResiDe (Research, Information, Delivery) Electronic library.

Asemi\textsuperscript{72} made a survey of awareness and use of digital resources in the libraries of Isfahan University of Medical Science, Iran and found that 70 percent of students were aware of digital resources, but only 69 percent of them have used them; 62 percent were aware of offline databases, whereas only about 70 percent were of online databases, accessible via the Central Library website, and about 53 percent of respondents have used them. Students used less of offline databases, attributed to factors such as infrequent periodic orientation and lack of education on use of offline databases and fewer terminals connected to the Central Library. Users faced problems like low speed connectivity and shortage of hardware facilities.

Vicente\textsuperscript{73} et al. conducted a study on the use and awareness of electronic information services by academic staff at Glasgow Caledonian University and reported that the freely available internet was the most widely used source than pass worded databases. Less than a third used the catalogue to find Electronic Information Service (EIS). Non-use of EIS was rarely due to difficulty of access or use. Staff members were pessimistic about their student’s skill levels in using EIS.

Masoom Raza and Ashok Kumar Upadhyay\textsuperscript{74} studied the usage of e-journals by the researchers at Aligarh Muslim University (AMU). The survey reveals the all the researchers are aware of e-journals in AMU. From this Survey, they have been able to find out that many research scholars are consulting e-journals from their departmental labs and computer centers, not only for research purposes but also to update their own knowledge.
However, the study also revealed several problems, including lack of training and slow downloading. The researchers' feelings about the need for print journals as well as electronic journals are also discussed.

Hewitspin\textsuperscript{75} reports the results of an investigation, undertaken at Leeds Metropolitan University, to study the awareness and extent to which university academic staff use and assimilate electronic information services (EISs) into their work. The research was conducted using two methods: a quantitative study involving a questionnaire mailed to a random stratified sample of 200 university staff (of which 101 were returned); and a qualitative study. The study also investigated a number of further areas, including: how academic staff at the university obtain information for their work; what they do with the information they obtain; how aware are university staff of EISs; how confident are academic staff in using EISs and the barriers that exist to their use; the extent to which academic staff are integrating the use of EISs into student's educational experience; and what the university can do to support staff better in their use of EISs. It is concluded from the results that the internet is the most popular information source but the factors affecting use at the expense of subscription-based services are complex. University staff, especially those with low level it skills, frequently use the internet because it is easy to access and provides instant results.

Dadzic\textsuperscript{76} investigated the use electronic resources by students and faculty of Ashesi University, Ghana. The investigation was a three folded one to determine the level of use, the type of information accessed and the effectiveness of the library's communication tools for information research. The study found that general computer usage for information access was high because of the University's state-of-the art It infrastructure. Usage of some internet resources were also very high, whilst the use of scholarly databases was quite low. The low Patronage was attributed to inadequate information about the existence of these library resources. The study
recommends, among others, the introduction of information competency across the curriculum and/or the introduction of a one-unit course to be taught at all levels and the provision of more PCs on campus.

Liu attempted to investigate the extent to which graduate students in a metropolitan university setting use print and electronic resources. Another purpose of this study was to examine the importance of subject discipline to reading preferences and use of print and electronic resources. His findings were 51.9 percent of all respondents turn first to library online information resources for completing their assignments and essays, and 28.6 percent to the WWW. Only 15.8 percent of all respondents begin with library printed sources (E.G., printed books and journals) when completing their assignments and essays. Electronic sources were more frequently used than print sources. Even though the use of electronic sources and online reading habits vary by discipline, the frequency of printing out electronic documents was surprisingly similar across all disciplines.

Victoria Robertson conducted a study to examine the impact of electronic journals on the relationship between the journals, acquisitions and inter-library loans departments at St George's Library and compare it with that of other academic libraries. She inferred that most libraries thought that electronic journals have had, and will continue to have, some impact on the inter-library loans and journals departments; but there was only a slight impact on the acquisitions department. This may change in the future with the rise of the purchasing of electronic journals undertaken by acquisitions and journals staff. The recommendations included such points that libraries should promote their electronic journals stock in order to raise awareness amongst library users. Library staff should receive training in how to use electronic journals. There should be more resource sharing between academic libraries, e.g. enhanced consortia purchasing schemes. Publishers should ideally set
consistent standards of pricing for their electronic journals in order to aid librarian when they are planning their budgets for the academic year.

**ELECTRONIC LIBRARY USE**

Appleton\textsuperscript{79} used a case study in which staff and students at three separate further education colleges are encouraged to explore and share their experiences of using electronic library resources. The findings are limited to one case study, using three different colleges in the Merseyside area of the UK. The specific evidence, obtained from subjects at three separate further education colleges, has resulted in the conclusion such as the use of Electronic Library Resources (ELR) is highly appropriate for many Programmers of study within further education colleges. The use of ELR developed independent and autonomous learning within further education students. ELR can be used to inform teaching placed and lesson planning for further education tutors. Teaching staff and library staff should collaborate to ensure that ELR teaching is placed into an appropriate subject context.

Rehman and Ramzy\textsuperscript{80} studied that the health Professionals of the health sciences center of Kuwait University felt that Formal training program and active involvement of librarians are the crucial steps that can facilitate the effective use of the electronic resources.

De Groote and Dorsch\textsuperscript{81} concluded that the faculty, residents and students of University of Illinois at Chicago prefer online resources to print and many choose to print and many choose to access these online resources remotely.
REMOTE VS IN - LIBRARY USE

Western Libraries provide the online information access both within and outside campus, while this faculty is yet to be popularly introduced in India. The remote usage of networked electronic services is for different purposes than in-library use of networked electronic resources. The users are also demographically different. Library patrons using electronic resources for sponsored research are likely to be on campus, but not in the library. Further, funded researchers in particular are heavy remote users of networked electronic resources. It is likely that the demographics of the in-person user of all library resources (not just networked electronic resources) and the remote user of all library resources differ. It is also likely that the purposes of the in-person user and the remote user differ for all services.

Joe jaros recognized that remote use of the online catalogue was problematic. In particular, he realized that users lacked the search expertise necessary to find the information they were seeking, and were often unable to consult a librarian for assistance. In response to these concerns, print guides were developed to teach users the technical aspects of the system, as well as search techniques. Although the guides were designed specifically to meet the needs of remote users, the analysis of these needs was based largely on anecdotal evidence and the perceived characteristics of remote searchers rather than an objective study of user needs.

Vicente et al studied the use of electronic information services by staff at Glasgow Caledonian University, Glasgow, UK. They have reported that a majority of information searching is done through EIS and the most used service is searching the internet. The use of EIS is a time-saving strategy, and pass worded databases are valued above the internet. The EIS were mainly accessed from work (56 percent), but also from home (34 percent). From this review, it is clear that while libraries procure expensive
resources, these may not be optimally used due to lack of awareness, poor search skills, inadequacy of user training and lack of time etc. But the usage is differing depending upon the librarian’s active involvement and user’s computer literacy skills.

Levine-Clark\textsuperscript{44} conducted a survey of the users in the library of university of Denver community to assess knowledge about and usage of electronic books and found that scholars in the humanities have a higher level of awareness of e-books than their colleagues across campus but use e-books at the same rate. Their patterns of use are different, with humanists using less of the e-book than do other groups. Humanists still prefer printed books to electronic texts at a higher rate than do other groups and care less about added features, such as search ability than they do about content. Humanists conduct research differently than do most other scholars, using the library catalog and browsing as primary means of finding information, and valuing the book more than other resources.

Nicholas and Huntington\textsuperscript{45} analyzed the use of OHIOLink as well as the Blackwell Synergy, Science Direct, Emeraldinsight, and OUP databases by CIBER at University College London and found that many more people are accessing electronic journals than was previously the case in a print environment. Users are searching more widely as linking becomes easier and abstracts are becoming increasingly popular.
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