3.1 INTRODUCTION

Although the Internet is commonly thought of as a 1990s phenomenon, it was actually envisioned in the early 1960s for military research network. There has been enormous growth of literature on various facets of Internet technology, around the world since 1990s, but the growth of literature related to use of the Internet technology in the Indian context of academic and research environment, is very less. In the present chapter, a sincere effort has been made to collect and review all the relevant literature of the research study published in India and abroad. For this purpose, Academic Search Premier Full Text Database, Emeraldinsight.Com, Library and Information Science print and E-journals and full text conference papers, reports and articles on the Internet were scanned, collected, organized and synchronized for the literature review. Besides, a retrospective literature search was carried out using Library and Information Science Abstracts (LISA) on CD-ROM database from 1969-2003. Efforts were made to trace the original full text articles, where the full text articles were not available, the informative abstracts have been used for review of related literature. An attempt has been made in this chapter to provide a comprehensive literature review on the research problem of use of the Internet as an information source in educational endeavor.

For the convenience of the study, the review of literature has been dealt in five facets of research study as under:

- Use of the Internet as an Information Source in Teaching and Research;
- User Problems and Satisfaction of Internet;
- Internet search strategy;
- User Education and Training Programmes; and
- Impact of Internet on Library and Information Centers.
3.2 INTERNET AS AN INFORMATION SOURCE IN ACADEMIC AND RESEARCH ENDEAVOR

It is quite remarkable that, majority of U.S. teachers (68%) use the Internet in their effort to find information resources for use in their lessons, and more than one-quarter of all teachers report doing this on a weekly basis or more often (28%). In each case, almost one-half of all teachers saw these resources as essential for their teaching and nearly 90 per cent reported that they would consider these resources either valuable or essential information source in teaching and research. Even among teachers who did not have access to the Internet either at home or in their own classroom, one-third regarded the Internet as an essential teaching resource (Becker, 2003). The Internet is an important information resource for science and engineering faculty, research scholars and librarians. Internet can be established as a topic to the class syllabus, and providing at least one Internet-related assignment can accomplish inclusion of information available through the Internet. This works as a strategy for introducing these resources to library school students enrolled in science and technology literature and reference classes (Youngen, 1998).

The Internet ranks high among users as an important source of information. In less than eight years, as a publicly available communication tool, the vast majority of people in America, who use the online technology, view the Internet as an important source of information. In 2002, 60.5 per cent of all users considered the Internet to be a very important or extremely important source of information, virtually the same as the 60.2 per cent reported in 2001, but down from 67.3 per cent in 2000. Add those who said the Internet is a moderately important source of information, and the total increases to 90.6 per cent for 2002, about the same as the 90 per cent reported in 2001, but down from 91.7 per cent in 2000 (UCLA Internet Report, 2003). The Internet use by
Ohio University Students indicated positive correlation with use of the Internet as an instructional tool, a research tool and as a communication tool (Al-Motrif, 2000). The Internet has had a positive impact in many aspects of Tanzanian national life including the economic, social, educational, political and scientific sectors. The Tanzanian government has recognized the role of the Internet in national development and is making efforts to enhance Internet access and use in the country. The Government's efforts in this regard include the enactment of a national science and technology policy, liberalizing the telecommunication sector, licensing several Internet service providers, setting up a regulatory body to oversee the privatization of the telecommunications sector, reduction of import duty and other tariffs on software and hardware (Mutula, S.M and Ahmadi, 2000). The Internet is used as an additional information source rather than a complete substitute for their current methods of Information gathering. (Swan, 1997).

### 3.2.1 Engineering and Technology Arena

The Edinburgh Engineering Virtual Library (EEVL) is a project based at Heriot-Watt University, Scotland, to develop a gateway to Internet resources in engineering as part of the Electronic Libraries Programme. It acts as a rich academic and research information value, which aims to enable UK engineering academics, researchers and students to make better use of available Internet resources by improving accessibility to them. A process of identification, filtering, description, classification and indexing of networked resources before they are added to the database, which is freely available via the World Wide Web, achieve this. The paper further, outlines the project's timescale, resource selection and description, scope of coverage, service elements and technical infrastructure (Moffat, 1996). The top level engineering gateways provide broad catalogues of Internet based engineering resources that are more focused
than search machines, providing a list of World Wide Web sites and
descriptions to provide a snapshot of some of the better, more substantial ones
in the field of process engineering (MacLeod, 1997). The sources of
engineering information on the Internet are: list newspapers; databases of
interest; technical reports; full text reports via gopher; government information;
standards; professional organizations; and guides and updates (Dowling, 1994)
The best Web sites in the field of engineering sciences are: EMC Net, The Chip
Directory, HITEN The High Temperature Electronics Network, Data
Bookshelf, eg3.com Electronic Engineers Toolbox, Electronics Online,
Technical Report Search Service, Technology News, Circuit Cellar INK, and
Department of Electronic and Electrical Engineering, University of Surrey
(Harrison, 1999). A traditional, well-established secondary publisher has
successfully embraced the Internet to create a value-added global community of
engineers and technical researchers, by both adapting existing product lines to
Internet delivery and creating wholly new resource areas of content, services,
and community (Hollis, 1997). Wide range of information sources on the World
Wide Web are available providing information on various aspects of global
warming and climate change science covering: US government agencies,
international government agencies and programs, academic and independent
research centres and programmes, advocacy and educational organizations,
sceptics organizations and publications, resources for children and families,
news; periodicals and magazines, newsgroups and Listservs, data files, and
directories (Vaughan, 2001). Internet telecommunications network serve as a
source of medical information. It details the medical resources available
outlining databases, bulletin boards, discussion groups, electronic newsletters,
software archives and online public access catalogues on the web and describes
how to gain access to the network and interfaces that can help navigation
throughout it (Kleeberg, 1993).
Research study was conducted at the Drug Use Policy and Medical Information Service of Thomas Jefferson University Hospital, Pennsylvania, of industry and academic based drug information centers to examine the use of Internet based resources. A total of 464 surveys were sent, with a response rate of 29 per cent. Medical information specialists in industry and academic based drug information centers use the Internet daily. Most have access to electronic mail and the WWW, less than 25 per cent provided a homepage and Internet usage in many centers has increased from the previous year (Johnson and Wordell, 1998). The majority of German medical professionals used electronic mail, the World Wide Web, and Internet sources based in the USA and respondents claimed advantages from Internet use. There was a clearly expressed need for Internet courses as well as evaluation and presentation of Internet sources. A majority of respondents wanted the librarians to provide Internet related services. A follow up survey in 1996 suggested a trend towards a more realistic view among medical Internet users that incorporated expected benefits and advantages from the Internet (Obst, 1998). The Internet provides access to bibliographic information sources and allows electronic mail between individuals or special interest groups. The following factors within the institution must be considered when a library becomes involved in promoting the Internet: the computing environment, existing and potential use, and awareness raising and training (Kitagawa, 1994).

The study at Sree Jayachamarajendra College of Engineering, Mysore, intends to elicit information from the users regarding the exploitation of Internet resources. A questionnaire was distributed to 100 users out of which 79 members comprising of Professors, Associate Professors, Lecturers, Research Scholars and Students, have responded. About 75 per cent of respondents use Internet every day/once a week. E-mail is the most popular service used by engineering scientists. Further, it is stated that, 39.24 per cent of members are
facing difficulties in browsing Internet due to shortage of time slot allotted to use the Internet (Kumbar and Shirur, 2002). Internet connectivity available in Engineering Colleges of Orissa found that, 50 per cent of colleges have dial up and 30 per cent have leased line connectivity and 35 per cent have V-SAT connectivity. Most of the users are using Netscape (60%), MSN (55%) and Internet Explorer browsers (40%). About 75 per cent of colleges are using Internet to provide on-line demonstration for their clientele; followed by 60 per cent, who use it as a part of their course curriculum, while Google (85%) and Yahoo (75%) are the two popular search engines (Panda and Sahu, 2003). Majority of users at Chennai were engineers belonging to the age group of 21-40 years. The most popular Internet services used were e-mail and WWW. The female group of users use it more than male group and almost all of them use the Internet for sending e-mails (100%), getting required information (93.%) and obtaining news and publishing information (Rameshbabu and Gopal Krishnan, 1998). The use of electronic information services at Indian Institute of Technology Library, Delhi, found that, 77.78 per cent of respondents are well aware of Internet service extended in the library and majority of them are using for communication - E-mail, Chat (35.35%) and study/research purpose (36.37%). Similarly, 71.72 per cent of respondents are satisfied with the Internet service extended by the library and 3.03 per cent are not satisfied, while 25.25 per cent of respondents remained silent (Ali and Hasan, 2003).

3.2.2 Academic and Research Environment

Internet use among faculty of the three older universities in Ghana, namely the University of Ghana, The Kwame Nkrumah University of Science and Technology (KNUST) and the University of Cape Coast (UCC) indicated that, 59.45 per cent of respondents expressed that, their departments were not connected to the Internet, while only 40.55 per cent of respondents indicated
that their departments were connected to the Internet, showing that the majority of respondents cannot get access to the Internet from their departments. Majority of the respondents used the Internet for communication (80%). The mode values show that most of the respondents used the Internet sometimes to find information for lecture notes (27; 34.6 per cent), for research projects (35; 44.9 per cent), and to update their knowledge in their area of specialization (30; 38.5 per cent). Others sometimes read the news or downloaded software from the Internet. The majority of the respondents had never used the Internet to locate information on funding and donors (52.6 per cent) or to purchase items (91 per cent). On the use of the Internet, 26 respondents (24.5 per cent) indicated that they have never used the Internet, while a total of 80 respondents (75.5 per cent) indicated that they use the Internet rarely, sometimes, often or always. All respondents who use the Internet indicated that they use the Internet for electronic mail. This is not surprising since electronic mail has been said to be the most frequently used Internet service worldwide (Adika, 2003).

The use of the Internet amongst the users of the University of Toronto Library showed that 75 per cent of the users were male. About 46 per cent of the users reported that they found nothing that they were looking for and 13 per cent of the Internet sites available accounted for 80 per cent of the Telnet connections (Tillotson and Others, 1995). Internet use is consistently higher among faculty members in the sciences and agriculture than among those in the humanities or social sciences, as per the study of the Hebrew University of Jerusalem. Further, the study makes suggestions for training in the level of Internet use among the various disciplines of the faculty (Lazinger, 1997). Research into the use being made of the Internet facilities at Chester Library consisting of 178 users revealed that, substantial use by non-library members (52%), mostly aged between 16 and 35, with only slightly higher use by men (51%) than by women. Most of the sample had received no formal training in
Internet use (75%) and the most popular application was electronic mail (55%) (Turner and Kendall, 2000).

Internet access is made for the academic purpose dealing with frequency of use of e-mail, telnet, FTP and navigational aids (Bane and Milheim, 1995). A survey of 572 students at a large US public university suggests that Internet addiction and impaired scholarship focus more on chat rooms and Multiple User Dungeons than email and Usenet newsgroups (Kubey, 2001).

Faculty members from a major university were surveyed to explore the possible relationship between Internet usage and the following dependent variables: computer usage (length of time and perceived expertise), length of time of Internet use, perceived expertise of Internet use, and perceived utility of the Internet. 97 per cent have an Internet account. Furthermore, computer literacy and length of computer experience are correlated with early adoption of the Internet, perceived utility of the Internet is correlated with computer literacy and with Internet usage, and usage is correlated with perceived expertise, but not with the length of time of Internet experience. Highly skilled computer users are more likely to use the network in a more intensive way and have higher appreciation of the network's potential (Kaminer, 1997). Despite popular conceptions of older people's techno-phobia, most Australian research on older people's use of computers and the Internet has focused on the barriers to their embracing technology and ways to overcome obstacles. The motivations of older people, who have adopted computers and the Internet not only reveals their trepidation but also their thirst for social interaction, their quest for pertinent information and their desire to keep up with the times (Gietzelt, 2001).

Sixty-six per cent of public school teachers reported using computers or the Internet for instruction during class time. When teachers were asked to focus specifically on the variety of potential uses of computers or the Internet in the
classroom, 23 per cent of public school teachers reported feeling well prepared and an additional 10 per cent reported feeling very well prepared to use computers and the Internet in their teaching (NCES, 2000).

The study by Ramirez (2003) presents the general results of a survey with college students of the Schools of Philosophy and Literature and Sciences of National University of México with reference to Internet-related trends regarding four issues: experience, uses, new practices and perception. Out of the 678 students that answered the survey questionnaire, 54 per cent were men and 46 per cent were women. Regarding the time they have used computers, 68 per cent said between 4 and 6 years, and 29.5 per cent less than 4 years. During that time, 47 per cent learned how to use Internet by themselves, 15.6 per cent were taught by a friend, 14.2 per cent took a special course, 0.9 per cent were taught by library personnel and 1.5 per cent by the personnel of the computer department of their respective schools, in spite of the fact that 38 per cent use the Internet service of the library of their schools. 70 per cent said that they have the ability to access Internet to look for information; 87 per cent said that they did not need any training to do this; however, for 63 per cent, it is not easy to use Internet. 39.4 per cent feel that they depend more on Internet for activities related to their studies because it is easy and fast.

Research into the use of the Internet and electronic sources for teaching and research by English Literature academics at six Welsh higher education institutions, lists some of the questions raised by the study and describes the research methodologies. The findings indicate a mixed response to new technologies and Internet usage (Shaw, 2000). The participants of the Internet training courses held in Iceland from 1993 to 1998, found that the Internet was interesting and useful, with positive advantages over other media and for some, use was constrained by perceptions that they needed greater understanding
(Klobas and Clyde, 2000). Surveys were administered to 548 students from three regional universities in the southeastern USA to determine how many students regularly use the Internet, how many hours per week do the regular users spend on the Internet, and what computers they use. Information was tabulated for use of e-mail, use of the Internet to obtain university information, and for the number of students who had home pages. The respondents of the study consider the Internet to be a fad; project their future use of the Internet to be less, the same, or more than now; and project they will use the Internet in their chosen careers (Perry and Others, 1998).

The Internet was perceived to be a rich information reservoir that provides fast and efficient access to information. All the 608 students from 14 schools in Kuala Lumpur, Malaysia have computers, out of which nine have Internet facilities and three Internet terminals are located in the school resource centers. The majority believed that the Internet did not affect their learning process, with 20.7 per cent reporting a positive effect and 4.5 per cent a negative effect. About 51.5 per cent of respondent used the Internet. The main reasons for non-use were lack of skill and non-availability. The users mainly accessed the Internet from their homes and acquired Internet skills by self teaching or learning from friends. Slightly over 70 per cent of Internet users spent less than five hours a week on various functions, but few used it for study related activities. The average time spent on the Internet was 4.89 hours per week. Most of the Internet users (91.4 per cent) explored the World Wide Web while 75.4 per cent used electronic mail, 52.1 per cent used IRC or ICQ, 15.7 per cent joined newsgroups, 2.2 per cent used it for downloading and 0.6 per cent used it for playing online games. Major problems faced were 'lack of skills' and 'lack of time'. There were significant relationships between the use of Internet with gender, English grade, parents level of education, parents income, availability of Internet in school and location of Internet in school (Wee, 1999).
About 20 per cent of the 289 students at medium-sized Midwestern state university respondents had less than one year of Internet experience, while the majority (59 per cent) had from one to three years of experience. 35 per cent of the students reported using it everyday, 30 per cent reported using it several times a week and 18 per cent reported using it once a week. 83.2 per cent reported using the Internet when completing homework assignments, 78.3 per cent used e-mail for personal use, 71.0 per cent used the Internet for recreation, 43.0 per cent used e-mail for homework purposes, 39.5 per cent searched for employment or career-related information, 28.3 per cent downloaded software, and 13.3 per cent used the Internet for a variety of other purposes. The two major reasons for using the Internet were: information is more current and information is easier to retrieve (71.6 per cent). In addition, 37.4 per cent indicated that Internet information is more comprehensive, 20.1 per cent reported that information can be retrieved faster, and eight per cent said they use the Internet because it is more enjoyable than using traditional sources (Marxen, 1999). The motivating factors behind becoming a network user of Internet among media personnel is for the requirements of work and study (17.3%) and saving time, daily transactions (13.5%), Curiosity (11.5%) and facilitating contacts (11.5%) (Savolainen, 2000).

National Association of Software and Service Companies (NASSCOM), conducted the first Internet survey in India, covering over 68 cities and towns across India, which account for 92 per cent of the total Internet users in the country. The intensity of Internet use is very high in the country, with 48 per cent of Internet users in India using it daily, a distinctive feature considering the figure for the US is 31 per cent and for China 20 per cent. The 18-24 age group accounts for 49 per cent of Internet access in India, followed by the 25-39 age group (28 per cent) and the above-40 group (11 per cent), the other age groups accounting for the rest of Internet users. The profile of Internet users in India is
dominated by the professional/corporate segment, which accounts for 43 per cent of usage, followed by the student community who constitute 38 per cent of Internet surfers (NASSCOM, 2000). On the other hand, more than 2000 households across United States indicated that, the primary reasons users cite for starting to use Internet is ability to get information quickly (21.1%), followed by work needs (12%), and access to e-mail (12%). 59.3 per cent of respondents had access to Internet at home and 63.1 per cent of users ranked their Internet ability as good and excellent. Nearly 61 per cent of respondents considered Internet to be a very extremely important source of Information. Overall, the users of Internet were generally satisfied with online technology (UCLA Internet Report, 2003).

Internet is primarily used for research as 78.43 per cent ranked it first priority followed by teaching as 23.52 per cent and 33.33 per cent ranked it first and second. It is most useful for academics for research activities (Lakshmi, 2003). The level of utilization of the Internet for academic research at the Obafemi Awolowo University, Ile-Ife, Nigeria showed that the use of the Internet ranked fourth (17.26 per cent) among the sources of research materials. However, respondents who use the Internet ranked research materials (53.42 per cent) second to electronic mail (69.86 per cent) and conclude that the use of the Internet for academic research would significantly improve through the provision of more access points at Departmental and Faculty levels (Jagboro, 2003).

A survey of 3,097 US adults conducted in 2000 for library and Internet services in New Zealand, indicated that there is a complementary relationship between Internet and library services. Using an average, weighted by library popularity, of Internet and library users who chose to use only one provider for quick reference needs, 72 per cent used only the Internet. For work-related
needs 81 per cent used only the Internet, whilst for leisure 59 per cent used only the library (Pope, 2003).

The physicists at Banaras Hindu University, Varanasi are potential users of e-mail. Their average number of e-mail sent per day is 5.5 and average number of e-mail received per day is 8.9. The zoologists are found to be low users of e-mail, as they started the use later. The probability of using e-mail to contact scientists, physicists was 1.2, with Botany 0.98 and least likely were zoologists - 0.21 (Prasad and Singh, 2002). All the respondents (100%) comprising of scholars and scientists at Tagore Library, University of Lucknow are using Internet for communication, followed by accessing academic and research information (90%) and for higher studies/ fellowships (80%). E-mail and WWW are the two popular Internet services used by the users, while most of the users found enough relevant material for their research project on Internet accounting 80 per cent (Mishra and Satyanarayana, 2001). Majority of the respondents of Guru Nanak Dev University accept Internet as a time saving, easy to use and more useful resource than traditional documents. Among the various Internet services, E-mail is the most preferred service followed by WWW. (Kaur, 2002).

Majority of the users at Tata Institute of Social Sciences, Mumbai use Internet for communication, followed by access to information. The popular Internet services used were E-mail, WWW, Discussions forums, FTP and Telnet (Koganuramath and Jange, 1999). About 56.7 per cent of users at Tirupathi University use Internet for accessing information, 85 per cent use for WWW and 80 per cent use E-mail. The majority of users use general web sites (48.33%) followed by recreational (30.56%) and only 21 per cent of users use Internet and access subject-based website (Chandran, 2000).
3.3 USER PROBLEMS AND LEVEL OF SATISFACTION TOWARDS INTERNET

The average satisfaction with the reliability of the information found on the Internet, on a scale from one (Very Unsatisfied) to seven (Very Satisfied), was 5.09, indicating moderate satisfaction. Although the respondents were most satisfied (mean = 5.29) and graduate students were least satisfied (mean = 4.87), the differences were not statistically significant. When asked how they determine Internet information reliability, 65.7 per cent of the students said they determine the reliability of the information by the reputation of the organization that provides the information, 50.2 per cent reported that they compare it with other data sources, 41.9 per cent rely on their instructor to provide them with a reliable site, 21.5 per cent always assume the Internet is reliable, and 3.8 per cent gave miscellaneous individual responses, none of which was repeated (Marxen, 1999). The impediments hindering the optimum use of Internet are the poor quality of information, disorganization of information on the net and worries about security, speed and copyright of Internet, (Scarlett, 1997). The major barriers opined by National Network Office of NLM of all member libraries National Network of Libraries of Medicine, hindering the Internet connectivity are cost of computers, lack of expertise skills and management support. However, about 4 per cent of academic libraries, 27 per cent of hospital libraries and 10 per cent of other type of libraries were not connected to Internet (Lyon, 1998). Internet plays an important role among students and academicians at Netherlands. WWW is widely used service for searching information in general to very specific information, but the academics expressed many difficulties while searching World Wide Web and they expect active support from libraries by performing traditional tasks such as selection, bibliographical description, current awareness service and personal assistance (Voorbij, 1999). While a similar study, focuses on the research process and
details the evaluation criteria in order to help to identify the net resources of quality, stressing the location of information based on resource type, research centers and library catalogues (Mellendorf, 1998).

Internet users in Korea with a high-speed Internet service system tend to enjoy various kinds of services, including e-mail, and depend less on the traditional media, such as TV and radio, for information and entertainment. They also have an increased level of satisfaction in the dimension of convenience (Cho-Sungbin, 2003). Users showed a high level of satisfaction over Internet at Deventer School of Information Science students of Hardenberg public library users, Netherlands, although it was clear that users had little knowledge of the Internet and CD-ROMs (Eggink, 2000). Testing the validity and reliability magnitude estimation as a technique for gathering and analyzing interval data on satisfaction with information seeking was key to the investigation. Data for user satisfaction were then associated with end user characteristics like training, frequency of use and expectation of success. They have a high expectation of success when they engage in information seeking on the Internet and are satisfied with the process (Bruce, 1998).

Libraries can give value-added services and respond to individual needs using Internet technology. The four problems of Internet usage are: the volume of material; the lack of quality discrimination; the removal of websites; and the need for payment for access. The main difficulty lies with non-specific subject searching, but it is likely that all significant journals will eventually be accessible online. As for books, it is often cheaper to buy for the independent researcher than to use the library, and electronic books could make library use still less necessary. But libraries will still be needed for documents, which are not digitized or have to be seen in the original, the electronic version may be slow and inconvenient to use, and help may be needed with computer problems.
No successful electronic surrogate for browsing is available, although better ways of identifying useful material in advance could be developed (Line, 2001). Poor infrastructure, lack of awareness, unfriendly regulatory framework, and high access charges are some of the factors limiting Internet access and use in Dar es Salaam, Tanzania (Mutula and Ahmadi, 2000). The problems with Internet or Web based information retrieval is that quantity always wins out over quality, any general search will result in far more information than can be assimilated and there is no distinction made between, for example, scholarly publishing and private Web pages. Users frequently do not appreciate the mix of material located for them and many are not equipped to distinguish between the good and the bad (Armstrong, 1999). The pertinent issues and problems that are critical to establishing electronic commerce on the Internet were identified. Perspectives on those issues are formulated by conducting personal interviews with ten executives in as many organizations, while there is agreement on the potential payoff for electronic commerce on the Internet, concerns center on security, costs, legality of translations, uncertainty and lack of reliable information on the effectiveness of this paradigm for conducting business (Nath, R and Others, 1998).

Internet resources are evaluated using criteria: source, currency, tone and credibility, as researchers cannot assume that information is reliable when using the Internet as a research tool. Further emphasizes to develop standards in the future to regulate the Internet (McCarty, 1997). Web search behaviour of 16 selected libraries of Ahmedabad and Gandhinagar reveals the satisfaction level of LIS professionals with the type of information sought through search engines (Batthini, G and Madnani, A, 2003). Major problems hindering the use of Internet at RMRC Library (ICMR), Bhubaneswar are slow Internet access, incapability of single modem to handle multiple searches simultaneously and lot of time taken by Service providers (Sahoo, 1998). Users at Muslim Aligarh
University were satisfied with the timings of service (52.28%), 69 per cent of users opined that the number of nodes should be increased and 71 per cent were not satisfied with the existing Internet service. It was suggested to enhance the bandwidth, provide Internet user-training programmes and the service should be made available around the clock (Ali, 2000). Access to the Internet for the North East region's eleven universities remains a challenge and urges other universities in the region to take advantage of information technology especially Internet technology (Pathak, 1999).

3.4 INTERNET SEARCH STRATEGY

Google was very successful for finding the Web site of a journal particularly, law journals, with its remarkable information retrieval ability. On the Web, there are normally many pages containing the query string, but for the query, Google was successful. For example, the journal title, Law Library Journal, its home page was number one in a list of about 2,460 results. The remainder of pages seemed to be predominantly including the journal’s name in either lists of journals or as part of a citation (Thelwall, 2002). Google was found to be the most popular search engine used for meeting the information needs of business information resources in UK libraries and information centres (Pedley, 2001).

About 80 per cent of 786 questionnaires duly filled from faculty and students at Seton Hall University, reported that they used the web on a daily or weekly basis. Most of the respondents on a scale of five levels of satisfaction placed their level of satisfaction for Internet search results at level two (36%) and level three (37%). While 83.6 per cent of respondents use Internet search engines and 63.9 per cent type web addresses directly for finding information on the net. Among search engines, Yahoo (80.5%) followed by Info-seek (36.2) is the most favorite Internet search engine (Bao, 1998). Search engine
developments are reviewed to reveal a range of indexing and retrieval techniques that may assist casual users in the information retrieval task. It proposes an approach for a user centered evaluation on a conceptual framework in which user satisfaction is characterized as a variable dependent on system features and functions and expressed in a moderating context of user-task requirement. It also provides a degree of understanding of how users are satisfied and its use as a methodology for the evaluation of search engines from a user perspective (Johnson, 2001).

The retrieval performance of the AltaVista and Excite search engines was tested using a set of 10 queries. Majority of features are common to both search engines, with both offering two interfaces - one for simple keyword searching and the other for advanced searching using Boolean operators. However, findings show significant differences in performance between AltaVista and Excite in the areas of recall, precision and coverage, with AltaVista having higher scores in all three retrieval areas. This result confirms the findings of other studies, but, contrary to other studies, no significant degree of duplication in search outputs was found (Sasikala and Patnaik, 1999). A comparative study of Internet search engines by means of searches for a specific search topic: 'cost effective treatment for myocardial infarction' was conducted, in which the data sources published were conference reports, periodical articles, personal communications, and Internet resources. Data on features of the Internet search engines were obtained by browsing each of the 20 search engines selected and by communicating with individuals in charge of each search engine when needed. Actual searches on the topic were conducted by using the 20 search engines. The number of Uniform Resource Locators (URLs) and contents of each search engine were different. The number of records retrieved ranged from zero to 22000 among different search engines. Lycos and Magellan gave a fairly good hit percentage or relevance factor
The retrieval capabilities of six Internet search engines on a simple query by considering only the first 10 or 20 results returned by the search engine have been analyzed by Bar-Ilan (1998). In this work, all documents that the search engines pointed at were retrieved and thoroughly examined. Thus the precision of the whole retrieval process could be calculated, the overlap between the results of the engines studied, and an estimate on the recall of the searches given. The precision of the engines is high, recall is very low and the overlap is minimal.

The ranking of five popular search engines: AltaVista, HotBot, Excite, Infoseek and Lycos were devised to test for the presence of all terms and proximity and most topics were taken from actual reference questions. Search topics were equally distributed among the humanities, sciences, and social sciences. Tests were conducted for: presence of all terms, proximity, and location. In the case of all Terms, Excite produced the best score of 5.0 per cent for 20 hits. For proximity, AltaVista performed best with scores of 11.1 per cent and 7.7 per cent for 100 and 20 hits, respectively (Courtois and Berry, 1999). The salient features of eleven Web search engines: AltaVista, Excite, Galaxy, Infoseek, Lycos, Open Text Index, World Wide Web Worm, Yahoo, Aliweb, I-Explorer and Webcrawler have been discussed providing the URLs of the search engines and includes a short bibliography on Internet searching for library professionals (Kumbar, 1999). The features of the Web search engines discussed were: AltaVista, Excite, Fast Search, Google, HotBot, Lycos, Northern Light and Yahoo and its features and commands covered includes: search engine size, Boolean operators, phrase searching, proximity, truncation, title, date and URL fields, 'links to' a URL, language, media searching, case sensitivity, searches all common words, Web directory attached, clustered results, output options, paid sites first and similar pages (Hock, 2001).
Twenty queries have been used and the 1st 20 hits for each query were evaluated for relevance of the three keyword search engines Alta Vista, Excite and Lycos. They were expressed in a general manner in accordance with the search syntax available for each search engine. A three-point relevance scale is used, where highly relevant pages are assigned the value one, partially relevant 0.5 and irrelevant, inactive and duplicate links/pages get a zero. Precision measures were used. The method of measuring precision is designed to give credit to those search engines that present relevant hits early in their ranked lists (Breimark and Hagman, 1999). AltaVista, Excite and Lycos in terms of their search capabilities and retrieval performances using sample queries were drawn from real reference questions. AltaVista outperformed Excite and Lycos in both search facilities and retrieval performance although Lycos had the largest coverage of WWW resources among the three WWW search engines examined and thereby proposes a methodology for evaluating other WWW search engines (Chu and Rosenthal, 1996). The search capabilities of ten search engines: AltaVista, Excite, Hotbot, Infoseek, Lycos, Northern Light, Webcrawler, Yahoo and Galaxy have been compared with reference to the size of the database, frequency of update, search capability and design, and speed (Misra, 1999). World Wide Web search engines display some complexity in their variety, content, resource acquisition strategies and in the array of tools deployed to assist users (Schwartz, 1998).

Search engines were compared with generic features viz., database content, retrieval software, and search interface and proposes a general strategy for using web search engines. It also presents a state of the art review of World Wide Web search engines from the earliest Internet precursors and noting the problems inherent in the current range of WWW search engines; problems of searching the WWW and analyzing the resulting search engine types (Poulter, 1997). Webber (1998) focuses on some issues relating to Internet search
engines such as Alta Vista, HotBot and Yahoo and their use in news information Web sites on the Internet. It reviews ways in which search engine providers are responding to the challenge of improving searching, including: adding a selective, browsable database as an alternative; including only home pages producing fewer hits and browsability; adding company information; adjusting the weightings on their relevance rankings; building up searches; and allowing Boolean logic and field searching.

3.5 USER EDUCATION AND TRAINING IN INTERNET ACCESS

Ruth (2000) reports results of study designed to give a more explicit, long-term perspective on IT training in developing nations by employing a popular evaluation model used widely in industry. The Kirkpatrick model treats the training event as only a first step in a process that ultimately involves changing attitudes, behaviors and life styles. The Romanian Internet Academy is used as a case study to explore longer-term changes in attitudes and behaviors. While many predictor variables are appropriate, only age, gender, academic productivity and academic discipline were used in this preliminary study. Results indicate that this process can yield useful results for determining the true value of these courses and can lead to establishing policies for improving results significantly.

More than one third of respondents (Australian academic staff) seem in need of more training in Net use and time limitations and lack of training are typical barriers to effective use (Aplebee and Others, 2000). Public librarians in Germany want to make the most of the Internet for reaching their public, after undergoing a web based training course (Hasiewicz, 2000). Internet training for academic library staff encompassing extensive literature search by surveying 15 UK academic libraries and conducting interviews with three training librarians suggest that, Internet training is being implemented in UK academic libraries,
although evaluating the training is not a priority. All the staff has received some form of basic or introductory training on the Internet, while professional staffs are generally receiving more advanced levels of training on the Internet than non-professional staff. Research has also shown that, while many external Internet training sessions are available, the majority of academic libraries are designing and implementing internal training methods including Internet (Mathews, 1997).

As part of their Internet strategy, many libraries are venturing into the new world of training end users in searching rather than just browsing. The study sets out a strategy for planning a comprehensive Internet training programme, emphasizing the need to make the sessions entertaining whilst not losing sight of the educational objectives; the importance of providing follow up exercises that participants can take away to reinforce their learning; and the use of new technology in designing such training (Bell, 1998). Internet training programme, presented to academic staff at Sydney University, New South Wales, included a brief introduction and comprehensive review of the Internet, using NCSA Mosaic and Netscape software as presentation tools. The programme used locally produced Hypertext Markup Language (HTML) documents with live and 'canned' links to Internet tools and resources. They were also provided with their own Mac and DOS discs as handouts with a World Wide Web (WWW) browser and local Hypertext Markup Language (HTML) documents (Ryan and Leith, 1995). 'Libraries and the Internet' course, were conducted during the 1997, 1998 and 1999 Summer University (SUN) programme of the Central European University (CEU), Budapest, Hungary covering topics in the humanities and social sciences. The course aims to bring together students from Central and Eastern Europe and Central Asia focusing on the syllabus and teaching methods, Internet and the librarian, identifying resources, quality of resources, publishing and the Internet, and training the
trainer (Robinson and Others, 2000). Bertelsmann Foundation and its project partner, ekz. Bibliotheksservice Gmbh developed a virtual modular Internet course for libraries known as bibweb (Laquey, 1993).

Clyde and Klobas (2000) describe international research, which drew on the Planned Behaviour in Context (PBiC) model of networked information resource use to study reasons for learning to use the Internet. Further, the implications for internet training include: taking account of differences in trainees' prior knowledge of the Internet, recognition of different reasons for wanting to use the Internet, focusing on the purpose of use, not just tools, concentration on developing positive attitudes to outcomes of use rather than on ways to reduce negative impressions; introducing quality characteristics, acknowledging social influences on Internet use and attitudes, and adopting norms associated with the education of highly motivated adults. While Hiom and Place (2000) report on the launch, by SOSIG of the RDN (Resource Discovery Network) Virtual Training Suite: a set of free, interactive, World Wide Web-based tutorials for students, lecturers and researchers who want to discover what the Internet can offer in their subject area. An academic or librarian with specialist knowledge of both their subject area and the Internet have written each tutorial with key features, which include: TOUR (key sites in their subject area), DISCOVER (techniques for improving Internet search skills), REVIEW (skills needed to evaluate internet information), REFLECT (on practical ideas for using the Internet to support study, teaching or research).

A strategic model of Internet training for library professionals are presented in four broad units: the nature of the Internet and its uses in the academic library, how to use the Internet, including hands-on training, developing the skills to host and provide information on the Internet, and evaluation of Internet services and resources (Mishra, 1999). Internet and
World Wide Web play important role in the new curriculum (Mudhul, 1999). Research has shown that the Internet can be an effective teaching tool for students of all ages when its use is integrated into the school curriculum. Teachers must become expert users of this new technology and integrate its use into study units, even though many do not have the technological skills necessary to implement Internet use effectively into their teaching. Many public schools, however, lack the necessary hardware, software, and phone lines and provide limited access to the Internet (Hack and Smey, 1997).

The students at colleges and universities of New York State indicated that they had learned most of what they know about the Internet by teaching themselves (87.2 per cent), although 35.3 per cent reported having some formal classroom instruction. Only 6.6 per cent of respondents indicated receiving instruction by librarians and 1.4 per cent received instruction from the academic computing center on campus, while 17.6 per cent had received some assistance from friends or relatives. The groups differed significantly in terms of assistance from friends or relatives, with a much greater percentage of freshmen reporting assistance from those sources (Rosenthal and Spiegelman, 1996).

Internet is a profound force rapidly beginning to dominate US educational institutions. It also emphasized how good curriculum and clear instructional goals, along with authentic assessment, can be enhanced by the use of the Internet by providing illustration of a ten-step staff development exercise (Artis, 2001). The successful outcome of a training project of the Dutch government, involves an Internet course for over 100 policy officers, in which they were instructed in the use of the World Wide Web by teaching them how to use subject directories. Internet training has enabled the trainees to find the information they needed in a more effective and efficient way and this had a
favorable effect on their initially negative view of the Internet as a source of information (Beekink, 2000). Effectiveness of in-service training (INSET) programme through questionnaires was sent out to the project contact people in both primary and secondary schools and through follow-up interviews with a selection of the respondents. The four areas identified and that need to be addressed if INSET in this area is to be effective are: the institutional context, the relationship between teacher personal and professional use of information and communications technology, the delivery methods and support mechanisms, and curriculum integration, and training in curriculum leadership (Potter and Mellor, 2000).

The importance of Internet training in library science education, envisages a scenario where Internet services will be one of the main activities of academic libraries in India suggesting modules for teaching Internet topics at various levels of LIS education emphasizing on the theoretical and practical aspects to be included as part of the training (Madalli, 1999). The Internet and World Wide Web serve as a background to a discussion of the need for user training in Internet use and the importance of extending this to include the library school curriculum and continuing education programmes (Karisiddappa, 1999). The respondents at Pune University stressed the need for providing training in utilizing the Internet in its search and use by Library staff and user group (Mahajan and Patil, 1999).

2.6 IMPACT OF INTERNET ON LIBRARY AND INFORMATION CENTERS

The Internet is fast becoming an important tool for librarian. The purpose of this study was to determine how librarians in Malaysia use the Internet for work related purposes. A questionnaire was sent to 158 librarians and 83 usable responses were received. The main findings of the study
indicated that 90 per cent of the respondents used the Internet for work related purpose. The majorities were recent users and had first learned to use it from a friend or colleague, although they had also attended some formal training sessions. The users spent an average of 45.8 minutes per access and averaged 69.7 hours per week on the net. All of them used the WWW, with the majority using it at least once a day, while 97.3 per cent used e-mail, 62 per cent used telnet, 31.5 per cent used file transfers and 28.2 per cent used newsgroups. The main search engines used were Yahoo (45.8%), Infoseek (18.1%), Webcrawler, Excite, Megellan and Altavista. Majority regarded the Internet as essential tool for librarians and felt that it had contributed to increased efficiency in their workplace (Singh, 1998). The use of Internet facilities by reference librarians in University of Victoria found that e-mail, discussion lists, national and international library catalogues and periodical databases are identified as commonly used Internet services. On the other hand, the reference librarian’s rarely use Gopher and Telnet (Olson, 1995). There is a general agreement among library professionals in Sub-Saharan Africa on the fact that the Internet could play a very vital and important role in facilitating professional networking and sharing of information. About 47 library professionals in Sub-Saharan Africa indicated that they have access to the Internet and electronic mail facilities and this is mainly done at workplaces. However, use of the facilities for accessing electronic periodicals, discussion groups, newsgroups and other useful Internet sources is quite low and in some cases almost non existent due to the shortage of Internet and electronic mail access computers, poor telecommunications lines, slow and unreliable Internet links, inadequate Internet use skills and, since the facilities are available at workplaces, lack of enough time to use them (Chisenga, 1999).

The use of Internet by academic libraries showed that library staff and community training take place through non-credit workshops (62%),
presentations to academic departments (55%), and sessions from bibliographic instruction (54%). It also noted that librarians were finding it increasingly difficult to maintain their Internet skills due to lack of time (Condic, 1995). The paper investigated the use of Internet among 42 academic libraries in USA for reference work focusing specifically on how many reference librarians use Internet technology for answering reference queries; the formal training undertaken, search strategy adopted and problems in using Internet (Basu, 1995). Majority of the special librarians (93%) used the Internet for e-mail. They also found that 65 per cent of the respondents had trained themselves on the Internet, while 59 per cent had learned informally from a colleague (Tillman and Ladner (1992). Internet in government libraries was mainly used for e-mail (Dener and Others, 1996).

The status of the Internet in India explaining how the Internet can help Indian libraries perform fundamental library functions viz. acquisitions, technical processing, circulation, retrospective conversion, information services, reference work and resource sharing. The study also emphasizes that the degree of success of the economic and industrial development of any nation depends on the extent to which libraries and their information resources are tapped (Jambhekar and Pandian, 1999). Internet can be used to enhance the value and effectiveness of library and information services, including periodicals, technical services, reference services and the virtual library (Rao and Prasanna, 2001). They also demonstrate, with examples, Internet use in web bookstores, web based library catalogues and use of electronic mail.

The ultimate goal of World Wide Web Project at the Hong Kong University of Science and Technology (HKUST) Library is: to incorporate free Internet resources into the library collection, to develop selection guidelines for Internet resources, to build Internet navigation skills among selectors, and to
select free Internet resources and make them accessible to the HKUST community through the library catalogue or hyperlinks on the library Web site (Yip, 1997). Internet should help libraries in Japan rather than hinder librarians but they must learn new skills. Many users have Internet access at home but libraries must help the information-poor. Good sites for finding secondhand books, Japanese and Western, are listed. In company libraries, librarians use the Internet both for finding information and for providing it (Itoga and Others, 2000).

The emergence of the Internet has dramatically changed computerized information access and tools and resources available on the Internet affect library services in various ways. Many health science librarians are using Internet resources to meet their own information needs, and those of health care providers. It also examines different applications of the Internet components in medical library settings, with special emphasis on reference services and discusses the role of the Internet in fulfilling National Network of Libraries of Medicine, as a reference tool in health sciences libraries (Bandyaopadhyay, 1997). About 72 per cent of the libraries at academic institutions had access to Internet facility than the libraries in the hospital environment (Lacroix, 1994). Eaton and Others (2001) tabulates answers on differing use and attitudes to the Internet among public librarians and school media specialists in Rhode Island, USA and discovers what dangers and potentials are perceived and notes differing modes of filtering and instruction in research skills, evaluation and Web site navigation.

Users comprising of 40 library professionals working in the reference department of nine Malaysian academic libraries felt that, the Internet has contributed positively to reference work and has enhanced their effectiveness and efficiency. However, a majority of them disagreed that the Internet should
completely replace traditional reference tools. Respondents also felt that reference librarians should possess good computing and Internet use skills for providing effective reference services (Abdoulaye and Majid, 2000). Reference librarians among eighteen Quebec universities consider the use of Internet as an information and research tool (Levasseur, 1996). The managers of the 12 libraries of Kuwait University tried to analyze: Internet usage patterns of the Library and Information Science (LIS) professionals at the Kuwait University Libraries; training opportunities available; and the problems perceived by the LIS professionals in regard to use of Internet. Although the Internet had been available since 1993, over 50 per cent of the LIS professionals still do not use all the communications applications, such as Telnet, File Transfer Protocol (FTP), discussion groups and newsgroups. They were also dissatisfied with the way in which they had developed Internet capabilities, most of them having learned through self-instruction and on-the-job training (Ur-Rehman and Al-Obaidali, 2000). Majority of University libraries in Ankara, Turkey lack physical hardware and software infrastructure to avail the Internet facility. A few libraries could access online catalogues and about 40 per cent of university librarians did not know how to use the Internet and lack the requisite skills (Oclay, 1996).

Information technology provides Africa, a new threshold for greater economic, social, intellectual and cultural renaissance. Eighty-four (84%) of 42 information professionals in Lagos and Ibadan were aware that a lot of cultural interactions go on via the Internet. Majority (83%) agreed that cultural networks exist on the Internet and 62 per cent were affirmative that cultural websites are available on the Internet. However only 54 per cent indicated that the Internet could alter existing and established value systems, while 66 per cent agreed that African’s rich culture is exportable using the Internet platforms Librarians (59%) were also in agreement that African cultural heritage is under the threat
of the dominating influence of alien culture. Majority of the respondents viewed the Internet as capable of influencing most of the culture values items both positive and negative except for architecture, politics, painting and sculpture (Omekwu, 2003). Internet use is becoming widespread in Japanese university libraries but is less so in public libraries. In the United States, public libraries use the Internet to communicate with users and for publicity. The Internet can be used to expand reference services in smaller libraries. Public libraries relationship with the Internet should be more than simply as an access point provider (Yamamoto, 1999).

Applications of Internet technology and networked information currently being pursued by academic libraries in the UK includes subsidized database access; use of electronic journals; their own World Wide Web sites; email based inquiry and information services, and communication in technical services areas, e.g. for recalls, renewals and ILL requests. It also considers the potential of the Internet for the professional development and current awareness of library staff (McNab and Winship, 1996). 44 per cent (16) of the 36 respondents comprising of law subject specialists in UK university libraries reported that they use the Internet daily. Questions were asked about constraints on the use of the Internet, membership of mailing lists, type of connection mode, and reasons for using it. The need for better training is highlighted (Petit, 1995). Experience to date has shown that online searching of library catalogues and teleconferencing, as a means of accessing a vast amount of information, is the two Internet features most appreciated by the Library's users at Chelyabinsk State Technical University (Zelenina and Krivoshchekov, 1996).

Information quality problems concerning the Internet are treated in particular among Danish Internet users. It also outlines consequences for the new information professional and the electronic research library. The paper also
considers the virtual reference desk as a part of a controlled information network environment, with different service layers regarding quality of information (Clausen, 1996). Internet can be applied in library and library science processes, in addition to interlibrary loan (Koltay, 1997). The study also presents Internet service suppliers and sources, especially international ones, and discusses their use in various library fields, including acquisitions, indexing, classification, reference services, and library management.

Half the university libraries in Pakistan have access to the Internet and it has become an essential part of library services. The Internet is also being heavily used for performing various library functions such as: reference work, classification and cataloguing, document delivery, and subscription to online periodicals. The problems that are preventing wider use of the Internet in higher educational institutions of Pakistan are also discussed. All libraries that had Internet access were using more than one service. These libraries were heavily using e-mail and the World Wide Web. Five libraries reported that they use FTP and Telnet, while only two were using Gopher services (Saeed and Others, 2000).

The results of a 1994 survey of US academic medical libraries to determine the extent of Internet usage and establish a baseline for additional investigation focused on the public services aspects of the Internet rather than on technical issues. It indicated that, Internet tools and resources have been used most heavily in the librarians work practices. However, it remains to be established whether use of the Internet by users or librarians has significantly helped them meet their information needs and this fact alone suggests one line for additional investigation (Schilling and Wessel, 1995).

Internet is an ideal platform in Library related activities mainly acquisition, Classification, Cataloguing, Serial Collection, Resource sharing,
Reference services, Information services, database access and user education programmes (Yadhav, 2002). The Internet can be successfully applied in Library activities and services viz., collection development, acquisitions, cataloguing and classification, circulation, preservation and storage, cooperation, information services, user training, marketing of library services and inter-library loans (Kumbar, 1999). The Internet has enabled academic libraries to widen their services far beyond a basic reference service and traditional print-based collections. It also discusses the impact of Internet use on academic library services and presents an overview of important Web resources for academic library users and staff (Selvi, 1999). Application of computers and networking technologies has improved the efficiency of library services and enhanced information storage and retrieval and describes the features of Internet and intranet technology in which this technology can be applied in library activities and services to improve library services (Krishna, 1999).

3.7 CONCLUSION

It is observed from the review of the literature on the research topic - Internet, that enormous literature has been generated, much of it is reported from abroad and to some extent from Indian point of view. Most of the literature is exploratory in nature. Internet is a metamorphous concept and as such, research on Internet has been carried out on various facets of Internet technology. However in the Indian context, one could say that despite the growth in the number of netizens, the research studies in Library and Information Sciences pertaining to the use of the Internet as an information source and its services is at its infancy stage. It has been gradually emerging in India and moving towards the development of inter-disciplinary subject in Library and Information Science.
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