7.1 INTRODUCTION

An attempt has been made to give in summary form, the findings of the study and the recommendations to improve the use of the Internet as an Information Source among engineering faculty and Research Scholars and to implement Internet technology successfully in Libraries of National Institutes of Technology in India to enhance the exploitation of its rich information base and offer services to the clienteles.

7.2 SUMMARY OF FINDINGS

The significant findings of the research study pertaining to Use of the Internet as an Information Source among Engineering Faculty and Research scholars and its impact on Libraries of National Institutes of Technology in India are summarized below. The findings have been reported under characteristics of population, Use of Internet in Teaching and Research environ, Level of Satisfaction towards Internet, Search Strategy and Impact of Internet on LIS activities and services.

7.2.1 CHARACTERISTICS OF STUDY POPULATION

- Twelve Regional Engineering Colleges in India were covered for the study from all the corners of India representing south, north, east and west region of India, out of seventeen Regional Engineering Colleges available in India. A total of 850 questionnaires and Interview Schedules were distributed to the faculty and research scholars, 665 questionnaires were duly obtained with a response rate of 78.24%. Further, a total of 17 questionnaires were distributed to the Librarians of Regional Engineering Colleges in India, out of which 10 were duly obtained, with a feedback of 58.82%.
The study population consists of Professors, Associate Professors, Lecturers and Research Scholars in which the teaching faculty amounts to 55.3% (Professors – 17.2%, Associate Professors – 15.5%, and Lecturers – 22.6%) and Research Scholars to 44.7%.

Majority of the respondents were in the age group under 30 years accounting to 59.2%, while the respondents in the age group between 31-40 years and 41-above were 19.1% and 21.7% respectively.

About 47.6% of the respondents possess doctorate while the rest are non-PhDs. Thus, approximately the respondents of the study are in 1:1 ratio, as far the grading of qualification is concerned.

Most of the Professors are having rich teaching experience of more than 10 years in their respective fields. Nearly half of the Associate Professors are having teaching experience of 6-10 years and 11 and above years respectively. While most of the Lecturers are having teaching experience of 1-5 years. In a nutshell, nearly 58% of respondents of the study are having teaching experience while almost all the respondents possess research experience.

The most popular information sources referred by the Engineering community for meeting their nascent information needs are Internet, Books, and Scientific Journals.

Majority of the engineering scientists are making use of computers in their routine activities daily and at least twice a week.
7.2.2 USE OF INTERNET IN TEACHING AND RESEARCH

- Internet accessibility for the engineering faculty is mainly at Department, followed by Private Browsing Center, Computer Center and Library. On the other hand, for the Research Scholars, Private Browsing Centers and Department (48.3 per cent) forms the access points for browsing the net.

- Most of the respondents are using Internet for the last 1-5 years, while a very small portion of respondents have been using the Internet for the last 6-10 years.

- Majority of the respondents rate their ability to use Internet as ‘Average’, and followed by respondents rating their ability as ‘Beginner’ and ‘Experts’ in using the Internet.

- Most of the respondents have not undergone any formal training in Internet access and majority of the respondents opine that, there is a need for formal training in Internet access.

- The most popular perception of Internet technology described by the Engineering scientists is ‘Wealth of huge useful current information’ and is followed by ‘Effective communication tool’ ‘Enhances knowledge’ ‘Great reference value’ and ‘Mechanism to save time’.

- The main purpose of using the Internet is as ‘a means of communication’. This is followed by use of the Internet mainly for research purpose, downloading programs, chatting and entertainment.

- Research articles, Career Planning and Higher education, Training/ Seminar/ Conferences, Placements, Project reports, Fellowships and
Research Reports are the preferred information sources accessed by the engineering community on the Internet.

- E-mail service and World Wide Web (WWW) are the most frequently used Internet services among the engineering community, while relatively less time is spent on the Internet services like Chatting and Newsgroups.

- Score analysis for Use of Internet (UOI) has been analyzed using Rensis Likert's method of summed ratings. It was found that the minimum score obtained is three, while the maximum score obtained is 93 and majority of them have responded positive pattern of scoring 50 and above.

- The designation forming the status of respondents had an impact on Use of Internet and reveals that, use of Internet differs significantly by designation of respondents, showing statistically different variance among respondents.

- Young people are more prone to use the technology than older people in respect of age and thus, the level of Internet use is dependent on age of respondents.

- Relative change in qualification has had impact on Use of Internet among researchers’ aspirations in meeting the information on the net and thereby it is found that the extent of Use of Internet is dependent of qualification of respondents.

- Teaching experience of respondents has a direct bearing on the use of Internet as an information source and is a major factor influencing the extent of use of Internet.
There is a change in use of Internet due to change in research experience of respondents of the study and thus the two factors Use of Internet (UOI) and research experience are not independent rather they are strongly associated to each other.

Training had an impact on use of Internet and level of training in Internet, changes the proficiency of use of Internet.

As Use of Internet is categorized as low, medium and high, it is observed that, use of Internet is medium among respondents throughout the study, irrespective of learner characteristics viz. designation, age, qualification, teaching and research experience and formal training. Thus, the use of Internet is medium among respondents of the study.

7.2.3 LEVEL OF SATISFACTION TOWARDS INTERNET

E-Mail and World Wide Web are the most widely used Internet services by the engineering community and it has yielded satisfaction and as a whole, most of the respondents opined satisfaction with the current state of Internet and its support in their academic and research activities.

Most of the respondents of the study clearly indicated that, low bandwidth is one of the problems in the effective use of Internet facility. However, approximately half of the respondents opined that the Internet problems particularly Virus transfer, Pop-up-ads, frequent disconnection and getting connected do not indicate much problems for the engineering scientists for accessing Internet.

Majority of the respondents rated various features of Internet as Good, Very good and Excellent i.e. Usefulness, Flexibility, Organized Information, Hypertext Links, Ease of use, Comprehensiveness, Content
of Information and Timeliness respectively. However, the salient features of Internet mainly speed and quickness and uniqueness has yielded less satisfaction to the respondents, as compared to other features of Internet.

- It is observed from the table that, the minimum score obtained is 0 while the maximum score is 63 with a total number of frequency amounting to 645 for the variable Level of Satisfaction.

- The extent of level of satisfaction is affected with the change in status of designation and therefore, there is an association as far as designation of respondents and level of satisfaction is concerned.

- It is found that, the age of respondents is not dependent on the extent of level of satisfaction, as the statistical inference shows that, the observed value and expected value are not dependent on each other.

- Qualification of respondents and level of satisfaction are dependent variables and thus, change in qualification results change in level of satisfaction of respondents.

- The extent of level of satisfaction and teaching experience of respondents are dependent on each other and change in teaching experience of respondents influence the level of satisfaction towards Internet, showing statistically significant.

- The extent of level of satisfaction and research experience of respondents are two independent variables and are not associated with each other.
There is strong correlation as far as level of satisfaction and formal training is concerned and thus formal training is dependent in determining the level of satisfaction of respondents.

The results indicated that, there is very high correlation between variables, Use of Internet and Level of satisfaction. The co-efficient of correlation is also statistically significant showing high positive correlation, which implies that higher the level of satisfaction, higher will be the use of Internet.

It is suggested that, the most contributing factor is LOS (Level of satisfaction), hence any step to improve the UOI, LOS should be given high priority, followed by other variables. One unit increased in level of satisfaction will increase seven units in use of Internet.

Internet has advantages over print sources with respect to Journals, Patents, and Research reports, Biographical Sources, Abstracting Journals and Directory. While the print media is preferred by the respondents against Internet source with respect to Books, Bibliographies, Theses, Conference proceedings, Encyclopedias and Dictionaries. However, the overall preference over Internet to Print and vice versa is not much and shows a narrow margin.

The attributes of Internet compared to library shows that Internet is convenient, Accessible, Comprehensive and easy to use.

Most of the respondents have clearly spelt that, Internet is not going to replace traditional Libraries in future. Rather, the Internet acts as a supplement to Library, in building the image of library and improving the efficiency of information services to the users.
As far as Level of satisfaction towards Internet is concerned, majority of the teaching faculty and research scholars have indicated medium level of satisfaction towards Internet, irrespective of learner characteristics viz. designation, age, qualification, teaching and research experience and formal training.

7.2.4 SEARCH SKILLS FOR INTERNET SURFING

- Search Engines are the most preferred and best way to find information, from the vast store of information on the net and this is followed by directly browsing web regularly.

- Google is the most prominent search engine used by the user community of engineering sciences and is followed by Yahoo, Rediff and AltaVista.

7.2.5 IMPACT OF INTERNET ON LIBRARY AND INFORMATION CENTERS

- It is observed that, most of the NIT libraries were established between 1959 to 1963 and among them, NIT, Warangal is the first institute of national importance established in 1959 while, NIT, Jalandhar is the youngest, and was established in 1986. An average of 8-9 library staff is available for managing the library operations.

- Most of the libraries viz. NIT Warangal, Surathkal, Kurukshetra, Jaipur and Calicut are having more than one lakh collection of Books including bound volumes and NIT Warangal (415) dominates in subscription of scientific journals followed by NIT, Calicut (356) and Surathkal (273). Standards and AV materials form specialized collection of National Institute of Technology libraries and NIT Surathkal has an edge over these resources (15,454 and 1568). DDC and AACR-2 have been
extensively used by most of the libraries for proper organization and providing retrieval access tools to the engineering group. It is further found that, the libraries have extended various information services like OPAC, Reference service, CD-ROM database search service and access to online databases.

- Most of the libraries are having more than ten Pentium computer systems along with scanner, modem and printers. Specifically, NIT Caliculf, Warangal, Surathkal, Nagpur, Surat and Rourkela are having more than twenty computers for carrying out library operations. Almost all the libraries are working on Windows NT platform, while NIT Surathkal and NIT, Surat are using LINUX platform for executing library activities and services along with MS-Office software, as a common tool for office correspondence. To achieve consistency and compatibility, NIT libraries are using LIBSYS – dedicated library software for automating Library-in-house activities.

- All the libraries are having Internet facility for carrying out in-house activities and services to the users. Few libraries extend Internet facility to the users mainly to access information resources on the net, while e-mail facility is restricted to the users.

- Libraries perceive Internet mainly as Communication tool and supplement to online library. The librarians further describe Internet as – Wealth of huge current information and great reference value and this is followed by a mechanism to save time, image building for library and catching service to the Library.
All the libraries do not consider Internet as a substitute to library and rather they consider it as supplement to library as online library.

The major purpose of using Internet is Internet/E-mail service, means of Communication, accessing online databases and hosting home page. Followed by this, the libraries of NIT uses the Internet for Subscription to e-journals, Reference services, Access to catalogues and undertaking literature search.

E-mail, Online Databases and WWW are the most frequently used Internet services by the librarians. However, the Internet services - Discussion Forum, Newsgroups, Chatting, FTP Freeware/Shareware, Telnet and Gopher are rarely used Internet services for the library activities and services.

Internet is mainly used for identifying latest Books and journals in Acquisition and serials control activities of library. NIT libraries are extending information services viz. Internet, Library catalogues, E-mail, Online databases, Resource Sharing and Hosting home pages.

Search engines are the ultimate mode of searching information on the net. Besides this, different methods adopted for searching information is obtaining information from colleagues, browsing web sites regularly and using Subject Gateways. Among the search Engines, Google and YAHOO are the most preferred search engines by libraries.

The main problems of Internet are Low bandwidth, Lack of training, Pop-up ads / screens and Getting connected.

Almost all the libraries are fully satisfied with E-mail, WWW and Online Databases. Further, the respondents have indicated overall
satisfaction to a greater extent to the current state of Internet to support Library activities and Services.

- Among the various features of Internet, Usefulness, Comprehensiveness, Uniqueness and Accessibility \((X=3.5)\) are the features that have been rated nearly very good by the libraries of NIT in India.

- The features of Internet – convenience, comprehensiveness and Ease of use have advantage over library except accessibility, which has slight edge in favor of library. Among the various features, ease of use \((60\% \text{ against } 10\%)\) has strong plus point for Internet against library and as a whole, 80\% of librarians agreed that, Internet is advantageous over library.

### 7.3 RECOMMENDATIONS FOR THE STUDY

An attempt has been made to address several sets of overall recommendations based on the findings and users suggestions of the study that may help further to illuminate the better use of the Internet as an Information source. These recommendations are classified under two categories:

#### 7.3.1 To Promote and Optimize the Use of Internet as an Information Source among engineering faculty and Research scholars

- Developing Technology Culture

  Use of Information and Communication Technology is a basic foundation for optimization of Internet resources. Hence, it is recommended to incorporate technology based education for class related research to familiarize with the significance of technology and overcome inhibitions. Academic and
research community should be made to use computers as a means to enhance efficiency to imbibe technology culture irrespective of age.

- Creating awareness about the worthiness of Internet as an Information Source

Impart and educate the educationalists about the value of Internet and explore the wealth of resources available on the net to strengthen the information base to meet their academic endeavor. There is a need to create a sense of integrity and acceptance to the Internet technology for the user community as a valuable information resource to build strong information base.

- Availability of strong technological infrastructure

Campus network facility with strong infrastructure facilities of Internet connectivity will boost the better use of Internet services. A strong feasible network with sufficient number of nodes to access Internet facility with better bandwidth, shall improve the use of Internet.

- Accessibility to Internet services

It is recommended to make provision for Internet facility at various access points namely hostels, departments, computer center and library so that inclination to use the technology is inculcated in students and faculty alike.

- Internet in Educational curriculum

To promote better use of Internet in the classroom and research endeavor of engineering community, the Internet use should be incorporated in the curriculum of engineering sciences.
• Education and Training Program

There is an urgent need to educate and organize training program as a regular feature to train and explore the various options of Internet services and tools. For this library managers and also computing centre should initiate a detailed training schedule for the incumbents along with teaching faculty.

• Monitoring Internet use for Academics

The institute should strategically plan and assist netizens to check the proper use of Internet for academic and research purpose only, without deviating from the purpose of Internet in the interest of academic and research goals of the institute.

• Internet services and Tools

The Internet services and tools mainly FTP, TELNET, Discussion forums, Newsgroups, Online Databases and Chatting has to be given special emphasis, as many are either not aware or less used services. Efforts to herald its benefits to users will optimize these Internet services also.

• Compilation of Web sites

Library managers, as an information specialist, need to keep track of new web sites of interest to engineering sciences by identifying and notifying free e-journals, subject gateways, important web sites, search engines to the engineering scientists.
• Enhancement of use of Internet and level of satisfaction

Since the Use of Internet and Level of satisfaction is at medium level, there is a need to convert this into high level of use of Internet and level of satisfaction among respondents. By incorporating a sense of Internet culture at curriculum in engineering, provision for maximum access points and effective user education and training programme would achieve the enhancement of use of Internet, as an information source and lead to optimum level of satisfaction.

• Refining Search Strategy

In the world of Internet, information overload and disorganization of information are the two challenges that signify the importance of search strategy adopted by the respondents of the study. Although the search engines are used for searching information on the net, it is recommended to use meta-search engines, subject gateways and advanced search options available in respective search engines. Besides, they need to subscribe discussion forums, scan the follow up references and participate in Seminar/Conference to identify the up to date web sites of their interest.

• Ensuring the speed of Internet

As the user community has expressed their dissatisfaction towards the speed of Internet connectivity due to low bandwidth, it is recommended to establish campus Internetworking with dedicated leased line facility or VSAT technology for speedy access to Internet facility and availability of number of nodes to the users. It should also make provision to upgrade the infrastructure from time to time.
7.3.2 To promote the application of Internet in Library and Information Services:

- Internet Service: An integral part of Library service

Internet should become integral part of library service among NIT libraries. As Internet is considered as online library and supports the information needs and strengthens the resources of library, it should be an important component of library services and not the Computing center alone. This will not only build the image of librarianship, but also enables to build strong information for the library and extend Internet based services to the users and adds to the designation of Internet Librarian, in true sense. For this, mastering over Internet is desirable through attitude, dedication and training.

- Develop skills and expertise among LIS Professionals

It is recommended to have qualified librarians and supporting staff to achieve highest degree of success, especially in this Internet environment, by means of training and workshops. They should learn to be self dependent and must not completely depend on computer science departments. They must learn how to tackle at-least minimum technical difficulties to the extent possible. This is like ‘if you give a man a fish, he will have a single meal, if you teach him how to fish, he will eat life long’. Then, they should also conduct training programmes in Internet to the users at regular intervals for optimum utilization of Internet and derive level of satisfaction towards Internet, as an information and research source.
• Exploring the facilities of Internet Technology:

Besides, E-mail, WWW and Online databases, libraries should also explore the Internet tools like Discussion forums, Newsgroups, FTP, Telnet, Freeware /Shareware programs, Interactive discussion for the modernization of library activities and services.

• Document Delivery Center of Excellence:

NIT Libraries have to develop an IT infrastructure and create integrated information system through campus networking in order to pool and share the quality resources and services. For this, identify the rich resource center among NIT with respect to specific types of subject collection and type of information sources (Viz., Standards, Patents etc.), which in turn will act as nodal center of excellence serving the information needs of engineering community.

• Internet application in LIS activities:

As Internet is being applied to a little extent in library activities and services of NIT, it is suggested to employ the Internet technology in library activities like acquisitions, cataloguing and classification, serials management, training and user orientation, professional development of library staff, reference and information services, web-OPAC service, content alert service, bulletin boards and discussion forums, access to online full text and abstracting databases, electronic document delivery services.
7.4 FUTURE RESEARCH

Internet user research in different areas like Medical Sciences, Academic and Research environment etc. could strengthen the research. Further, there is a need to conduct in-depth studies regarding Internet applications in Library and Information Centers. Insights into these issues will advance the knowledge base about online surveys and thereby help to empirically assess the potential of the Internet to supplement traditional means of conducting research by ensuring an adequate response rate and response quality. The major thrust areas of future research on Internet are:

- Internet Information Services and Products;
- Filtering of Information;
- Search engines: Development and Comparison;
- Retrieval and evaluation of Information;
- Bibliographical control on the Internet;
- Reliability of Information on the net;
- User Interfaces;
- User studies to explore the Internet treasure;
- Organization of Information on the web;
- Intelligent search agents
- Web vs. traditional information resources;
- Characteristics of Internet documents;
- TQM Model for Internet services;
- Designing Machine readable catalogues and content designators on the lines of MARC; and
- Internet application in Library and Information Centers.
7.5 CONCLUSION

To date, there has been little or no quantitative evidence in research for examining self-regulated learning of different learning strategies in the informal setting of Cyberspace. With the threat of a massive influx of uses for advanced electronic media and technologies especially, Internet in the classroom and libraries, an abundance of qualitative research has to be performed. The balance between choice i.e. constructivism, and structure i.e. objectivism, in creating successful environments that encourage self-regulated learning, is an area of needed professional development. The role of librarians is continuing to evolve with the adoption of Internet and World Wide Web into the profession of librarianship. Though it is difficult to predict with certainty how active the role of librarians would be in this evolving scenario, it can be said with confidence that their services cannot be dispensed with because they have the necessary qualification and historically the first right to attend to the information needs of the seekers. Internet has become the information world’s obsession, posing many strategic and searching questions for information users, information professionals and information industries.

Knowingly or unknowingly, intentionally or unintentionally, Internet has had impact on Library and information centers to such an extent that, it has become integral part of library activities and services. In this environment, when the Ministry of HRD, has taken a giant step to subscribe to full text and abstracting information resources for the engineering scientists under INDEST consortia available on the net, the functioning of library system has to be redefined. Based on the findings that, Internet is not a substitute to the library, but rather supplement to library, the librarians cannot relax. Similar to the dictum, survival of the fittest, until and unless, the library professionals show their competence in developing technology based products and implementing
information technology especially Internet technology in library activities and extending information services, there is a risk for librarianship. Before a non-professional steps into their shoes, the librarians have to evolve to meet the challenges of the information technology.

Librarians have been spurred by technological developments to become more efficient organizers, indexers, abstractors, archivers, in addition to assuming new roles such as, intermediary, facilitator, end-user trainer/educator, web organizer and designer, researcher, interface designer, knowledge manager/professional and sifter of information resources. It is therefore, up-to the Information and knowledge managers to make or mar the professional development by incorporating Internet technology as an information and research tool and evaluate at regular intervals for optimization of Internet resources and services to the devotees of Library.