

Impact of ICT Towards Change of Library and Information Science (LIS) Curricula and Information Services Pattern

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Abstract

The paper discusses the paradigm shift from delayed book and journal print information services to fast items like open access and institutional repositories for scholarly world and impact of the revolutionary inventions. In this context, LIS curricula should include the components like areas of library automation, networking, internet, website development, digital technology (including digital library/institutional repositories, open source movement) etc. It also discusses about the constraints and opportunities of the library schools and key to success of Indian LIS students in national and international job market.

Keywords : ICT, Library Curricula, Open Access, Open Source

1 Introduction

ICT (Information and Communication Technology – or Technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite system as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, health care, or libraries. It is common for this to be referred to as IT & T in the Australasia region, standing for Information Technology and Telecommunications.

Few concepts in history have spread as rapidly as the digital divide (the disparity between technological “have” and “have not” geographic locations or demographic groups), and with it, the hope that modern ICT could be used to promote development. From an unknown mathematical phrase, digital divide has suddenly leapt to the forefront of the development discourse. It is today the slogan of the season, the mantra of the year. Billions of dollars and crores of rupees are committed to the hope that ICT can enable the poorest of developing nations to leapfrog traditional problems of development like poverty (in 2002, UNESCO initiated a programme to innovate and research ICT applications for poverty reduction [ictPR] in nine project sites across South Asia (UNESCO, 2004), illiteracy, disease, hunger, unemployment, corruption, and social inequalities so as to move rapidly into the modern information age. In India as abroad, the basic hope is that ICT can be used in a double capacity:

- ◆ First, to enhance India’s international economic position by building further on the success of the Indian software industry.
- ◆ Second, to develop programs of IT for the masses (in the words of a recent Government of India report) that would play a critical role in solving the as yet unsolved problems of

development that beset large sections of the Indian population.

However, the positive effects of ICTs have continually been noted in developed countries, it has become critically important for developing countries like India to embrace these technologies. The United Nations Development Programme (2001: section 2.1.1) refers as a "powerful enabler of development" because of the significant impact on the economic, scientific, academic, social, political, cultural and other aspects of life. In higher education and human capacity building, there are significant patterns of change because ICTs are impetus for change in traditional concepts of teaching and learning, as well as prime motivation behind the change in scholarly and professional activities. Library and Information Science (LIS) academic departments have witnessed not only this increasing globalization of higher education but also that of the LIS work place including the consequent extension of competition beyond traditional, institutional, national and regional boundaries. This environment has made it important for LIS education and training to strive to improve their quality of programmes, on the one hand to be able to participate in educational networks and develop innovative strategies in planning and administration of LIS education (Curry, 2000), and on the other hand, to produce graduates whose workplace spans the whole world. Thus it is forgone conclusion that ICTs are significant in the achievement of LIS educational goals/objectives and the fulfillment of the primary tasks of LIS schools. Hence, with this conclusion came the realization that there was need for greater infusion of ICT competencies into the LIS students.

2. ICT and Change in LIS Curricula

Sutton (2001) observes that the changes brought into the LIS profession by ICTs can be divided into two major categories, namely, the natural evolutionary changes, on the one hand, and transformatory changes, on the other. As natural evolution, the library and information science profession has harnessed ICTs to perform old tasks better through the automation of housekeeping tasks such as reference work, bibliographic services, cataloguing, serials, circulation and acquisition, which are performed more efficiently in an ICT environment. Transformatory changes, on the other hand, include the emergence of new functions arising out of an expanded, demand-driven information society, wider and/or interdisciplinary jurisdiction and closer focus on user needs (Sutton, 2001). These transformative changes represent systematic changes that substantially alter the boundaries of the profession. For example, Fourie and Bothma (2006) observe the increased use of the World Wide Web in private, social, business lives of many people and hence note that it is a vital component of the enabling structure for school, university, career and other use for information and communication. This one platform exhibits the fact that those involved in information services need to be sufficiently prepared to handle both the users of information and the attendant technologies. Thus knowledge of networking, communication and retrieval technologies has become core to the profession. And as distinctions continue to blur between telephones, television and computers (Curry, 2000), information professionals, and/or LIS graduates have to be able to navigate information

networks competently so as to provide relevant services and materials for their users. Consequently, LIS curricula need to consolidate ICT concepts, knowledge, skills and proficiency into core competencies, and LIS schools need to provide adequate content and practice that will enable LIS graduates to adapt and use ICTs effectively.

After the IT revolution in 1990s, almost all Indian universities change their syllabus in BLIS & MLIS level. UGC (University Grants Commission) also change the NET (National Educational Testing) syllabi for Library and Information Science subject and the major changes were made in 2000s. The components of ICT in NET Examination are given in the next section.

3. IT/ICT coverage in UGC-NET Syllabus for LIS

In Unit VII, the following components are included:

Information Technology – Components; Impact of IT on Society

Computers – Hardware, Software, Storage Devices, Input/Output Devices

Telecommunication – Transmission media, Switching Systems, Bandwidth, Multiplexing, Modulation, Protocols, Wireless Communication, Fax, E-Mail, Tele-conferencing/Video-conferencing, Bulletin Board Service, Teletext, Videotex, Voice Mail

Networking – Concepts, Topologies, Types – LAN, MAN, and WAN, Hypertext, Hypermedia, Multimedia, Integrated Services Digital Network (ISDN), Open Systems Interconnection (OSI)

In Unit VIII, the following components are considered:

Library Automation – Areas of automation, Planning, Hardware and Software Selection, OPAC

Networks – ERNET, NICNET, DELNET, JANET, BLAISE, OCLC, INFLIBNET

Internet- Components, Services, Browsing – Web Browsers, Search Engines, Meta Data, Digital Object Identifier (DOI)

National and International Information Systems – NISSAT, NASSDOC, INSDOC, DESIDOC, INIS, AGRIS, MEDLARS, INSPEC

4. Model IT/Library Automation Components

4.1 B.Lib.Sc./BLIS Course (Theoretical):

- ◆ **Information Technology:** Definition, components, need/impact of IT on society, scope and objectives
- ◆ **Computer Basic (Hardware):** Historical development of computers, generation of computers, classification of computers
- ◆ **Computer Architecture:** Central Processing Unit/Storage Devices, Input and Output Devices

- ◆ **Software:** Operating Systems: single and multiuser, basic features of MS-DOS, Windows-NT, MS Windows, Linux, Unix, Solaris etc., programming languages: concepts and tools, algorithm and flowcharting, general application software
- ◆ Computer applications in Library and Information Centres, Use of CD-ROM, Internet, library application software

4.2 **B.Lib.Sc./BLIS Course (Practical should be in detail):**

- ◆ **Use of Operating System**
- ◆ **Word processors, spread sheets**
- ◆ **Database creation and search**

4.3 **M.Lib.Sc./MLIS Course (Theoretical):**

- ◆ **Computer Basics and Hardware:** Computer architecture – CPU and peripherals, multimedia applications
- ◆ **Software:** Operating System, programming languages C,C++, Java, Visual Basic etc. and other application software
- ◆ **Library Automation:** Need for in-house operations – modules for acquisition, Catalogue, circulation, serial control, OPAC and services like CAS, SDI etc. and Administration (for maintenance); library automation software packages – their study and evaluation
- ◆ **Data Processing:** Data structure, data models, file organization, logical operations of some database management software (dBase, CDS/ISIS etc.)
- ◆ **Telecommunication:** Basics of communication systems, transmission media and devices, switching system, bandwidth, multiplexing, modulation, protocols, wireless communication, Fax, e-mail, tele-conferencing, bulletin board service, teletext, videotext, voice mail
- ◆ **Networking:** Concepts, network types and topological communication networks (LAN, MAN, WAN), library networks, hypertext, hypermedia, multimedia, Integrated Services Digital Network (ISDN), Open System Interconnection (OSI), ERNET, NICNET, DELNET, JANET, BLAISE, OCLC, INFLIBNET etc.
- ◆ **Internet :** History, basic features and tools, markup language history, connectivity and protocols, services, browsers and search engines, security, Metadata, Digital Object Identifier (DOI)
- ◆ **National and International Information Systems:** NISSAT, NASSDOC, ICSSR, NISCAIR, INIS, AGRIS, MEDLARS, INSPEC.
- ◆ **Management of Computerised Systems:** Selection of hardware and software, manpower requirements etc.

- ◆ **Digital Technology:** Impact on education, Digital libraries – contents and benefits, Institutional Repositories, open source movement, digital preservation, content development, artificial intelligence and expert systems with reference to LIS
- ◆ **Website Development:** Different aspects of quality library website, evaluation criteria of usability of website, home page: characteristics, evaluation, main topics of academic library and public library, better homepage development, website visit statistics, web 2.0 services/ weblogs/blogs: criteria, purpose

4.4 **M.Lib.Sc./MLIS Course (Practical should be in detail):**

- ◆ **Operating System, word processing**
- ◆ **Creating and maintenance of database by dBase, CDS/ISIS etc.**
- ◆ **C, C++, Java, Visual Basic etc. programming languages**
- ◆ **HTML, XML, SGML and web page design**
- ◆ **Proto type digital library initiatives/institutional repositories**
- ◆ **Library software packages – national and international**
- ◆ **CD-ROM searching**
- ◆ **E-Mail, Internet searching**
- ◆ **Project work (internal assessment)**

5. **Major Constraints and Opportunities**

All Library and Information Science (LIS) schools recognize the importance of infusing more ICTs in their curricular. But their wishes and efforts are constantly thwarted by a number of key constraints. These include:

5.1 **Constraints**

5.1.1 **Inadequate Technological Infrastructure**

Inadequate technological infrastructure to support the integration of ICTs in the curricula (Manda, 2006), this refers to issues as poor or lack of national ICT policy, low internet connectivity, inadequate supply of electricity, inadequate number of PCs, etc. There is need for policies that deregulate satellite communication and other telecommunication links, regulate ISPs, regulate government and cross-border data flows, etc. ICT policies can help address stringent tax regimes that still treat computers, communication equipment and other peripherals as luxury items, thus imposing heavy import duties on them and subsequently rendering these items very expensive.

Internet access is now widely available, but the efficiency is poor as many LIS schools experience downtime, several times a week. The telecommunication services are the root cause of these downtimes in terms of either low bandwidth, technical faults or other network configuration problems. As Jensen (2005) puts it, there are also “many external system factors such as electricity, transport

networks, import duties” etc, which impact on internet service delivery on the Indian sub-continent. In some institutions, access is limited, not only by the number of internet service points, but also by the time that access is available or permitted, leave alone the difficulty of bandwidth. Yet for research purposes, access to the internet is no longer a luxury or privilege for only a few people because in academic circles, access to the internet and hence to the world’s stores of knowledge is a necessity. LIS departments still need to lobby to gain greater access to internet resources for academic staff and/or research. Thus there is urgent need for improved ICT policies and infrastructure in institutions and countries.

5.1.2 Lack of Funding/Sustainability of the Technology

Funding/sustainability of the technology is the major non-technical constraint in LIS schools (Minishi-Majanja, 2004). Most universities decry the issue of under-funding in most of its functions. Besides, the unprecedented, phenomenal and multifaceted growth and development of the ICTs themselves pose another challenge. This rapid pace and transient nature of technological development requires sustained funding. While the centralization of ICT services, hence funding, has been found to be the most affordable system for institution-wide development and use of ICTs, it only works well where there exists a policy that has explicitly incorporated the goals and needs of all sectors, including those of the LIS school. In institutions where the political economy is slanted, coupled with the absence of such a policy, a LIS school may suffer from neglect and hence be unable to develop and use ICTs.

5.1.3 Gap between Job Market and LIS Curriculum

There is a gap between the competencies that LIS education provides and those required by the job market today (Ikoja-Odongo, 2006). It is a challenge for current LIS curricula to meet the expectations of stakeholders (Beukes-Amiss, 2006). Even though some consultation is usually taken by LIS schools when they re-curriculate, it is often difficult for employers to clearly visualize how their needs can be translated into the curriculum and vice versa. Producing job-specific graduates is a “tall-order” considering the diversity of employers. LIS schools, in trying to provide for everybody, often end up providing for none.

5.1.4 Lack of ICT Skill of Lecturing Staff, System Manager/Information Scientist and Low Level of Students Epistemological Access

Manda (2006) observes the lack of ICT knowledge and skills among lecturing staff. So, re-skilling of lecturing staff and more discussion with the students regarding ICT matters are very much needed. There is still a serious need for technical support staff with high level expertise in the maintenance aspects of ICTs because of poor maintenance and insufficient skills to diagnose system problems and swap parts.

Minishi-Majanja (2004) decries the low level of students' epistemological access and Ikoja-Odongo (2006) observes that many students join the university without any computer skills and hence much time is taken trying to make them computer literate. However it seems that the [problem of students' ICT skills may be short-lived because on the one hand, computer literacy has now been introduced at many school and colleges, while on the other hand, the 'N' and 'Y' generations are becoming of age.

5.2 Opportunities

5.2.1 Extended Job Market

The market demand for LIS graduates who have strong ICT skills and broad perspective on information management has expanded. Both the public and private sector have recognized the importance of effective management of their knowledge and information resources. However, many of the organizations in these sectors do not necessarily want the traditional LIS perspective. Rather, they need a versatile professional who is able to actively participate in detecting cues for relevant information, gaining/providing access to relevant information sources, searching and synthesizing data, repackaging information, and adding any other value that enhances the effectiveness of the organization. All these need extensive ICT knowledge and skills that LIS education can effectively integrated in their curricula.

5.2.2 Curricula Review and Co-ordination with Other LIS Schools

Indian LIS schools should continually review their curricula and innovatively infuse a stronger ICT component. Apart from the established procedures of curriculum review, heads of LIS schools need to network and keep in contact with colleagues in other LIS schools through correspondence, e-mail or conference attendance so as to pick up new ideas. Additionally, LIS schools should explore methods of collaborating with their counterparts (such as other LIS schools, academic staff or non-LIS departments), who have expertise and resources to offer modules/competencies that they may be unable to offer. Where academic staff expertise is the problem, but ICT facilities are available, this can be achieved through distance education and/or online education.

6 New Pattern of Information Services

6.1 Open Access

The development of technology (in particular, of the Internet) has created enormous opportunities. Scientists now have almost instant access to a large and rapidly increasing amount of information that previously required trips to the library, interlibrary loan delays, or substantial effort in locating the source (Lawrence, 2001). Although it is now possible to have free access to a significant amount of literature on the web, many research results are still not freely available. The reasons may be many – the non-availability of major high impact journals on the web through open access channels; the preference of researchers to publish in high impact journals on the web through

open access channels; the preference of researchers to publish in high impact journals coupled with the escalating subscription price of scholarly journals and e-journals, etc. Here arises the importance of open access, where the onus of making available the research results is placed more on the individual researchers and research institutions, in contrast to the earlier model of dissemination through formal publishing channels.

The concept of open access evolved during 1991 due to the realization of the need to facilitate scholarly scientific communication. If we look at the definitions of open access and various initiatives, it is apparent that, though different modes of open access have been developed, the philosophy remains the same.

Open access to scientific articles means online access without charge to readers or libraries. Committing to open access means dispensing with the financial, technical and legal barriers that are designed to limit access to scientific research articles to paying customers (Suber, 2002).

Open access is a cost effective way to disseminate and use of information. It is an alternative to the traditional subscription-based publishing model made possible by new digital technologies and networked communication (Association of Research Libraries, 2004).

6.1.1 Open Access Literature

Open access literature is available in open access journals, institutional repositories, subject repositories, digital archives, and so on. Another service that has gained momentum after the establishment of different institutional repositories or open access archives is the metadata harvester. Metadata harvesters index or harvest metadata from different open access archives and open access journals. The open access concept has now expanded to include the area of learning resources, through Open Courseware (OCW).

6.1.2 Present Status of the Developing Countries

For the developing world, the open access movement has come as a boon. The developed world consists of information rich countries, enterprises and organizations. These enterprises exert control over valuable information resources. For example, most top ranked peer reviewed journals in science, technology and medicine (STM) are published in the developed world. The major secondary database publishers also belong to developed countries. The developing world is at a critical juncture where the development of technologies, economics and humanity as a whole largely depends on access to relevant and adequate information resources. The developing world includes many information poor least-developed countries, where the academic and research institutions cannot afford to subscribe to a wide array of primary literature due to lack of resources or limited budgetary provisions. In this situation, the open access movement gains worldwide support as an alternative and sustainable model of scholarly communication and accessing research literature.

6.1.3 Open Access Projects

At the Massachusetts Institute of Technology (MIT), Open Courseware (OCW) is a major successful project that provides free access to around 2,000 courses. Its philosophy is to bring MIT education to the doorsteps of learners who are not fortunate enough to study for a degree, but who can get access to MIT's quality educational resources, inclusive of study notes, assignments, exercises, presentations, audio recordings, video recordings of live sessions, etc. OCW plays a significant role in open and distance education. The United Kingdom's Open University has already opened its courseware from the year 2006. In India, the Indira Gandhi National Open University (IGNOU) has taken up a project e-Gyankosh where all the courseware developed by the university is being placed in an open access repository online to facilitate wider accessibility. In the context of those countries where access is hindered by economic constraints, all these developments are quite significant. The development of free and open source software packages, such as DSpace and Eprints, is facilitating access to all kinds of material irrespective of scholarly publication. Using these free open source softwares a number of open access archives have been developed in India for wide dissemination of scholarly literature, viz. Eprints@IISc by the Indian Institute of Science, Librarians' Digital Library (first Dspace repository in India), SDL: Search Digital Libraries (second in World in LIS), DLRG: Digital Library User Forum by the Documentation Research and Training Centre, etc.

6.1.4 Open Access Initiatives in India

India is in the forefront of the developing world as well as the South Asian region in terms of both economic growth and scientific productivity. Research and development (R&D) establishments and institutions of higher learning in India are engaged in advanced studies, leading to the development of new applications, new techniques, new products and new technologies. These organizations have developed expertise in their respective areas that is now recognized worldwide. Such institutions are now collaborating with the world's leading institutions through varying degree of partnership. Leading Indian scientific research institutions, such as the Indian Institute of Science (IISc), the Indian Institute of Technology (IITs), the Indian Statistical Institute (ISI), and institutions under the Council of Scientific and Industrial Research (CSIR) and the Indian Council of Medical research (ICMR), now have considerably greater inflows of sponsored research, supported by industries and enterprises as well as by international and national funding agencies. Technology transfers and technology incubations from these institutions to enterprises and consultancy services for national development are also very significant. That is why cash inflows to research institutions of national importance are comparatively higher than those of non-elite institutions and universities. While the elite institutions have reasonably good information provision facilities that support scholarly communications, the not-so-elite institutions are struggling to achieve the same. The problem is mainly related to the accessibility of literature, the reason being primarily shrinking budgets. There is a paucity of funds for acquiring primary literature, i.e., subscription based scholarly journals. The

costs of subscriptions to scholarly periodicals, especially high impact journals, are increasing very rapidly, while library budgets have almost remained the same. The scholars' preferences for publishing in high impact journals to achieve recognition in the elite world create the necessity for the library to acquire such literature. Here open access literature can play a vital role, in terms of both research communication and access – provided, of course, that the benefits in terms of economic and social recognition are assured by this system.

The ICT infrastructure necessary to take advantage of open access is not adequate in developing countries, as is apparent in many cases. In India, however, the situation has improved to a considerable extent in recent years. The number of internet subscribers, for example, increased from 0.14 million in March 1998 to 3.64 million in March 2003 and about 7.2 million by 30 September 2006 (Department of Telecommunications, 2006). The total international bandwidth available currently stands at approximately 12 gbps (Garai and Shadrach, 2006).

Libraries and information centres attached to various types of institutions in India are now taking part in the open access movement by establishing institutional repositories, digital repositories to provide worldwide access to their research documents.

6.1.5 Indian Open Access Journals

Open access journals provide access to full-text contents of scholarly, peer reviewed journals. There are two types of open access journals – one available in electronic version only and the other available in electronic and print versions, viz., Current Science. In the first type, the journals are published at regular intervals on the Internet and do not have any print-on-paper counterpart. In the second type, the journals are published in print-on-paper format and distributed to subscribers. The same contents are made available to scholars free of charge in electronic form.

A number of scholarly journals, covering a wide spectrum of subjects, are published in India. Many of these journals are peer reviewed and indexed and abstracted in premier indexing and abstracting periodicals. But the availability of these journals outside India and the South Asian Association for Regional Cooperation (SAARC) region is very limited, due to the absence of strong distribution channels in other regions. The open access movement makes it possible for Indian journals to reach the target audience of the world's research communities. More than 150 Indian research periodicals now provide free access to their full text contents. The publishers of these journals publish print-on-paper journal issues, and also provide online access to the same contents. Some of the journals permit online browsing without user registration, whereas some, such as the Indian National Science Academy (INSA) journals, insist on free user registration for accessing the full-text contents of the journals. Very few publishers in India have started electronic-only journals. Metadata harvesters, journal indexing services and search engines harvest and index metadata of these open access journals, but some journals do not maintain structured metadata as required by metadata harvesters.

They simply upload the new issues of journals to their respective websites, as is the case with the journals published by Kamla-Raj Enterprises. That creates another major problem for the metadata harvesters and search engines. The National Centre for Science Information (NCSI) at the Indian Institute of Science (IISc), Bangalore recently initiated a project called 'Scientific Journal Publishing in India', sponsored by the Asian Media Information and Communication Centre (AMIC) in Singapore. Through this project, NCSI campaigned to the Open Archives Initiatives (OAI)-compliant architecture using Open Journal System (OJS) or similar software (Walters, Rajasekhar and Singhal, 2006).

The open access journals in India are mainly initiated by six journal publishers, namely, the Indian Academy of Sciences, the Indian National Science Academy, the Indian Medlars Centre of the National Informatics Centre, Medknow Publications, Indianjournals.com and Kamla-Raj Enterprises. These publishers have many titles to their credit. Some publishers have only one or two open access journal titles. Examples of such publishers are the Indian Statistical Institute, Publishing Sankhya (<http://sankhya.isical.ac.in>) and the Sameeksha Trust's journal Economic and Political Weekly (www.epw.org.in).

6.2 Indian Institutional Repositories

Some institutions in India, like the Indian Institute of Science, Bangalore; the Indian Institute of Management, Kozhikode; the Indian Statistical Institute, Bangalore; the Indian Institute of Technology, Delhi; the National Institute of Technology, Rourkela; the National Aerospace Laboratories, Bangalore; the National Chemical Laboratory, Pune; the Information and Library Network (INFLIBNET), Ahmedabad; the National Institute of Oceanography, Goa; the Raman Research Institute, Bangalore; the Indira Gandhi national Open University (IGNOU) and others have established open access Institutional Repositories (IRs) that disseminate the research outputs and open courseware of the respective institution. Sometimes these are self-archived. Otherwise, the administrators of the repositories collect the research documents from different sources and submits them to the IR on behalf of the person concerned (Rajasekhar, 2003).

Other types of digital repositories also exist in India that store and provide access to subject-specific collections of documents. These repositories accept scholarly publications from any professional or researcher who is concerned with the respective subject. The Librarians' Digital Library (LDL) of the Documentation Research and Training Centre (DRTC), Bangalore is an example of such a subject specific repository for library and information professionals. Another example is OpenMed@NIC, maintained by the National Informatics Centre, New Delhi, which stores and provides access to biomedical literature.

Another kind of digital repository in India stores and provides access to collections of a specific type of documents. Vidyanidhi of the University of Mysore is an example of such a collection that stores and provides access to electronic theses and dissertations of Indian Universities. Vidyanidhi accepts

any thesis or dissertations from any researcher or student that has been accepted by any of the Indian universities or academic institutions. INFLIBNET provides the list of subject wise theses with the title of the thesis, name of the researcher and guide, institution etc.).

Some open access archives in India also offer RSS (Really Simple Syndication or Rich Site Summary) feeds to registered users. With this facility, registered users are notified of the addition of new items at regular intervals. Repositories such as OpenMed@NIC and ETd@IISc have started providing such RSS feeds.

These institutional and subject repositories follow the self archiving model using two most popular open source softwares, DSpace and GNU EPrints. Some institutions, such as the National Informatics Centre (OpenMed@NIC) and the Indian Institute of Science (ePrints@IISc), have customized certain users' interfaces at the time of installation or upgrading. Some of these repositories are growing very rapidly and reaching users worldwide. Search engines and metadata harvesters index many of the operational repositories of India.

6.2.1 DSpace Repositories in India

DSpace open source digital library software used repositories are as follows:

1. GB Pant University of Agriculture & Technology, Pant Nagar
2. ICFAI Business School, Ahmedabad
3. Indian Institute of Astrophysics, Bangalore
4. Indian Institute of Management, Kozhikod
5. Indian Institute of Science, Bangalore
6. Indian Institute of Technology, Bombay
7. Indian Institute of Technology, Kharagpur
8. Indian Institute of Technology, New Delhi
9. Indian National Science Academy, New Delhi
10. Indian Statistical Institute, Bangalore
11. Indian Statistical Institute, Kolkata
12. Indira Gandhi Institute for Development Research, Mumbai
13. Indira Gandhi National Open University, New Delhi
14. INFLIBNET, Ahmedabad
15. LDL: Librarians' Digital Library, DRTC
16. Management Development Institute, Gurgaon
17. National Centre for Radio Astrophysics, Pune
18. National Chemical Laboratory (NCL), Pune
19. National Institute of Oceanography, Goa
20. National Institute of Technology, Rourkela

21. Raman Research Institute, Bangalore
22. Sri Venkateswara University, Tirupati
23. Thapar University
24. University of Hyderabad, Hyderabad
25. University of Mysore

6.2.2 EPrint Repositories in India

EPrint open source digital library software used repositories are as follows:

1. Indian Institute of Science, Bangalore
2. National Aerospace Laboratories (NAL)
3. National Centre for Catalysis Research (NCCR), IIT Madras
4. National Informatics Centre (NIC), New Delhi

7. Conclusion

It can be concluded that India is in the mainstream of ICT exploitation and consumption, even if somewhat lagging behind. The LIS environment in India is still basically traditional, but becoming more and more ICT-driven following trends in the rest of the world. The education and training of LIS professionals, their needs and their potential, empowers them to unleash the potential and the sophistication of technology. Indian LIS schools have embarked on this task by incorporating ICT modules in their curricula. Curriculum development, which is largely under departmental jurisdiction, has been attended to and most LIS schools have developed relevant ICT modules. However, complete diffusion of ICTs into the LIS schools has not been achieved because the schools are beset by issues and problems that are largely above their total control. The problems are to be found in the overall ICT infrastructures both at national and institutional levels, as well as individual LIS School's equipage of appropriate hardware, software and expertise. An important undercurrent in these problems is the lack of adequate funding for ICT implementation in Indian LIS schools. However, the significance or magnitude of these issues and challenges vary between countries and institutions, presumably due to socio-political and economic environments. Thus the diversity of the continent is mirrored in the nature, type and diffusion of ICTs in LIS schools within the region.

But the 'bottom line' is that LIS schools in India must harness the opportunities offered by ICTs in teaching and learning, for instance, in the development of appropriate market-driven curricula, acquiring of relevant, up-to-date educational technologies and resources, and the use/application of state-of-the-art educational methods and techniques such as mounting on-line courses and enhancing computer assisted learning. It is important that the Head of a LIS school possess the vision, knowledge, commitment and exploratory flexibility to adapt to new changes/challenges and spearhead or apply the theory of Individual Innovativeness by allowing early adopters to provide guidance.

I hope that if the LIS schools equipped their students with theoretical and practical aspects of the model IT components in a better way then they can placed themselves in the national and international job market.

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