

Open Access : India is moving towards Third world Superpower

Dr (Smt) Mangala Hirwade
Librarian
Shivaji Science College
Congress Nagar, Nagpur
hirwade2004@indiatimes.com

Dr (Smt) D. Rajyalakshmi
Reader and Head
DLIS, RTM Nagpur University
Nagpur
desarajurl@rediffmail.com

Abstract

The past few years have seen tremendous developments in information production, acquisition, and dissemination. Budgetary restrictions in research libraries have led to a period known as the serial cutting era. The new millennium has also ushered in the concept of the virtual library with seamless access to an integrated collection of print, electronic, and multimedia resources regardless of their physical location or ownership. Research scientists, policy makers, and reference librarians the world over are coming together to introduce reforms to make scientific knowledge affordable. Providing access to information free of charge in electronic formats is a concept that is gaining momentum. Open Access is one step ahead of Free Access. Open Access holds promise to remove both price and permission barriers to the scientific communication by using Internet. The present paper outlines the features of open access and the two vehicles viz. open access journals and open access archives. A few current open access initiatives in India are described in detail. In India, there is a large opportunity for open access publishing but still the number of registered archives is very less. Indian scientific communities and organizations like Indian Academy of Sciences, Indian Institute of Science, Indian National Science Academy, NISCAIR, INFLIBNET, etc are now actively taking initiatives towards creation of institutional repositories and providing open access to their publications.

1. Introduction

Open access to scholarly information is a burning issue in web based education and research nowadays. Open access has become an increasingly important and potentially divisive issue in recent years as journal inflation rates have increased. For many librarians and scholars, journal price inflation is itself the central problem and open access is the solution.

Open Access holds promise to remove both price and permission barriers to the scientific communication by using Internet. In fact, 'Open access' (OA) is a step ahead of "Free Access" which removes just the price barriers by providing free access to end users. Open Access removes the permission barrier as well. In other words, under Open Access, the end-user not only has free access to the content but also have the right to further distribute the content.

2. Salient features of Open Access (OA)

The salient features of Open Access are [1]

- Open access literature is digital, free of charge and free of copyright
- OA is compatible with copyright, peer review, revenue, print, preservation, prestige, career advancement, indexing and supportive services associated with conventional scholarly literature
- OA campaign focuses on the literature that authors give to the world without expectation of payment

- OA literature is not free to produce or publish
- OA is compatible with peer review and all the major OA initiative for scientific and scholarly literature insist on its importance

3. Vehicles of Open Access

There are two primary vehicles for delivering open access to research literature viz.[1]

- Open Access Journals
- Open Access Archives

3.1 Open Access Journals

OA Publishing is just like any other journal publishing. Like traditional publishing, it involves peer reviewing of submitted articles from authors and publishing. Published content is freely accessible over Internet and the users have right to download, use and further distribute it with proper attribution. The business model is however different here. In traditional publishing model, it is the “end-user” that pays to access the paper. Open access journals cost money to produce and distribute, especially since they are peer reviewed and edited like conventional journals. Various funding strategies are in use like, direct author fees, institutional memberships to sponsor all or part of author fees, funding agency payment of author fees, grants to open access publishers and institutional subsidies.

3.2 Open Access Archives

OA Self-Archiving model is liberal on peer review. It simply provides persistent digital repository where authors / owners of the content may archive their documents (Pre-referred or post-referred). Self archiving can be achieved in three ways viz.

- Putting articles on author web sites
- Depositing articles in disciplinary archives
- Depositing articles in institutional archives and repositories

4. Open Access Initiative Protocol for Metadata Harvesting (OAI-PMH)

Open access works are scattered across many disciplinary archives, institutional e-print archives, institutional repositories and open access journals. Therefore, it is difficult for scholars to locate all needed works on a particular subject.

One important international movement to solve this problem is the Open Archives Initiative (OAI), which aims to develop and promote the use of a standard protocol, known as the Open Archives Metadata Harvesting Protocol (OAMHP), designed for better sharing and retrieval of e-prints residing in distributed archives. [2]

5. Directories of Open Access Journals

There are four main open access journal directories viz.

5.1 Directory of Open Access Journals (DOAJ)

The Directory of Open Access Journals, which is maintained by Lund University Libraries, is the most important directory of open access journals. The aim of the DOAJ is to "increase the visibility and ease of use of open access scientific and scholarly journals thereby promoting their increased usage and impact." It "aims to be comprehensive and cover all open access scientific and scholarly journals that use a quality control system to guarantee the content." There are now **1927** journals in the directory. Currently **470** journals are searchable at article level. As of today **80843** articles are included in the DOAJ service. (as on 24.11.05). DOAJ can be searched in three ways viz. by journal name, title of the article and subject. It has been observed that DOAJ covers maximum journals in Social Sciences. There are 54 Library and Information Science journals reported in DOAJ. [3]

Table No. 1: Subject wise availability of OA journals in DOAJ as on 24.11.05

Sr. No.	Type of e-pint	No. of Journals	Percentage
1	Social Sciences <i>Library and Information Science (54)</i>	424	22.00
2	Health Sciences	294	15.26
3	Earth and Environmental Sc	148	7.68
4	Technology & Engineering	144	7.47
5	Agriculture and food Science	108	5.61
6	Languages and Literature	99	5.14
7	Mathematics & Statistics	85	4.41
8	Law & Political science	83	4.31
9	History & Archaeology	76	3.94
10	Biology & Life Science	75	3.89
11	Philosophy & Religion	60	3.11
12	Physics & Astronomy	46	2.39
13	Arts & Architecture	46	2.39
14	Business & Economics	45	2.34
15	Chemistry	44	2.28
16	General work	18	0.93
17	Science General	06	0.31
18	Others	126	6.54
	Total	1927	100

5.2 Free Full Text

This directory "provides direct links to over 7,000 scholarly periodicals which allow some or all of their online content to be viewed by anyone with Internet access for free (though some may require free registration)." Although the only access to the included journals is by browsing an A-Z title list, the depth of coverage of this directory is hard to beat, and users of the Google toolbar (or similar search engine toolbars) can use it to search this site for desired journals.[4]

5.3 Free Medical Journals

This directory was "created to promote the free availability of full text medical journals on the Internet." The journals indexed are sorted by specialty and language (English, French, German, Portuguese, Spanish, and others). In addition, the site provides information about some free

medical journals' impact factor. An e-mail alert service to new free medical journals is also available. [5]

5.4 HighWire Press: Free Online Full-text Articles

Pioneering e-publisher HighWire Press, which is a division of the Stanford University Libraries, offers this alphabetical directory of scientific and medical journals that it publishes that offer full or partial free access to their contents. Over 840,000 freely available articles are included in this directory. [6]

6. OA initiatives in Library and Information Science

A disciplinary archive provides access to e-prints for one scholarly discipline or multiple scholarly disciplines. A disciplinary archive can be searched or browsed. One popular example of a disciplinary archive is arXiv, [7] which covers physics, mathematics, non-linear science, computer science and quantitative biology. Following two are the famous disciplinary archives for Library and Information Science.

- E-LIS, E-prints in Library and Information Science <http://eprints.rclis.org>
- DList, Digital Library of Information Science and Technology <http://dlist.sir.arizona.edu/>

6.1 E-LIS

E-LIS was formed in 2003 for the deposit of documents in the Library and Information Science (LIS) domain. It is the first international e-server in this subject area. E-LIS resulted from the RCLIS (Research in Computing, Library and Information Science) project and the DoIS (Documents in Information Sciences), promoted by the Spanish Ministry of Culture. E-LIS relies on the voluntary work of individuals from a wide range of backgrounds and is non-commercial. It has been observed that maximum E-prints are reported in the subject Information sources, supports, channels.[8]

Table No. 2: Subject wise distribution of E-prints in E-LIS

Sr. No.	Subject Heading	No. of E-prints	Percentage
1	Information sources, supports, channels	813	18.11
2	Information use and sociology of information	648	14.44
3	Information treatment for information services	547	12.18
4	Information technology and library technology	531	11.83
5	Libraries as physical collections	458	10.20
6	Publishing and legal issues	341	7.59
7	Industry, profession and education	241	5.37
8	Technical services in libraries, archives, museum	240	5.35
9	Theoretical and general aspects of library & Information	236	5.26
10	Management	235	5.24
11	Users, literacy and reading	186	4.14
12	Housing technologies	013	0.29
	Total	4489	100

Indian Contribution to E-LIS: Total number of E-prints submitted to E-LIS by Indian scientists are 146. Major Contributors are Kalyane V. L., Kademani B.S., Koganuramth, Chandra Harish and Gosh T.B.

6.2 DLIST

DLIST is the Digital Library of Information Science and Technology, an Open Access, cross-institutional repository of full-text electronic resources in the domains of Library and Information Science (LIS) and Information Technology (IT). The DLIST Archive is a service of the School of Information Resources and Library Science and Learning Technologies Center, University of Arizona. Subbiah Arunachalam is a Distinguished Fellow and full-time volunteer, since 1996, with a non-governmental organization called the M S Swaminathan Research Foundation (MSSRF), in Chennai, India. There are two ways to browse the archive, by subject and by year. The archive offers two levels of searching, simple and advanced. For document deposition needs registration. There are total **535** e-prints available in DLIST. (as on 27.11.05). Maximum e-prints constitute journal articles. [9]

Table No. 3: Type wise distribution of e-prints

Sr. No.	Type of e-pint	No. of e-prints	Percentage
1	Journal Articles	209	39.07
2	Presentations	90	16.82
3	Conference Paper	73	13.65
4	Reports/ Technical Reports	48	8.97
5	Guide	13	2.43
6	Book Chapter	12	2.24
7	Preprints	12	2.24
8	Theses	11	2.06
9	Conference Proceedings	10	1.87
10	Tutorials	09	1.68
11	Conference Poster	08	1.49
12	Bibliography	07	1.31
13	Library instructional material	04	0.75
14	Books	04	0.75
15	Newspaper and Magazine Articles	03	0.56
16	Dataset	02	0.37
17	Departmental Reports	01	0.19
18	Interactive material	01	0.19
19	Others	18	3.36
	Total	535	100

7 OA initiatives in India

Open-access publishing enables researchers in developing countries to establish priority for their research, which they could use later to defend their intellectual property. It removes excess barriers in terms of both price and permission, enhances national research capacity, and improves visibility for developing-country research. Open access thus enables a global platform for this research and collaboration and reciprocates the information flow among the countries.

In 1982, Dr. Eugene Garfield said, “*Clearly India is the research ‘superpower’ of the Third World*”. Indian researchers alone authored half the 16,000 articles from the Third World indexed

in Science Citation Index (SCI) 1973. Table No. 4 shows number of papers published by leading developing countries. It can be traced from the figures reported in this table that India is now in danger of sliding into the periphery. .[10]

Table No.4: Number of papers published by leading developing countries

Country	2004	2003	2002	2001	2000	1981-1985
India	23336	23135	20405	19339	17501	10978
China	57378	49790	40749	35392	30509	2146
Brazil	17731	17014	14998	12807	12317	1124
South Korea	24464	22958	18421	17343	14629	Not available
India's position	3 rd	2 nd	2 nd	2 nd	2 nd	1 st

India's challenge is to reciprocate the information flow and improve access and thereby the impact of Indian research. To meet this challenge and to generate a national Research and Development resource base, an open access approach in line with the Budapest Open Access Initiative is being promoted. To achieve open access to scholarly journal literature, the initiative recommends the complementary strategies of self-archiving and open access journals. Several Indian publishers have already adopted the open access philosophy for the electronic versions of their journals. Unlike some open access journals in other countries, in which authors pay to publish their papers, Indian open access journals use government grants and subscriptions to their print version to cover publishing costs.[11]

Major OA initiatives in India are:

7.1 Indian Academy of Sciences:

The learned scientific society with its aim of promoting progress and upholding the cause of science in pure and applied branches publishes 11 journals in all front-line scientific disciplines. It has taken the lead in India in providing open access to Indian research by making available the electronic versions of its journals over the Internet. The Academy feels that open access to research literature achieves a quick impact and makes quality articles much more visible. Retrospective digitization of back files is complete and they are accessible. Unlike the open access journals of some of international publishers, the Indian Academy of Sciences does not charge authors for publishing their papers. The cost of publishing is met by government funding and subscriptions to their print journals. [12]

Table No. 5: List of Open Access Journals published by Indian Academy of Sciences

Sr. No.	Name of the Journal	Issues available
1	Current Science	July 1932 - Present
2	Journal of Chemical Sciences	July 1977 - Present
3	Proceedings Mathematical Sciences	January 1978 - Present
4	Journal of Earth System Science	January 1978 - Present
5	Sadhana	July 1978 - Present
6	Pramana	July 1973 - Present
7	Journal of Biosciences	March 1979 - Present
8	Bulletin of Material Sciences	January 1979 - Present
9	Journal of Astrophysics and Astronomy	November 1980 - Present
10	Journal of Genetics	Full text in pdf from 1999- present Work is in progress
11	Resonance: Journal of Science Education	January 1996 - Present

7.2 Indian Institute of Science

Indian Institute of Science play a major role in strengthening open access initiative in India. There are four different open access initiatives of IISc. These are

- **E-print archives of IISc**

ePrints@IISc repository collects, preserves and disseminates in digital format the research output created by the IISc research community. It can be accessed by anybody but the submission of documents is limited to the IISc research community. It was set up by using eprint.org open source software. The website also supports metadata for browsing and searching. It can be browsed by subject, year, author, e-print type, keyword and by latest addition. It has been observed that the contribution of e-prints Division of Information Sciences is comparatively less and contribution from the J.R.D. Tata Memorial Library is nil. [13]

E-print archives of IISc is an online digital repository of research papers, both preprints and postprints, technical reports, unpublished findings and journal articles of the faculty.

Table No. 6: Type wise distribution of e-prints (as on 27.11.05)

Sr. No.	Type of e-pint	No. of e-prints	Percentage
1	Journal Articles	2339	83.99
2	Preprints	181	6.49
3	Conference Papers	179	6.43
4	Conference Posters	29	1.04
5	Departmental Technical Reports	24	0.86
6	Patents	23	0.83
7	Book Chapter	05	0.18
8	Conference Proceedings	05	0.18
9	Book	0	--
10	Newspaper / Magazine Articles	0	--
	Total	2785	100

- **Universal Library Project (Digital Library of India)**

The goal of this project is to create the Universal Library with a free-to-read, searchable collection of one million books, primarily in the English language, that are no longer copyrighted, available to everyone over the Internet. Funding for the *Million Book Project* is coming from multiple sources. National Science Foundation is providing funding for equipment, India and China are providing manpower resources for scanning, indexing and hosting, and various companies and foundations are providing partial support. It is hosted by the Indian Institute of Science, Bangalore in collaboration with the Carnegie Mellon University, USA and ERNET. [14]

- **Journal of Indian Institute of Science**

This journal is published by Indian Institute of Science. It is now available online along with its back issues since 1914. [15]

- **Digital repository of Theses and Dissertations of Indian Institute of Science [16]**

It is a joint service of National Centre for Science Information (NCSI) and IISc Library

- **SciGate: The IISc Science Information Portal**

It provides seamless, network access to worldwide scholarly information resources of relevance to the IISc academic community, facilitating improved learning, teaching, research, collaboration and information sharing. NCSI provides variety of electronic information services to the Institute scholars. These include: intranet and Internet access to world's leading bibliographic databases; gateway services for electronic journals and open access resources on the Internet; customized web access ('MySciGate'); IISc e-print archive; and document delivery services. NCSI also publishes a monthly electronic newsletter 'InfoWatch' reporting new Internet resources of relevance to S&T researchers. NCSI also operates a moderated, free discussion forum (List service) 'LIS-Forum' for library & information professionals in India. LIS-Forum is an e-mail based discussion forum for Library and Information professionals in India. It is operated and maintained by NCSI, Indian Institute of Science, Bangalore. It was established in the year 1995 with support from NISSAT, DSIR, Govt. of India.[17]

7.3 Indian National Science Academy

In order to strengthen the open archive movement at the national level, the Indian National Science Academy (INSA) proposed a project, "Building Digital Resources: Creating Facilities at INSA for Hosting Science and Technology Journals Online." The National Information System for Science and Technology funds the project; it facilitated digitizing Science and Technology journals published by INSA and hosting them on a web server. INSA wishes to promote a cadre of open access experts in Indian higher educational institutions and federally funded laboratories. INSA also encourages other professional societies having their own web sites to get a link on INSA's site to facilitate a single point of access. [18]

7.4 BioLine international

This is a collaborative initiative of scientists and librarians of the University of Toronto Libraries, Canada, Brazil, and Bionline, UK. It is a non-profit electronic publishing service committed to providing open access to quality bioscience research published in developing countries. It makes available published information from peer-reviewed journals from Brazil, Cuba, India, Indonesia, Kenya, South Africa, and Zimbabwe via the Internet.[19]

Table No. 7: Indian open access journals in Bionline International

Sr. No.	Name of the Journal	Issues available
1	Indian Journal of Cancer	2002 (3) – 2005(1)
2	Indian Journal of Critical Care Medicine	2003(4) – 2004 (2)
3	Indian Journal of Dermatology, Venereology and Leprology	2003 (3) – 2005(5)
4	Indian Journal of Human Genetics	2002(1) – 2005(1)
5	Indian Journal of Medical Microbiology	2005(1) – 2005(3)
6	Indian Journal of Medical Sciences	2003(7)-2005(9)
7	Indian Journal of Occupational and Environmental Medicine	2005(10) – 2005(2)
8	Indian Journal of Pharmacology	2004(1) – 2005(5)
9	Indian Journal of Plastic Surgery	2003(1) – 2004(1)
10	Indian Journal of Surgery	2002(6) – 2005(3)
11	Journal of Cancer Research and Therapeutics	2005(1) – 2005(2)
12	Journal of Health, Population and Nutrition	2005(1)
13	Journal of Indian Association of Pediatric Surgeons	2005(1) – 2005(3)

14	Journal of Minimal Access Surgery	2005(1) – 2005(2)
15	Journal of Postgraduate Medicine	2000(1) – 2005(2)
16	Neurology India	2002(1) – 2005(2)
17	Asian Biotechnology and Development Review	2002(3) – 2005(3)

7.5 Indian Medlars Center

This is an initiative by the National Informatics Center (NIC) and Indian Council of Medical Research (ICMR), two governmental agencies. The center has developed indMED, a bibliographic database of peer reviewed Indian biomedical journals. MedIND (<http://medind.nic.in/>) is the full-text archive for 28 peer-reviewed Indian Biomedical journals indexed in indMED. [20]

7.6 NISCAIR (National Institute of Science Communication and Information Resources) Journals

This is an effort by the government-funded Council of Scientific and Industrial Research (CSIR) (<http://www.niscom.res.in/ScienceCommunication>). The publication wing of CSIR, NISCAIR, brings out 11 research journals in different S&T disciplines. Though full text is not currently available online, bibliographic information and abstracts can be accessed and searched. [21]

7.7 Sankhya

There are other isolated efforts from learned societies such as the Indian Statistical Association which provides full text access of its journal SANKHYA (<http://sankhya.isical.ac.in/>) [22]

7.8 Vidyanidhi

Vidyanidhi (Meaning 'Treasure of Knowledge' in Sanskrit) is India's premier Digital library initiative to facilitate the creation, archiving and accessing of doctoral theses. Vidyanidhi is an information infrastructure, a digital library, a portal of resources, tools and facilities for doctoral research in India. Vidyanidhi is envisioned to evolve as a national repository and a consortium for e-theses through participation and partnership with universities, academic institutions and other stake holders. Vidyanidhi enhances access to Indian theses and enlarges the reach and audience for Indian doctoral research works. Vidyanidhi began as a pilot project in the year 2000 with support from NISSAT, DSIR, Govt. of India. Vidyanidhi is a member of the Networked Digital Library of Theses and Dissertations (NDLTD), <http://www.ndltd.org>, a global initiative with more than 170 members from different countries of the world. Following databases are under construction. [23]

Indian Theses database: The Indian Theses database has records of bibliographic descriptions of theses. Currently it supports Indian Languages like Kannada, Hindi and other Languages are under construction. It can be searched in six ways viz. simple search, advanced search, field specific search, directory search, author search and subject search. Under Library Science it includes 8 entries.

Indian ETD collection: It uses DSpace open source software. Vidyanidhi is envisioned to evolve as a national repository and a consortium for e-theses through participation and partnership with universities, academic institutions and other stake holders. Vidyanidhi enhances access to Indian theses and enlarges the reach and audience for Indian doctoral research works.

Indian Universities: It is a dictionary of Indian Universities. 282 Indian Universities listed in our Database with address. (as on 27.11.05)

Experts Database: University Faculties Search for Brief Curriculum Vitae

7.9 UGC India's Initiative

The UGC-Infonet E-journal consortium is our pride in the field of education and research. Under the consortium, about 4000 full text scholarly electronic journals from 25 publishers across the globe can be accessed. The programme is wholly funded by the UGC and monitored by **INFLIBNET** (Information and Library Network) Centre, Ahmedabad. It provides links to 16 Open Access services. INFLIBNET maintains following databases which have an open access.

- Online Profile of Academic Community of Indian Universities
- Research Projects Database
- Experts Database in Science and Technology (EDST)
- Books Database
- Theses Database
- Serials Database

INFLIBNET has explored Dspace open source software and configured Darchiee <http://dspace.inflibnet.ac.in> which contains the full text of CALIBER and PLANNER proceedings. INFLIBNET in Press and Media covers digitized Newspaper clippings about INFLIBNET. It can be searched and browsed. The archive also includes the INFLIBNET publications like Annual Reports of INFLIBNET and IRTPLA (INFLIBNET Regional Training Programme on Library Automation) course material. [24]

7.10 Digital Library of DRTC

The DRTC digital repository contains a specialist collection of Library and Information Science resources. The objectives are to provide an open platform for information professionals to enable the sharing of resources world wide; to provide access to papers published in DRTC conference and seminar proceedings and to facilitate digital library research interactions through a discussion forum "Digital Library Research Group" (DLRG). This depository includes 178 e-prints. [25]

Table No. 7: Type wise distribution of e-prints in DRTC digital repository

Sr. No.	Type of E-print	No. of E-prints
1	Publications and articles	168
2	Demo of Multi lingual documents	05
3	Theses and Dissertations	02
4	Presentations	02
5	Photographs of LIS activities	01
	Total	178

7.11 NCL Digital Repository

Digital repository of National Chemical Laboratory, Pune includes 200 scientific documents (177 Pd.D Theses, 22 Project reports and 1 Patent) [26]

7.12 Indian Institute of Technology, Delhi

IIT, Delhi maintains a digital repository E-prints and ETD@IITDelhi. It includes 741 research publications of the faculty [27]

7.13 University of Hyderabad Digital Repository

This repository includes books, theses, dissertations and research papers contributed by the faculty. It also covers Annual Reports, Prospectus and University Photographs. The course material for distance education is available online through this repository. [28]

8 Hurdles in promoting open access in India

In India, the efforts towards adopting open access initiative have already been started. But there are some hurdles and misunderstandings about open access among the Indian research community. These are

- Lack of expertise in every organization to promote creation of institutional archives and encourage scientists to place their papers in them.
- Lack of infrastructural facilities like hardware and connectivity of high bandwidth
- Scientists are under the impression that the editors of renowned journals may not accept the archived papers.
- The scientists are not aware of the fact that the attitudes of the journals are now changing and renowned journals also permit the authors to archive both preprints and postprints.

9 Conclusions

- The benefits of open access include lower costs, great accessibility and better prospects for long term preservation of scholarly works.
- Scientists in developing countries like India need to aware themselves about the new opportunities provided by Information and Communication technologies. One way of doing this is to adopt the “open access” approach.
- A national level efforts are essential to promote and co-ordinate open access publishing systems and to improve awareness for open access. INFLIBNET should take concrete steps towards this direction.
- National donor agencies like Department of Science and Technology, Department of Biotechnology, Heads of major research councils like CSIR, UGC should take the initiatives towards self archiving of the results of all the research.
- INFLIBNET should conduct training programmes for Librarians to promote the use of open access journals and archives in libraries.
- The open archives and open access initiatives in India are sporadic efforts, which have to be consolidated and have a long way to go. It is a positive sign that Indian scientific community with the active participation of governmental funding agencies, learned societies, and publishers, has taken a step in the right direction.

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First Author

Dr (Smt) Mangala Hirwade

Working as Librarian in Shivaji Science College, Nagpur since February 2003. 12 years experience as Documentation Assistant in Patent Information System, Nagpur. 6 years Teaching Experience. Educational qualification is B.Sc., MLISc., NET, Ph.D. First Merit in MLISc from Nagpur University. Published three Research papers in National journals. Honoured with P.V. Verghese award for the “Best Paper published in ILA Bulletin in 2002”. Attended one International and five National conferences. Presented five papers in National conferences. Presently working on a Minor research Project funded by UGC, India entitled as “Architecting a Model for Science Virtual Library”.

E-mail: hirwade2004@indiatimes.com



Second Author

Dr (Smt) D. Rajyalakshmi

Reader and Head, Department of Library and Information Science, RTM Nagpur University, Nagpur. Educational qualification is M.Sc., MLISc., Ph.D. 8 years experience as ‘Lecturer in Zoology’. Worked in University of Katar as Assistant Librarian for 5 years. 6 years experience as Information Officer in NEERI, Nagpur. Working as Reader and Head, DLIS, RTM Nagpur University, Nagpur since last 6 years. First Merit in BLISc and MLISc from Nagpur University. Published 20 papers in National and International journals. Presented 30 papers in National and International conferences. Published One book and two students awarded Ph.D. under the supervision.

E-mai: desarajurl@rediffmail.com

