DESIDOC Journal of Library & Information Technology, Vol. 29, No. 1, January 2009, pp. 5-13

Web 2.0 and E-Learning: The Indian Perspective

Pratibha A. Gokhale* and Smita Chandra**

**Department of LIS, University of Mumbai, Vidyanagari*
Santacruz (E), Mumbai-400 098
E-mail: pratibha_gokhale@yahoo.com

***Indian Institute of Geomagnetism*
Plot No.5, Sector 18, Kalamboli–Panvel Highway
New Panvel, New Mumbai-410 218
E-mail: smtcd79@gmail.com

ABSTRACT

As the World Wide Web moves from the Web 1.0 to its newer version of Web 2.0, it offers transformation of the nature of human interaction with information. This will have profound implications for education that has shifted according to time and technology in the way it is imparted. The Web 2.0 technologies have enabled higher order skills of analysis, synthesis, and evaluation resulting in new terms like e-learning 2.0 and Library 2.0. E-learning 2.0 has created a comprehensive suite of learning resource materials, which enable scientists and students of different fields, particularly those from the developing world, to develop lifelong learning skills. This has wide scale implications for the library and its services. This paper takes a look at the awareness of the various learning paradigms of the Web 2.0, e-learning 2.0, and the Library 2.0 environment with a focus on the geoscience education in India.

Keywords : E-learning, Library 2.0, Web 2.0, library science education

1. INTRODUCTION

Never before in the history has mankind been connected with everybody else as he is today. This limitless connectivity and potential to create an open social order and system of interaction and collaboration have been made possible only because of the high performance and robust electronic infrastructure—termed broadly as information and communications technologies (ICTs). By reducing the physical component of material and increasing the message part, ICTs have transformed the richness of human experience, the diversity of human languages and cultures, and the full range of human creativity. These technologies have empowered humanity with radical new ways of conducting research not only in the scientific and technical domains but also in the arts, humanities, and the social sciences.

In the initial phases of its development, ICTs led to the emergence of the Internet and the WWW for access to information, thereby driving revolutionary social, cultural, and political changes. This media for information not only transformed human awareness and expectations but resulted in digital globalisation also. Information was widely recognised as a self-regenerative natural resource in the post-industrial era[1]. As information is inherently economic, it resulted in the utopian dream of an affluent society. Lack of social, legal, and technological information exacerbates poverty, which has its roots in ignorance.

The Web or Web 1.0 that most of us are familiar with and using for some years now, has largely been a one-way medium with the sole purpose of looking for information. The Web 1.0 was merely an expression of our mindsets of the way knowledge was transferred over centuries by our gurus or teachers to their disciples. As we further progressed into the information society, it was realised that the issues like access and equity to information were important enough to be taken care of for political and economic survival. The Web 1.0 methods of information handling, preservation, and access underwent a radical transformation from ownership to sharing and from physical to electronic to virtual.

Access to information via Internet has now reached its second phase or edition as is evident from somewhat audacious use of the term Web 2.0. As opposed to its earlier version, i.e., Web 1.0 environment where information was merely sought after, Web 2.0 environment engages people to modify, contribute, and create their own identities in innovative ways[2]. Web 2.0 is like a social phenomenon that not just connects people together but generates and contributes the web contents itself. It gives openness in terms of not only the technologies employed, but also the ideologies created. The 'digital natives' or the 'n-gen', as the Web 2.0 communities are referred, constitute not only the general public from all walks of life, but school children and professionals from research or higher education community also.

The aim of this paper is to examine the effect of Web 2.0 environment in learning as implied to the education system, followed by an assessment into the general awareness and understanding of the Web 2.0 world and the role of the changing educational model.

2. WEB 2.0

The ability to publish or broadcast free on Internet has facilitated openness that is associated with values of tolerance, individual freedom, lifelong learning, participation, empowerment, and cooperation. Such values give rise to open-societies, open-innovations, open-standards, open-ecosystems, open-source, and open-architecture[3]. Such an open-source paradigm is characterised by the properties of independence, zero cost, modularity, and regenerative capacity of the Web 2.0. It is exactly at this higher level of interaction and a deeper and more fulfilling user experience that the Web 2.0 is centered around.

Some of the infrastructure and tools running the social systems today are[4]

- Really Simple Syndication (RSS)
- Wikis
- New and revised programming methods like AJAX and APIs
- Blogs and blogging
- Commentary and comments functionality
- Personalisation and 'My Profile' feature
- Personal media such as Podcasting and MP3 files
- Streaming media, audio and video formats
- Reviews and user driven ratings
- Personal alerts
- Web services
- Instant messaging and virtual reference including co-browsing
- Folksonomies, tagging and tag clouds
- Social networking software
- Open access, open source and open content
- Socially driven content
- Social book marking (such as del.icio.us).

Teaching and learning are always dependent on the tools and techniques used in the process. The above technologies give us an idea of the potential of interaction and collaboration enabled by Web 2.0 into the education environment. Though technically such a host of infrastructure means moving from an old era of hierarchical portals and restricted group of content creators to search engines, aggregators and user-based contents, knowledge-wise this means a better integration of the different methods of presentation with more interaction and better learning space that allows a student to learn at his own chosen pace, time, and place. Such tools thereby help bridge the divide of race, age, gender, language, culture, and geographical boundaries. It is no wonder that such tools have proven to be useful learning aids for students with learning disabilities like dyslexia and for the non-native language speakers.

It is, however, important not to get carried away by the hype supporting the Web 2.0 platform but rather invest money in the stronger underlying ideas. As with any technology, tools alone do not make it useful; rather they should be integrated with the workflow of the organisation or the individual to lead them to success[5]. Besides this, various postings from blogs state that around 50 per cent of senior managers do not appreciate the benefits of promoting Web 2.0 technologies in the workplace, and a third of them do not understand it all. Also, there is no dearth of documentation on the perils of accessing wrong information or information laden with inappropriate content that students may copy and paste. While the educational potential of social software is huge, commercial social networking sites that allow any individual to create digital identity and make it available to other users for communication via chats, forums, e-mails, and messaging poses a significant threat. A recent legislation in the US, Deleting Online Predators Act (DOPA), seeks to address the moral panic over such

sites, and the perceived dangers to school children[6]. In blogs reporting on the myths and realities of engagement and sharing information in the online world, a certain amount of restrain and maturity on part of the individual in social connectivity is required. Educating the naïve users of online engagement requires more authoritative form of technology to ascertain our trust in technology. The firm belief of technology solving all our problems and liberating us from personal discipline and responsibility thus needs an even more human touch.

3. E-LEARNING 2.0

The technical developments of the WWW allow us to trace the history of e-learning in the stages of

- The multimedia era (1984-1993)
- The web infancy (1994-1999)
- Next generation web (2000-2005) and
- Mobile learning technologies of today.

The new learning tools have resulted in change in the educational goals. With technology being integrated into all aspects of lives the digital learners of today rarely see e-learning as a separate activity. Students no longer rely on the old methods of memorising for studying. Instant access to facts has replaced their rote learning skills with skills like analysis, synthesis, and evaluation of higher order. The collaborative instruction techniques today focus more on the individual learner. The Web 2.0 facilitates new learning paradigm as is apparent in the use of the widely recognised term e-learning 2.0, from its lexicology[7]. In the e-learning 2.0 environment, teachers become the facilitators of the learning process and learning by doing and collaborative and active methods of learning become the essential approaches to attain the new learning objectives.

While many e-learning websites commonly employ a number of Web 2.0 tools, the following Web 2.0 features are more commonly associated and employed with the e-learning 2.0 scenario[8].

Wikis: A wiki is a website that allows users to produce or change content from the site, e.g., the Wikipedia. Wikis can be used in education to support collaborative work, or produce a course in cooperation or to distribute information amongst students for the purpose of updating materials.

Blogs: A blog is a way of distributing knowledge by one or many authors, adding comments, or receiving new entries via RSS readers. To support collaborative work, teachers often use blogs to produce dynamic learning environment without prior knowledge of html.

RSS Reader Pages: This tool is based on a new way of sharing information on a collective and collaborative basis. RSS shares the entire page using RSS syndication rules.

Online Office: Also referred to as the Web desktop or the WebTop, allows applications to run at the browser. Online office refers to packets similar to Microsoft Office or Open Office and includes word processors, data sheets, multimedia presentations, etc. Such an office facilitates the production of online documents with some history, discussion, and annotation notes, etc. An example is the Google Docs.

Social Book Marking: As the name suggests shared book marking is a new way of information access, based on collaborative selective searching, e.g., del.icio.us.

Shared Videos: Youtube.com and several such sites offer sharing of educational and instructional videos over the web, often solving technical or size-related problems. Some websites, specifically offering educational materials, are Teachertube, Sclipo, Expertvillage, etc.

Podcasting: Podcasting refers to sharing all kinds of educational instructional materials like multimedia presentations, written documents, and images, etc. One can download such material for free usage.

Video Online: Public open resources like Stickam.com or Ustream.com and institutional websites often include online videos as learning resources. Such sites allow educators to distribute educational videos in their distance learning or coaching sessions.

Social Networks: The theory and practice of social networks is the backbone of the whole Web 2.0 understanding. Often seen as a community of practice, networks like ELGG are social networks developed specifically for the educational community.

Group Work Spaces: While virtual campuses have been used in e-learning environments, the latest trend in the Web 2.0 world is the personal learning environment (PLE). ELGG is an example of a PLE.

Based on the eLearn magazine's Editor-in-Chief Lisa Neal's blog post, ten things you can do in ten minutes to be a more successful e-learning professional, Stepehen Downes has outlined 10 things one can do successfully to utilise the Web 2.0 tools to be a more effective e-learning professional[9]. These are:

(i) Use the RSS feeds to run across conference presentations and bookmark the conference sites.

(ii) Record presentations about the work or learning materials, either as audio, video or a blog.

(iii) Besides GoogleSearch, use Google Blog Search, Google Image Search, Del.icio.us, Technorati, Slideshare, or Youtube to do a search and save them to del.icio.us to read them later.

(iv) Write a quick blog post or article about something learnt recently, from a meeting, or a conference note. The idea is to make your point known to others immediately and click submit.

(v) Always update your e-portfolio, e.g., upload your slides, audio, video on the appropriate online sites, code your presentations online, or describe the links to your latest publication or projects available online.

(vi) Use Flickr, licensed under the Creative Commons license, to find an image and create slides using ZOHO.

(vii) Find the blogger of your interest currently in your RSS reader, go to their sites and follow links to other blogs, feeds, or posts.

(viii) Write a personal comment on a blog post, article, or book written by an e-learning researcher or practitioner.

(ix) Go to sites like Engadget.com, Metafilter.com, Digg, Mixx, Mashable or Hotlinks, browse through their items and write a blog or comment on something interesting.

(x) To end it all in a relaxing way, catch up with an online gaming friend or watch an online video.

Baris's Web 2.0 list offers a comprehensive list of some Web 2.0 resources that can be used for such activities as well[10].

The learning object repository (LOR) is the best store house of digital reusable learning objects of the Web 2.0 world. Such LORs are based on the OpenCourseWare consortium and support the use and exploitation of interoperable collections and objects of geographic, cultural, scholarly or scientific nature from libraries, archives, and museums. While there are a number of links representative of the scope and range of the LORs, the WikiEducator has a comprehensive collection of open e-learning content repositories[11]. Institutional repositories (IRs) that play significant role in enhancing e-learning are examples of LORs.

Learning in virtual environment takes place at any website of educational value and the typical learning landscape that a student may find appropriate for his/her e-portfolio. Also known as webfolio, it is a web-published collection of documents, information, audio, and video clips, with no restrictions on the amount of information that can be added, deleted or shared. Often known as PLE, it gives students the personal space to pose questions, put up drafts, link to comments on similar and relevant sources, and create an adhoc learning environment best suited to his/her own needs and capabilities[12]. Such webfolios when integrated with IRs act as LORs, facilitating the network, discovery and retrieval of the Web 2.0 resources in learning. Thus the Web 2.0 environment provides a platform for students to create a digital identity. Using the networks one can connect resources, experiences, tutors, and enrich themselves with the e-learning 2.0 experience lying therein.

3.1 Library and E-Learning

E-learning in the wider perspective connotes a knowledge-centric rather than a course centric approach, allowing the user to query the knowledge base to learn better. Such a knowledge base is built on a variety of resources such as documents, websites, experts, communities, tools, and events. As a host to many of the elements of this knowledge base, libraries act as an enabler to the e-learning process. The IT enablement of the learning process, besides providing universal learning opportunities, explores how best libraries can blend or redefine their own systems and services so as to address the needs of the new learning environments. It is under this guise and more that the Library 2.0, a term brought in from the Web 2.0 lexicology is still being deliberated upon[13].

The Web 2.0 has changed the user experience with information. The webby networked world requires libraries to reconfigure its services to support research and learning activities by responding to the changing networking-user behaviour. Such environments provide libraries the collaborative possibilities of exposing library services, creating and maintaining digital asset repositories, and creating standards for interoperability. Table 1 shows how libraries and librarians can be involved at each stage of the e-learning process in meaningful ways[14]. The successful adoption of these e-learning processes would mean a leap into the Library 2.0 world resurgent with the IT world.

Librarians can work with faculty members, students, or the IT specialists in the pre-authoring stage of the e-learning process for the selection and evaluation of learning materials. They can also help with the metadata schemas for content management or towards information literacy modules involving organising metadata for online resources or training in information seeking, assessment, evaluation, and consolidation of resources, plagiarism, copyrights, and the digital rights management

Table 1. e-learning and library

Stage of e-learning process	Library involvement
Pre-authoring	Selecting/evaluating/assessing learning objects
Content development	Metadata/information seeking training modules/federation of integrated library systems
Course management	Plagiarism, IPR/copyright/DRM
External database interface	Knowledge management activities and VRS
Delivery	Delivery

(DRM) issues with respect to the duplication and usage of digital learning materials. Libraries can provide free downloads plagiarism software into the digital diaries or PLEs of users. Similarly the virtual reference service (VRS) is a powerful mean for engaging the user in the experience of the omnipresent librarian towards the correct discovery, and the rightful integration and re-usage of digital materials using information systems scattered all over the web. Library services could be integrated with the learning management system (LMS) such as WebCT, Blackboard, DesireLearn, ANGEL or Moodle, so as to make accessible to all course components direct links such as e-journals, articles, inter-library loan, online interactive reference service, and content resources.

Social tagging on the web has changed the purview of information management and provision from being a librarianship centric skill to one that allows just everybody to categorise information the way they want. Similarly the long held notion of authenticity and validity of information held in the field of librarianship has been broken by the collaborative information tools and technologies. All over the world, libraries and librarians are constantly reinventing and evolving themselves in response to the changing technologies, user needs and behaviour. Libraries worldwide are trying to maximise online access to enhance transparency of library operations and increase interactivity, thereby adding new value to the users with increased library usage [15, 16]. Some of these are:

(i) Based on Web 2.0 technologies, libraries are setting up blogs for online library reference services.

(ii) Libraries today rely more on informal and instantaneous communication via instant messaging and wikis.

(iii) Libraries are offering more space within their walls that congregate the digital natives online.

(iv) Promoting library collections and services through Facebook, RSS feeds, and widgets.

(v) Creating database of free online resources, enriched with recommendations, comments and ratings by the librarians themselves.

(vi) Using browser tool bars on the web for displaying the library tools, photos, and videos.

(vii) In an effort to make the catalogue more interactive, some libraries are opting for more personalisation tools and options for rating books as well as dynamic floor plans showing subject collections.

(viii) Customise curriculum resource pages.

(ix) Offer Web 2.0 classes for the public on blogging, etc.

(x) Provide free space for flexible resources, vodcasts, podcasts with a continually updated download list.

Thus the library community with its commitment to preserve vast stock of knowledge is in the forefront of successfully mapping the whole of society's knowledge by using the relevant technologies and serveing the readers.

4. WEB 2.0 AND THE SCIENCES

The digital resources, tools, and networks of the ICTs, influence ways in which scientists investigate the real world, the way they organise and communicate what they know, and how they think. Such resources offer effective ways of handling the geoscience information by opening the possibilities of more rigorous analysis with quantitative and statistical methods and more vivid visualisation techniques. Such tools have revolutionised the management and rapid dissemination of scientific information. 'E-science', a term used for changes related with information technology (IT) in the scientific disciplines, used in conjunction with other terms like e-research and e-scholarship shows the transformative shifts sweeping across the scientific domains as a result of the IT revolution in particular[17].

The Web 2.0 has facilitated the conduct of science and research into a global enterprise, which transcends geographic boundaries, disciplines, and educational levels. It facilitates the ability of scientists to work with experts from all over the world, to use resources across international boundaries, and to share and integrate different types of data, knowledge,and technology being generated in real time from all around the world.

ICT applications have no disciplinary boundaries; these have always been an integral part of the evolution of various branches of science, e.g., geoscience, which is centered on Geology. It inevitably, overlaps into such subjects as geophysics, geobiology, geochemistry, applied geophysics that includes geophysical prospecting and exploration, general geology that includes internal geodynamics, geotectonics, tectonophysics, external geodynamics, historical geography or stratigraphy, economic geology, and soil science. As atmospheric science, environmental science, surveying and geomorphology are related to the geoscience discipline, one should not confuse them with subjects like hydrology, meteorology or oceanography, which are broadly into the domain of the Earth Sciences[18]. Such interdisciplinary subjects must be catalogued with rich metadata for long-term access involving decades or centuries owing to the nature of the associated research challenges.

5. THE INDIAN SCENARIO

The Indian constitution makes education a fundamental right for children in the age group of six to fourteen. India has approximately 300 million students in this age group. With 300 University level institutions, more than 12,600 colleges, 80 lakh students and 4,00,000 teachers, India has one of the world's largest higher-education systems. Despite this, the literacy rate in the rural areas is 56 per cent. The country has a huge population of enthusiastic younger generation that strives to acquire scientific and technical skills, and reading and writing in the English language. The main challenge for the Indian education system today is to provide basic education to all. The rising cost of education often calls for a change from traditional space-and-time bound institutions to ones that will offer cost-effective but technologically enhanced programmes. For this purpose, the educators first need to develop pedagogically-based research programmes and electronic courseware at different levels to adapt teaching styles to maximise student learning.

While some of the universities in India have distance education programmes for the undergraduates and the postgraduates in major disciplines, their intake and growth has been far from imprssive. These courses still use the traditional paper-based notes and reading materials, and supplement these once a week by physical contact with local instructors for the registered students. Some of the reasons for the non-use of ICTs for this purpose are:

- Lack of penetration of ICTs in semi-urban and rural India.
- Lack of reliable communications infrastructure.
- Lack of course content, except in the IT domain.
- Lack of content in vernacular Indian languages as most of the content is still in English.
- Lack of psychological acceptance due to the absence of the personal touch associated with classroom lessons.
- Lack of teachers and experts for development, deployment, and delivery of the e-learning solutions, as well as experience and understanding of the e-learning market.
- Lack of standards and a long gestation period for implementation.

A number of institutions of higher learning have now begun to offer e-learning courses. These institutions have the necessary infrastructure and technology for online video conferencing and virtual laboratory set-up. India is also the first country in the world to have its own exclusive satellite, namely, EDUSAT for educational purposes. Besides the apex institutions, EDUSAT networking is being expanded to the remotest areas where a college level institution is located. About 2,700 schools in the backward districts of the country are also using this facility; this includes 10 schools for the blind in the state of Gujarat being served by the EDUSAT by special transmission.

E-learning solutions in the corporate sector are reasonably well picked up in the country, with a number of companies employing effective e-learning strategies for its employees to remain competitive. This, however, has a negative effect as the number of small vendors entering with e-learning solutions has increased. The credibility of such stakeholders cannot be ascertained as there is no regulatory body in the Government.

India has one of the youngest population in the world and is going to remain young for the next 15 years. This young generation of the country is as net savvy and digital as that of any other part of the world. As such, these n-gens are achievement oriented, selective, manage their time, are practical, and use

the Web 2.0 tools to create their own digital identities. The webby world in its various versions has made a mark for itself within India and the netizens of the country will adapt any of the Web 2.0 technologies with as much fluidity as those for the next generation web, the Web 3.0.

Libraries in India are not yet equipped with the necessary infrastructure to face the challenges of e-learning in the broader term. There are very few initiatives in the fields of digital libraries, institutional repositories, and open access publishing. Such initiatives could be harnessed to aggregate, create and disseminate a knowledge base, and leverage the e-learning environment in the country. Besides the personal web spaces like blogs, podcasts, etc., of a few enterprising librarians, there are only few instances of bringing the Web 2.0 environment into the library settings in India. This is contrary to the fact that such open technologies of the Web 2.0 would help overcome economic barriers that are often imposed by technologies, and are aimed at addressing the digital divide if harnessed to its full potential.

6. E-LEARNING AND LIS EDUCATION

The challenge today is for raising awareness, especially for those researchers and library members who are not web-savvy. Making them literate in the use and application of the Web 2.0 tools into their personal and professional life is the first task the library community should engaged in. This could be a starting point for the information literacy modules to gain momentum within the library community in India. The library science schools in the country have a direct responsibility in doing so. This can be done in two stages, viz., by training the existing generation of librarians who are already employed, and by educating the up-coming generation of LIS students in ICT skills in general and e-learning concepts in particular.

The librarians first will have to learn the dynamism of e-learning and the pedagogical issues involved. At an operational level, they will have to manage and administer the virtual learning environment. To start with, the essential building blocks for the same can be developed on the following lines:

- Study, review and organise the e-learning products with clear agenda for organisational needs.
- Learn to work through interoperability.
- Develop suitable infrastructure to support environment for e-learning.
- Create content, prepare a list of web-enabled resources available in the library.
- Prepare pathfinders for searching information through important reference sources, encyclopedias, world of learning, handbooks, industrial guides, government publications, gazetteers, list of awardees, institutions granting scholarships, day-to-day news analysis, research reportsin such a way that they form a ready reckoner for learners.
- Provide links through library's homepage to relevant e-resources, institutions, research centres, universities, full-text and/or free-text services.
- Manage the contents through metadata schema and federated searching services through interoperability.
- Monitor the delivery of contents through free/fee-based access and networked system.
- Prepare expert systems, subject gateways on a small scale to suffice local needs.
- Distribute the new web resources via mailing lists, listservs or discussion groups.

The drive towards e-learning requires libraries to adapt to the needs of the increasing online user population. System developers and librarians together should provide a mechanism that would support the e-learning initiatives and the environment. The creation of technical standards and specifications would be the immediate task ahead in near future.

The library science schools must take steps to revise their syllabus to include practice-oriented ICT skills. Much has been talked and discussed these days on this issue through discussion forums, conferences, listservs, seminars, and so on. The fixed framework of syllabus has certain limitations as it cannot accommodate everything which should be ideally part of the course content. It is not an easy task to ascertain the priorities and relevance of traditional and non-traditional subjects and what should be dropped while revising the syllabus, as the traditional subjects also have their importance and place of their own. There are number of steps involved before getting the syllabus approved and implementing the same. Availability of competent and dedicated faculty is yet another issue. Higher education is facing a number of challenges today. Social, political, and economic pressures are mandating. The overall education system is confronting and entrapped 'mass education versus class education' with no clear agenda for the same, except lot of paper work and too many discussions. There is a visible education divide between haves and havenots as far as infrastructural facilities, teaching, guidance, and sustainability is concerned. Library science education is no exception to this. E-learning in library science

represents a pair of variables studied together for knowledge produced within the organisation and that produced outside the organisation. Introducing short-term courses first and then developing electronic courseware suitable to the home situation to exploit the power of e-learning, possibly could be a viable solution in present situation. In the move towards e-learning or virtual learning, while the focus on technology is important, the educators need to think about issues of pedagogy to promote effective teaching and learning.

7. CONCLUSION

The right implementation of proper ICTs can help solve a number of problems pertinent to the Indian education scenario. For example, a combination of virtual classroom, online tutorials and digital libraries, and or the virtual reference tools in local language could help the rural Indian youth to compete with the outside world and move towards information literacy path irrespective of their socio-economic status. E-learning could be a powerful tool for lifelong training for workplace employees and will help them remain competitive. It is thus a successful tool to re-skill large workforces that become redundant over the time. There is a need for library advocacy. Decisions made at all levels of government and within the institute about funding, copyright, telecommunications, intellectual freedom, and other policy issues need to address the role of libraries. Librarians should get representation in decision making process regarding e-learning initiatives within the organisations.

Thus, by adapting ourselves and our libraries to the everchanging information world, we can make the academic and other research libraries as centres of resources within any learning environment. Thereby, we can look forward to the dream of Rabindranath Tagore:

> "Where the mind is without fear; Where the world has not broken up into fragments by narrow domestic walls; Where words come out from the depth of truth; into that heaven of freedom, my Father, let my country awake".

REFERENCES

1. Garfield, Eugene. Society's unmet information needs. U & I: Turning Pages-Reflections in Info-times, 2005, 13-15.

2. Dempsey, Lorcan. The digital library environment: Ten years after. *Ariadne*, 2006, 46. http://www.ariadne.ac.uk/issue46/dempsey/

3. Straub, Richard. Is the world open? *In* e-Learning Papers, 2008, 8. http://www.elearningeuropa.info/files/media/media15526.pdf

4. Abram, Stephen. Web 2.0, Library 2.0, and Librarian 2.0: Preparing for the 2.0 world. *SirsiDynix OneSource*, 2006, 2(1). http://www.imakenews.com/sirsi/e_article000505688.cfm

5. Millard, Rob. Web 2.0 confusion hindering firms. The adventura of Strategy, Edge International, November 2007. http://robmillard.com/archives/tools-for-strategists-web-20-confusion-hindering-firms.html

6. O'Hear, Steve. E-learning 2.0 – how Web technologies are shaping education. Read Write Web. http://www.readwriteweb.com/cgi-bin/mt-tb.cgi/2711

7. Downes, Stephen. E-learning 2.0. *e-Learn Magazine*. http://www.elearnmag.org/subpage.cfm?section=articles&article=29-1

8. Bartolome, Antonio. Web 2.0 and new learning paradigms. *In* eLearning Papers, 2008, http://www.elearningeuropa.info/files/media/media15529.pdf

9. Downes, Stephen. Ten Web 2.0 things you can do in ten minutes to be a more successful e-Learning professional. *eLearn Magazine*. http://www.elearnmag.org/subpage.cfm?section=articles&article=60-1>

10. Hornik, David. The Web 2.0 list. Venture blog: A random walk down sand hill road, 2006. http://ventureblog,com/cgi-bin/mt/mt-tb.cgi/264

11. Exemplary collection of Open e-Learning content repositories. http://ww.wikieducator.org/ Exemplory_collection

12. Good, Robin. Electronic portfolios: What are they? *The Guardian*, 2006. http://masternewmedia.org/news/2006/03/10/electronic_portfolios_what_are_they.htm#.

13. Mannes, Jack M. Library 2.0 theory: Web 2.0 and its implications for libraries. *Webology*, 2006, **3**(2). http://www.webology.ir/2006/v3n2.

14. Chandra, Smita & Patkar, Vivek. ICTs: A catalyst for enriching the learning process and library services in India. *The Intern. Inform. Lib. Rev.*, 2007, **39**(1), 1-11.

15. Roes, Hans. Digital libraries and education: Trends and opportunities. *D-Lib Magazine*, 2001, **7**(7/8). http://www.dlib.org/dlib/july01

16. Librarians speak up. How is your library implementing eLearning? *Library Connect Newsletter*, 2008, **6**(2), 8-9.

17. Goldenberg-Hart, D. Libraries and changing research practices: A report of the ARL/CNI forum on e-

research and cyberinfrastructure. *ARL Bimonthly Report*, No. 237, 2004. http://www.arl.org/newsltr/237/cyberinfra.html

18. Loudon, T.V. Geoscience after IT: Part A and B. *Computers & Geosciences*, 2000, **26**(3A), A1-A13.

About the Authors

Dr Pratibha Gokhale is Reader in the Department of Library and Information Science, University of Mumbai. She has experience of more than 30 years in the field of Library and Information Science. Initially she worked at the Tata Institute of Fundamental Research for three years, then moved to a multinational chemical company and worked as a corporate librarian for 15 years. She thus has a blend of practicing librarianship and teaching as well. She has contributed several articles in professional journals, national and international conference volumes, edited books, and has presented papers at national and international platforms. She received *Dr C.D. Sharma Award* for best presented and written article at the ILA National Conference in 2003. She is a resource person for different continuing education programmes, workshops, courses, etc., and has worked in various capacities for different committees. Her areas of specialisation are library management, grey literature, organisation of knowledge, and IT applications to library work.

Ms Smita Chandra is working as Librarian at the Indian Institute of Geomagnetism since 1997. She is the first IFLA/OCLC fellow from India in 2001. She was awarded the honorary membership of the American Society for Information Science and Technology (ASIST) for 2001-2003. She was selected by the SLA–Bay Chapter for membership to the Special Libraries Association and for their International Twinning Programme from April 2003-2005. She is a member of the Indian Library Association and the Bombay Science Librarians Association.