Distance education and the role of IT in India

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Abstract

Purpose – To highlight India’s efforts in raising literacy levels through distance education (DE) by utilizing various technological choices, including information technology (IT), available in the country.

Design/methodology/approach – This article discusses the education scenario, emergence of correspondence courses/open universities, government initiatives for IT enablement of education and DE, participating institutions and technology choices available in India. It examines the preparedness of participating institutions, status of networks facilitating virtual classrooms, technological solutions, educational channels, etc., for the spreading of DE in India.

Findings – The paper strongly suggests the need for digital libraries (DLs) and their integration, and the initiation of INTEND-OPENET as an exclusive network for DE.

Practical implications – The needed policy guidelines to use IT for education are now in place in India. The backbone for developing DLs already exists. Declining prices of PCs and networking devices makes it economically feasible to use IT to deliver quality education to previously unreachable populations and to enhance the quality of education.

Originality/value – This paper offers practical solutions for the spread of DE for policy makers and implementers, participating institutions and distance learners.

Keywords Distance learning, Communication technologies, Library and information networks, India

Paper type Viewpoint

1. Introduction

Learning nowadays is becoming a life long process. Teaching and learning are no longer confined to the classroom or the school day. Distance education (DE) has been in existence for more than a century. Until recently, many people regarded DE as unconventional and a peripheral function, and the sheer distance between teachers and students, rendered teaching and learning not only inefficient but also ineffective. The improvements in communications and information networks have demolished the barriers of physical distance and other inherent shortcomings affiliated with DE. DE has made remarkable progress over the last two decades and has now gained widespread acceptance as a viable alternative delivery system and alternative to the conventional system. Further, the use of information technology (IT) is giving this system an edge over the conventional system. Information technology can be used both for instruction and document delivery and libraries play a vital role in this context. The rapid expansion of IT, computer literacy and access to the internet offers immense opportunities for online delivery of DE and training. The real-time web-based courses are a matter of reality on the internet and the virtual university is no longer a fiction. The objective of the paper is to provide an overview of India’s efforts in raising literacy levels through DE by utilizing various technological choices available in the country.
2. DE and the role of technology

There are many synonyms used for distance education such as distance learning, distributed learning, or remote education. Distance education can be defined broadly as: Any educational or learning process or system in that the teacher and instructor are separated geographically or in time from his or her students; or in that students are separated from other students or educational resources; the learning is affected through the implementation of information and communication technologies to connect teacher and student in either real or delayed time or on need basis; and the content delivery may be achieved by integrating various technologies, including audio, video, computer, internet, multimedia, satellites, TV, cable TV, interactive video, electronic transmissions via telephone lines, postal service, etc. DE is a modality consisting of a broad, mixed, category of methods to deliver learning. The types can be organized along several descriptive dimensions and individual types can be mixed into hybrid forms (Table I).

The broad based technologies for DE include:

1. **Satellite technology.** It facilitates quickest delivery to any geographical location in the shortest period of time. An unlimited number of classrooms and individual students can participate in any given lesson, on a nation-wide basis. It provides equal access to all, including populations in remote areas. The course material is available on demand due to any time access to system’s databases and communications facilities through e-mail and internet browser.

2. **Audio-visual medium.** The need of audio-visual communication like TV is increasing day after day that is evident from the increase in cable TV homes in India. India has a large population living in rural and urban areas and TV has become a medium of education, information and entertainment to the masses. Digital TV is more powerful due to its multiplying factor (use of compression technology) and interactivity.

3. **Integrated communication networks (ICN).** In the age of liberalization and globalization, information has become the key factor to success. The need for an ICN in India is due to:
   - majority populace of India are residing in rural and semi-urban areas;
   - rural communication and education has become a necessity for the upliftment of the society and eventually for the country;
   - DE and learning is the only mode for increasing literacy at remote and tribal inhabitations;
   - dissemination of information and knowledge is required for geographically dispersed people;
   - basic education is required for women and child development in the villages and semi-urban areas; and
   - an ICN acquires information in various signal formats (video, image, text, audio, voice, data, internet), seamlessly integrates and disseminates by using efficient and cost effective communication modes to various destinations for public use (Figure 1).
<table>
<thead>
<tr>
<th>Technology</th>
<th>Characteristics</th>
<th>Notable features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print</td>
<td>Readily available, materials inexpensive, portable and with high comfort level</td>
<td>Requires reading skills, no interactions, limited sensory involvement and time delay</td>
</tr>
<tr>
<td>Audio tape</td>
<td>Audio learning tool, very mobile, easily accessible and duplicated, and inexpensive when combined with print materials</td>
<td>Useful in language learning and practice as well as literature. Linear format with no visual cues and interaction</td>
</tr>
<tr>
<td>Video tape</td>
<td>Visual and audio tool, easily accessible and duplicated</td>
<td>Multi-sensory tool with linear delivery format. Complex to record with no interaction and requires hardware</td>
</tr>
<tr>
<td>Laptop computer</td>
<td>Versatile approach to providing a wide range of learning activities from skill and drill to simulations</td>
<td>Hardware is expensive and being replaced by less expensive internet delivery</td>
</tr>
<tr>
<td>Mobile van/lab</td>
<td>Resources taken to the learners, useful for work site learning</td>
<td>Useful way to distribute videos, audio tapes and other learning tools</td>
</tr>
<tr>
<td>Radio course</td>
<td>Low cost way to reach learners and should be used by more learning providers</td>
<td>Model must include ways for learners to interact with the instructor. Phone call in during or after air time could be integrated into the programming</td>
</tr>
<tr>
<td>Telecourse</td>
<td>Delivery over TV, usually a cable public access channel or school owned channel</td>
<td>Model must include ways for learners to interact with the instructor. Phone call in is popular. Print materials accompany on-air instruction</td>
</tr>
<tr>
<td>Audio conference</td>
<td>Inexpensive and easy to set up</td>
<td>No visual cues and interaction; requires hardware</td>
</tr>
<tr>
<td>Teleconference-two way interactive video</td>
<td>Electronic communications among people at separate locations. It can be audio, audio graphic, video or computer based</td>
<td>Often uses proprietary software and consequently expensive. Internet models, broadband communications will make it more affordable and accessible</td>
</tr>
<tr>
<td>Satellite video conference</td>
<td>High realism</td>
<td>Expensive hardware and must be scheduled. Usually one-way only</td>
</tr>
<tr>
<td>Microwave video conference</td>
<td>High realism, may be interactive and relatively inexpensive</td>
<td>Limited coverage and must be scheduled; requires hardware and no interaction</td>
</tr>
<tr>
<td>Cable/broadcast TV</td>
<td>Easy to use and accessible; may be video taped and includes audio and visual</td>
<td>High production costs and must be scheduled; requires hardware and no interaction</td>
</tr>
<tr>
<td>E-mail</td>
<td>Asynchronous text files and attachments; flexible, interactive and convenient</td>
<td>Good tool to stimulate learning, writing and communications skills. Requires hardware and software variations</td>
</tr>
<tr>
<td>Voice mail</td>
<td>Low cost, easy to use and increases interactions</td>
<td>Length may be limited, no visual cues and may involve toll charges</td>
</tr>
<tr>
<td>Internet/web based</td>
<td>Instructionally delivery over the internet, either learning modules or entire courses; incorporates multimedia, worldwide access and interactive</td>
<td>Improved broadband communications will enable the effective use of video and communications. Requires computer and web access</td>
</tr>
<tr>
<td>Online chat</td>
<td>Real-time interactions and instant feedback</td>
<td>Requires similar software and must be scheduled; requires hardware</td>
</tr>
</tbody>
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Table 1. Characteristics and notable features of major DE technologies
3. Indian scenario

Despite having about 6 million primary schools, 75,000 higher secondary schools, 36,600 colleges of higher education and 300 universities, the higher education system reaches out to only 7 per cent of the age group eligible for such instruction in every discipline. India spends about 4 per cent of its GDP on education, compared to 9 per cent in many developed nations and 6 per cent as the world average. More than 44 per cent of India’s population is still illiterate and an estimated 100 million school age children either never go to school or drop out before finishing.

In 1962, the University of Delhi (www.du.ac.in) initiated DE in the form of correspondence courses; In 1982, the first Open University was established in Andhra Pradesh as Andhra Pradesh Open University, subsequently renamed as Dr B R Ambedkar Open University (BRAOU) (www.braou.ac.in); in 1985, the Indira Gandhi National Open University (IGNOU) (www.ignou.ac.in); and in 1987, the Kota Open University - renamed as Vardhaman Mahaveer Open University (VMOU), Rajasthan, came into existence. Since then, the DE system has grown substantially and by the year 2002 there were 10 Open Universities and 64 correspondence courses directorates or institutes attached to different Universities providing courses through distance mode (Department of Education, India, 2003). Initially, these Universities reached their students through post offices and begun to supplement their courses in recent years with classes that use radio and TV broadcasts. They primarily cater to educationally disadvantaged groups such as unemployed, people living in rural areas, working people who cannot attend regular institutions, housewives, and the like.

In India there are four types of institutions offering distance education, namely: IGNOU, State Open Universities, Directorates of DE functioning under conventional Universities (Dual Mode Universities) and private professional institutes. However, only the IGNOU uses third generation tools (Internet based education) and the Directorates attached to conventional universities are still at first generation level (correspondence model) (Srivastava, 2002).

3.1. Government initiatives

Several Government initiatives are actively pushing for the IT enablement of school and University education in India on an unprecedented scale. The Working Group on IT for Masses, constituted by the Government of India in May 2000, made recommendations while stating "in a large country like India, technologies, such as
distance learning, need to be used in a major way to address the problem of limited educational material and resources for use in different parts of the country”. Many educational experts are of opinion that the best way quality education can be delivered to the masses cost-effectively is to leverage mainly IT, communications and broadcasting (Government of India, 2001).

The Ministry of Human Resource Development (MoHRD) allocated a budget of Indian Rupees (INR) 450 crore ($104 million) for IT enablement of education and DE, and for strengthening of computing and networking infrastructure in Category II and INR 700 crore ($161 million) in Category III institutions over the next three years (in comparison to cumulative expenditure of INR 200 core ($46 million) on IT in education efforts over the last 20 years). To enhance University education, the MoHRD has drafted a set of recommendations to build digital libraries (DLs) and interconnect 50 Category II and 200 Category III institutions. This will expand the existing educational backbone network Education and Research Network (ERNET).

The University Grants Commission (UGC) (www.ugc.ac.in), the apex policy and funding agency for higher education in India, plans to build a very small aperture terminal (VSAT) and terrestrial network to connect all Universities under its umbrella in a scalable Wide-Area Networking (WAN), wherein even remote areas can be covered as easily as urban locations. This facilitates data transfer, internet access, video conferencing and DE programmes at all major Indian Universities.

### 4. Participating institutions and technology choices

Several public and private institutions have come forward with complete solutions for creating virtual classrooms anywhere, anytime with connectivity to a main resource centre. The select institutions, technologies, solutions, education channels, etc., are discussed below:

#### 4.1. Institutions

Following are select institutions providing virtual classrooms:

- **IGNOU, New Delhi (www.ignou.ac.in)**. The University caters about 1.3 million distance learners in India and 30 other countries through a network of 48 regional centres, six sub-regional centres and over 1,200 study centres, all over India about 1,000,000 students. It deploys TV broadcast technology to deliver some of its courses to students around the country. It has built two-way audio and video conferencing facilities at 175 nodes across India to facilitate interaction between faculty and students. Under its “Virtual Campus” initiative, digital content delivery through multimedia CDROMs and the internet, and further seeks to combine the internet, teleconferencing and broadcasting into a composite learning experience. The IGNOU acts as a nodal agency for EDUSAT, wherein all regional centres, State Open Universities: BRAOU, Hyderabad; VMOU, Kota; Nalanda Open University, Patna; Yashwantrao Chavan Maharahstra Open University, Nashik; Madhya Pradesh Bhoj Open University, Bhopal; Dr Babasaheb Ambedkar Open University, Ahmedabad; Karnataka State Open University, Mysore; Netaji Subhas Open University, Calcutta; UP Rajarshi Tandon Open University, Allahabad; Tamil Nadu Open University, Chennai and participating technical institutions, acts as receiving nodes. It has plans to offer agriculture education for farmers and rural community.
BRAOU, Hyderabad (www.braou.ac.in/profile.htm). The University has around 152 study centres with about 450,000 students. The study centres are located in local colleges, seven in remote tribal areas and four in prisons. It has state-of-the-art-TV and radio studios, where lectures and panel discussions are recorded and transmitted for a few hours a week on state run TV and radio. The University campus was equipped with Ku band earth station and plans to implement application of new technologies to DE, inter-linking of its local areas through Local Area Network, campus and study centres through WAN.

4.2. Networks
The select networks facilitating virtual classrooms through participatory institutions include:

- **ERNET India** (www.eis.ernet.in/). ERNET was conceived in 1986 and play the role of an indigenous internet, limited to academia and R&D institutions. It serves as a critical infrastructure bearing a direct role in the higher education sector. It is setting up UGC-Infonet in partnership with UGC (www.eis.ernet.in/ugcnet.htm); “Vidya Vahini” an Intranet and internet for schools by providing IT in education (www.eis.ernet.in/vv%5B1%5D.htm); “Gyan Vahini” an integrated internet and Intranet tools and computer aided techniques into the learning environment (www.eis.ernet.in/gv.htm) and “Navodaya Vidyalaya Samiti” – Net (www.eis.ernet.in/nv.htm).

- **EDUSAT** (www.isro.org/edusat/). The first Indian satellite built exclusively for serving the educational sector to meet the demand for an interactive satellite based DE system. It carries five Ku-band transponders providing spot beams, 1 Ku-band transponder providing a national beam and six extended C-band transponders with national coverage beam. It provides six exclusive channels for primary, secondary, higher education, technical education and e-governance. EDUSAT’s objective is to provide effective teachers training, supplementing curricula based teaching, greater community participation and monitoring, providing access to quality resource persons and strengthening the DE programs initiated by others. Its full potential could be envisioned as e-connectivity for information sharing relating to all aspects of education among universities, UGC, AICTE, DST, DBT, etc.

- **Europe Star** (www.europestar.com). Europe*Star provides point-to-point and multipoint delivery of data, voice and video content for video conferencing, internet broadcasting and video streaming directly to PCs. The pay-as-you-use basis enhances its cost effectiveness. It is more cost-effective in setting up a satellite dish of 45-60 cm in rural villages around India than to build a whole terrestrial network and the rollout rate may be 50,000 schools a year. Europe*Star has footprint across the Indian subcontinent, Middle East, Africa and Europe, and become a major player in the emerging DE scenario.

- **Skymantra.** Skymantra is a broadband network from Bharti Data and Broadband Group that can be used for connectivity in DE. Bharti is an enabler, associates with content creators like the Manipal Group, Delhi Public School (DPS) and others, deploys a state-of-the-art broadband VSAT infrastructure and terrestrial network of the telecom group to create a
sustainable business model. It enables teachers and students to access distant libraries and databases on a global scale and remains interactive with peer groups. The Manipal Institute of Technology and the Government of Sikkim, jointly delivering instruction in vocationally focused learning initiatives in healthcare, engineering and IT in the Northeast and other regions through DE over Skymantra. The DPS has established a central studio in New Delhi and links up with 25 of its branches through Skymantra (Manjunath, 2003).

4.3. Solutions
Following are select solutions facilitating DE:

- **SpaceTeach.** A national virtual classroom can be created with SpaceTeach (an education dissemination application) through that institutions make available talent across the country by deploying satellite video multicast facilitates. A centralized instruction resource combines the best quality and content for the audience. Moreover, the video/chat return channel offers benefits of interactive learning. HCL Comnet has set up SpaceTeach at IIT Bombay (a VSAT based interactive, two-way DE application) and IIT Kharagpur (setting up India’s first multi-service IP network for student campus) (HCL Comnet Ltd., 2004).

- **DiRECWAY Global Education.** It is a comprehensive training and education service, and utilizes a blend of broadband satellite technology and interactive learning technologies, targeted at companies and individuals. It redefines the concept of classroom education retaining all its benefits, improving reach and enhances collaborative group learning. It is being implemented at Indian Institute of Management, Kozhikode to offer interactive distance learning educational courses, Xavier Labour Relations Institute, Jamshedpur for satellite-based management programmes and Apollo Group, Inc., USA to provide high quality education services in the country (Hughes Escorts Communications Ltd., 2001).

- **BGAN program.** The Inmarsat’s regional broadband global area network BGAN specifically useful where VSAT is not an ideal option and volumes of data are small. Inmarsat’s footprint is across India, the Middle East, Europe and North, Central and West Africa. It has been used in many villages where there was no local infrastructure. It supports multiple users from one unit through a router, thereby reducing costs for each user (Franchi and Sengupta, 2001).

The other solutions include: Saras system – an instructional management system using shareable content object reference model with different assessment systems from Excel-Soft Technologies (Excel-Soft Technologies, 2001); Deepthought framework – a community-based education framework that defines the operational and messaging needs for a high-end DE system targeted towards mass education (AEM Pvt. Ltd, 2004); and Enlitor system – serves as an electronic learning management system, enables one to deliver and manage learning resources efficiently and cost effectively on the internet, intranet or extranet (NSE.IT, 2004).

4.4. Educational channels
Educational channels have been in existence in India for over five years (MoHRD, 2003). The select channels include:
(1) **Gyan Darshan.** Launched in 2000, as an educational TV in India. It was envisaged as a public co-operative involving major educational institutions: IGNOU, UGC/Consortium of Educational Communication, NCERT/Central Institute of Educational Technology, Directorate of Adult Education, IITs, Technical Teachers’ Training Institutes and other developmental organizations to contribute programmes. The transmissions are uplinked from the earth station of Electronic Media Production Centre-IGNOU, New Delhi. Gyan Darshan comprises four channels:

- **Gyan Darshan-I:** serves different categories of users such as pre-school kids, primary and secondary school children, college/university students, youth seeking career opportunities, housewives and adults;
- **Gyan Darshan-2:** devoted to interactive distance education with one-way video and two-way audio satellite-based interactive systems;
- **Gyan Darshan-3 or Eklavya:** the technology channel dedicated to technical education. It features lectures of the courses taught at the IITs situated at Kharagpur, Bombay, Kanpur, Delhi, Guwahati, Roorkee and Madras (http://paniit.iitd.ac.in/eklavya/); and
- **Vyas:** launched in 2004 with 85 per cent curriculum based content and the rest being enrichment programmes.

(2) **Gyan Vani.** Launched in 2001 as an educational FM Radio channel operating through 10 FM stations from various parts of the country with a further expansion to 40 stations by 2007. Gyan Vani stations operate as media cooperatives, with day-to-day programmes contributed by various Ministries, educational institutions, Non-Governmental Organizations and national level institutions and Open Universities. It serves as an ideal medium for niche listeners and for addressing local educational, developmental and socio-cultural requirements. Around 2000 hours of audio programmes produced and distributed as audio CDs. The programmes are in English, Hindi and the language of the region. The broadcast duration is in the range of 8-12 hours.

(3) **Interactive Radio Counselling (IRC).** IGNOU and All India Radio run a collaborative venture called IRC, each Sunday, from 4 p.m. to 5 p.m., on 189 radio stations. The programmes are produced in Hindi and English, and the AIR stations broadcast IRC in the language suited to their region.

4.5. **Natural language interfaces**

Natural language technology is of great use in DE and has a tremendous potential for rural India. NLIs help people to communicate with the machine in a language that is natural to them. The interfaces can be intelligent tutoring systems and virtual reality systems, and of great use to build various customized training applications for the rural Indian. Though natural language interfaces (NLIs) are in a nascent stage, institutions like Centre for Development of Advanced Computing (www.cdacindia.com) and IITs at Madras, Kanpur and Bombay, are working in this direction. NLIs along with touch screen technology and voice enabled inputs aids in achieving National Literacy Mission. The MoIT has already initiated several projects such as “Bharat Bhasha Kosh”; web-based learning system in Indian languages, Speech Synthesis System at Central Electronics Engineering Research Institute, Pilani (www.
5. Role of libraries in DE

In distance education, learners are far away from their teachers and instructions are imparted through multi-media approaches. Hence, the role of libraries becomes a basic requirement to fulfill this gap. In general, distance learners need some library and information services such as: loan of a particular text or specific reference book; photocopy of a specific journal article or single chapter of a book or previous examination papers for their course; information/material on a particular subject; self-instructional materials; viewing and listening to audio-visual materials; using different type of library collection, equipment and facilities available in the library. Library facilities to distance learners vary from country to country, based on policies and availability of communication technologies. Most libraries in developed countries are fully computerized and use various technological devices (telephone, telex, facsimile, e-mail, internet, etc.,) to provide information to distance learners. And India is following suit.

5.1. Issues in providing distance library services

Watson (2003) discussed select four issues in providing distance library services:

(1) Access to materials and document delivery. Some countries monitor or restrict access to downloaded contents from internet sites. The electronic information sources such as e-books, databases, virtual libraries, Web pages, etc., are commonly used in developed countries, but are not widespread use in many developing countries. Hence, distance library services must be sensitive to these realities and establish delivery of services through mail, fax or phone for enquiries and print copies or audio/videotapes of materials can be sent through regular mail or by courier. Agreements for borrowing and service can be made with libraries in other locations – for instance, the Simon Fraser University Library (www.lib.sfu.ca) in British Columbia, Canada provides library services for distance learners of several other institutions. Fees for these services can be either charged to the user, or paid through an arrangement between the contracting institution and the library providing the service. Pre-packaged information services from commercial vendors, such as Questia (www.questia.com/), XanEdu (www.xanedu.com/) and ebrary (www.ebrary.com/corp/index.htm) can also be used, through subscription or pay-per-use.

(2) Consultation services. These can be extended through e-mail, toll-free telephone services, pre-packaged mail-out information or scheduled remote site visits depending on distance from parent institution.

(3) Reference services. Students can use forms (print or electronic) to make research queries and the prompt ones replace face-to-face assistance in helping the student to properly complete a request. Institutions that have dedicated library telephone services may use them for reference queries. Institutions with web-based services may procure online versions of major reference works to
provide students with a convenient access point, as Athabasca University’s Digital Reference Centre (http://library.athabascau.ca/drc).

(4) Bibliographic instruction (BI) and information literacy (IL) instruction. Libraries need to facilitate learners to access, evaluate and use information effectively and efficiently. The electronic communication utilities such as Centra eMeeting (www.centranow.com) useful to deliver BI at a distance; interactive web-based IL tutorial software from UNILINC (www.unilinc.edu.au) – used at Deakin University, Australia; alternative delivery methods such as radio – used at the University of South Africa (www.unisa.ac.za/library); computer and video conferencing – used at the Central Queensland University, Australia (www.library.cqu.edu.au); etc.

5.2. Library situation in India
Library services to distance learners in India can be provided in several ways:

• Services can be based on delivery of library materials directly at student’s homes, as in Australia, Canada and other countries where students are geographically remote from the institution at which they are studying.

• Resources can be placed in study centre libraries where students attend in person to borrow items and to receive user education, as followed in many areas of the USA.

• Facilitating electronic access to libraries and their resources. High-speed delivery of books, audio-visual items and photocopies of journal articles may complement electronic access to services and resources.

The libraries of open universities in India function at three levels: one each at the university headquarters, regional and study centre. The library of the study centre is normally located at the college where the study centre is located. The college library also acts as the library of the study centre. These libraries mainly contain study material, textbooks, audio-visual aids and other reading material for its clientele. The organization of important library services in various study centres scattered over far-flung areas by creating full-fledged study centres is a difficult task. However, the distance education system can select some college libraries or district libraries for rendering library services to various students residing in the territorial jurisdiction of a particular college or district library. The authority of a distance education system may finance these libraries to procure more resources for distance learners, so that these can be utilized as study centres for its readers. The services offered by the libraries of open universities are quite restrictive in nature, such as, reference, listening, viewing of audio/video cassettes, limited photocopying facility, etc., and are not able to cater fully to the needs of distance learners. In this context, the integrated digital libraries seem to be the most viable solution and the utility of such systems needs to be examined seriously.

5.3. Integrated digital libraries
Integrated digital libraries create a shared environment by linking resources from a personal information collection to collections of conventional libraries and to a large worldwide database. The DLs allow teachers and learners to take advantage of a wide range of materials and to communicate with people beyond their immediate learning
environment. The basic services provided by DLs include: online searching of databases, request of material through e-mail, electronic delivery of e-journals, image files and ASCII files, online reference service, alerting services and SDI services via e-mail, provision of an electronic collection of e-journals and other reading materials, access to electronic indexes and directories, services like newsgroups, list serves and mail archives, internet browsing facility, etc. Thus, the advantages derived from DLs in the context of DE are manifold. The basic advantages that one can derive from such systems: access to knowledge bases in a wide variety of media; accessible from the students’ work places or homes, at their own convenient time, therefore cutting down the trip to different libraries; aid in avoiding the unnecessary duplication of material in different regional or study centres and making it a cost-effective means of providing library services; facilitate broader, faster and better delivery of resources, information and prevent loss of material in the transit.

At present the development of DLs in India is in the nascent stage. However, efforts are on to develop network based learning environment for the distance learners. The Indian Training and Education Network for Development (INTEND) facilitates value added services such as e-mail, down loading of lectures/lessons from the hub station to remote classes, provision of internet services through gateways, library services, video conferencing, etc. The implementation of the INTEND was planned in two phases, spreading over ten years. As part of the INTEND project the Open and DE system in India has decided to set up the Open Education Network (OPENET). The OPENET is envisaged to be a network of physical, intellectual and academic resources of all the Open and DE institutions in the country. The technical system of INTEND-OPENET comprises of National hub at IGNOU, New Delhi, Regional hubs in the State Open Universities and state capitals and VSAT’s of varying capabilities in Universities, regional centres, study centres and other partner institutions.

In library networking frontier, Information and Library Network (INFLIBNET) (www.inflibnet.ac.in) has been established to link the libraries of all Universities and R&D institutions in the country. The INFLIBNET will be integrated with the INTEND-OPENET in the future. Apart from the INFLIBNET, the other major efforts in library networking are several metropolitan networks including: Delhi Library Network (DELNET) (http://www.delnet.nic.in); Calcutta Library Network (CALIBNET); Madras Library Network (MALIBNET); Bombay Library Network (BONET) etc., (Rao, 2001).

6. Conclusion
Information sharing is critical to the process of raising educational standards. If institutions are interconnected through IT enabled networks, they will be able to share information more easily and thus raise standards rapidly. Policy guidelines to use IT for education are now in place in India. What remains to be done is to develop an appropriate mix of technologies and teaching methodologies for IT enabled education, and to find the funding for mass implementation. Fiber, broadband, satellites, complimentary media, are available in India. The backbone needed for developing DLs for the distance learners already exists in the country. The need is to have a clear understanding of the emerging opportunity to leverage the technology to play a global role in a cost-effective way. The declining price of PCs and networking devices makes it economically feasible for countries like India to use IT to deliver quality education to
previously unreachable populations and to enhance the quality of education in existing
teaching institutions. IT enabled education and IT enabled DE will become
commonplace in the future.

References

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