UNIT 8   E-LEARNING: ROLE OF ICT IN EDUCATION AND TRAINING

Structure

8.0   LEARNING OUTCOMES

After studying this Unit, you should be able to:

- explain the concept and significance of e-learning;

- describe the online delivery of education and training through internet;

- discuss the concept and benefits of Virtual Learning Environment;

- highlight the features of digital library;

- explain the importance of digital portfolios; and

- highlight the basic features of the Edusat initiative of the Government of India

8.1   INTRODUCTION

Information and communication technology (ICT) has become an integral part of learning today. Countries across the world are using ICT in facilitating information dissemination and communication in all areas of education and training. There are now educational and training institutions imparting skills in the basic and advanced concepts of ICT. Besides, ICT is being used in facilitating distance learning. It is enabling online designing of courses, online delivery of courses, computer-aided teaching, online assessment, besides management and networking of a large number of educational institutions. ICT based systems and

software, CD based courses, online courses, digital libraries, discussion forums, digital portfolios, teleconference, etc. has made e-learning a reality today.

In this Unit, we will be discussing these ICT-based applications in the field of learning, that is, education and training.

8.2   E-LEARNING: CONCEPT AND SIGNIFICANCE

E-learning is an approach to facilitate and enhance learning through, and based on, both computer and communication technology. It refers to the use of computer-based electronic technologies of internet, e-mail, websites and CD-ROMS to deliver, facilitate and enhance both formal and informal learning and knowledge sharing from any place at any time. The communication devices can also include digital television, personal digital assistants (PDAs) and mobile phones.

E-learning is also called Computer-Based Training (CBT). Generally, CBT and e-learning are treated as synonyms, but CBT is the older term dating from the 1980s. The term e-learning evolved from CBT along with the maturation of the internet, CDs and DVDs. It includes Internet-based Learning, Web-based Learning and Online Learning.

E-learning: Significance

E-learning is significant in many ways. It

- enables flexible learning where just-in-time learning is possible. It is a means to effective and efficient learning due to its ease of access and the pace being determined by the learner;

- facilitates collaborative internet and web-based learning opportunities to the learners. It supports distance learning with wide area networks (WAN). It addresses the practical side of learning by organising the topics to be taught and creating multimedia CD-ROMs or websites. An important advantage is that hyperlinking is possible and having interactive parts illustrating difficult things or for doing exercises is also possible;

- allows a wider range of learning experiences, such as, educational animation to online learners;

- imparts e-training through the asynchronous and synchronous communication modes, permitting the learners the convenience of flexibility. Asynchronous learning uses technology such as blogs, wikis and discussion boards to allow participants to contribute when time allows. Synchronous activities allow all participants to join in at once with a chat session or a virtual classroom or meeting;

- develops the role competencies of the personnel in an organisation through the use of electronic media. Specialised training is rendered through customised software, which addresses the particular needs of the clientele mostly through the synchronous mode on a dedicated broadband internet connectivity. Equally, it also renders training to the learners through the generic software displaying universal contents in asynchronous mode to the learners through a shared network with limited internet access or on World Wide Web; and

- enhances teaching by professional development of teachers through training on usage of ICT in education. E-learning system like World Links enables the teachers to integrate technology into teaching and thus create dynamic student-centred learning environment in classrooms. The faculties can also interact with their peer groups in the world and exchange ideas and notes on the subject.

Hence, as put by Gupta and Singhal, e-learning is a planned effort towards providing interactive and experiential learning; flexibility in terms of time, place and pace; participation and accessibility; expertise and qualitative subject matter; best resource at the learners' doorsteps and personalised training; and centres round the trainees.

8.3 E-LEARNING: ONLINE DELIVERY OF EDUCATION AND TRAINING

E-learning is basically the delivery of learning via the internet. We can refer to this type of learning as online learning and/or web based learning. With the internet boom since mid-1990s, the concept of online learning has spread broadly. Online learning can be thought of as a subset of the broader e-learning category because it refers specifically to content delivered via the internet or intranet. A growing number of universities and colleges are now offering select set of academic courses via the internet. Universities around the world offer online courses ranging from associate's degrees to doctoral programmes in everything from business administration to criminal justice to nursing. While some programmes require students to attend some campus classes or orientations, many are completely online. In addition, several universities offer online student support services such as online advising, student newsletters, etc.

For the younger children (for example in US) there are free learning sites ranging from those that provide worksheets to those with interactive exercises. But, it is left to the parents to provide continuity, determine and to assemble an overall programme. In addition, there are online subscription services for children that track the children and provide assessment, placement, continuity and reports.

Similarly, there are universities and distance learning systems offering courses online to its learners. Now even the corporate and businesses are using online learning to provide cost-effective training to their employees, partners and customers.

As the number of students taking online classes continues to grow at a quicker pace (owing to the convenience and cost factor) we today have a second wave of online college students who are different. They are students who know the ingredients of a good online class. They are the new savvy consumers of online education. In response to their higher expectations, providers of online education are incorporating increasingly sophisticated teaching approaches, such as, educational animation that address the challenges of presenting dynamic content to learners.

Open source online learning system is growing fast in the education and business world. WebOpenSource.com lists the entire available open source online learning system in the market today. Instructors in education and business organisation may free use it under GNU Software License. One of the best open source online learning system is Moodle. WebClass.com is a professional hosted online learning system based on Moodle.

Internet Forums

ICT facilitates discussion groups, which can enable its participants to exchange ideas, suggestions and discuss crucial pedagogical/educational issues over the internet. This is a facility on the World Wide Web for holding discussions. Hence, the learning community can develop its discussion groups and exchange messages and join in debates through the internet. Some examples of discussion forums are the Manipal Academy of Higher Education Discussion Board, Directorate of Technical Education Discussion Forum, the EDTECH List, which is an international consortium of scholars and teachers; and the H-Net that uses communication technology to facilitate the free exchange of academic ideas and scholarly resources thereby advancing teaching and research in arts, humanities and social sciences. Such discussion groups/forums are also referred to as internet forums, web forums, message boards, discussion boards, bulletin boards or simply forums.

A virtual community of teachers, subject experts, professionals, learners and instructors can be developed and they can discuss a number of related themes/topics. Facilities like bulletin boards allow them to dial into the computer system over a phone line and using a terminal programme perform functions, such as, downloading software and data, uploading data and exchanging messages with other learners or teachers. Now it is even possible to have more than one forum dedicated to a particular topic.

As of late, forum software developers have actively encouraged the creation of open source plug-ins, which can be integrated with the software as a means of expansion. Plugins are auxiliary programmes that works with a major software package to enhance its capability. Generally, plug-ins provide more interaction for users and may add special features to the forum software. For example, plug-ins are widely used in image editing programmes, such as, Photoshop to add a filter for some special effect. They are also added to web browsers to enable them to support new types of content such as audio, video, etc.

8.4   E-LEARNING SYSTEMS: VIRTUAL LEARNING ENVIRONMENT

The Virtual Learning Environment (VLE) also called Managed Learning Environment (MLE), Learning Management System (LMS), Course Management System (CMS), Learning Support System (LSS) or Learning Platform (LP) makes possible for a course designer to present to students through a single, consistent and intuitive interface, all the components required for a course of education or training. It makes extensive use of computers and internet to implement all the elements pertaining to learning, such as:

*   the syllabus for the course;

*   administrative information including the location of sessions, details of pre-requisites and co-requisites, credit information and how to get help;

*   a noticeboard for up-to-date course information;

*   student registration and tracking facilities, if necessary with payment options;

*   basic teaching materials. These may be the complete content of the course, if the

VLE is being used in a distance learning context, or copies of visual aids used in lectures or other classes where it is being used to support a campus-based course; and

- additional resources, including reading materials and links to outside resources in libraries and on the internet.

Virtual Learning Environment

The above webpage depicts the VLE with:

- navigation menu and icons giving access to automated tools and content pages to the learners;

- self-assessment quizzes which can be scored automatically;

- formal assessment procedures; and

- electronic communication support including e-mail, threaded discussion and a chat room with or without a moderator.

Besides VLE provides differential access rights for instructors and students and causes production of documentation and statistics on the course in the format required for institutional administration and quality control.

All these facilities are capable of being hyperlinked together. Also, easy authoring tools for creating the necessary documents including the insertion of hyperlinks is provided-though it is acceptable for the VLE to be designed so that standard word processors or other office software can be used for authoring. In addition, VLE is capable of supporting numerous courses, so that students and instructors in a given institution (and indeed across institutions) experience a consistent interface when moving from one course to another. Virtual learning software packages like Moodle, works toward a student-centred learning solution by helping educators create quality online courses.

Open Universities and other institutions of higher education are increasingly turning to VLEs in order to:

- economise on the time of teaching staff, especially when they are also involved in research and administration. The extent of the economy over traditional 'talk-and-chalk' teaching is not yet clear, but using a VLE almost certainly absorbs less instructor time (and requires less expertise, while producing a more professional result) than creating a home-grown website for a course:

- provide a service for students who increasingly look to the internet as the natural medium for finding information and resources;

- ensure that quality control requirements are met by providing a standard vehicle for collecting the required information; and

- facilitate the integration of distance and campus-based learning or of learning on different campuses.

Rather, open schools and distance education universities should be encouraged to make use of such learning platforms where is possible for every learner to have an access to an online learning space and e-portfolio.

In India, we have conceived an e-learning system namely 'E-Vidyapeeth'. It is a Learning Management System and an e-learning infrastructure product. It has been developed with a vision to transform the internet into a powerful environment for teaching and learning. This system can be used for launching almost all the courses offered by various universities and educational institutions. This system makes it easy to publish documents, lectures and exercises for faculty members and lab faculty members. Besides, it will be a main portal for all the students to get the most up-to-date information for their lectures and exercises. With the help of this system, monitoring student performances will become easier. The system helps in:

- student registration;

- enrollment;

- course delivery;

- online examination;

- discussion;

- chat;

- white board;

- calendar;

- administration; and

- faculty operations

8.5   DIGITAL LIBRARY

According to Wikipaedia, a digital library is a library in which a significant proportion of the resources is available in machine-readable format accessible by means of computers,

as opposed to print or microform. The digital content may be locally held or accessed remotely via computer networks.

In libraries, the process of digitisation began with the services in the following order:

First: cataloguing services;

Second: periodical indexes and abstracting services;

Third: periodicals and large reference works; and

Finally to book publishing.

Some of the largest and most successful digital libraries are Project Gutenberg, ibiblio, and the Internet Archive.

Advantages

The Wikepaedia Dictionary has summarised the following advantages of the digital libraries to the traditional libraries:

	Traditional libraries	**Digital libraries**
• **Storage Space**	limited	greater with digital information requiring very little physical space to contain them.
• **Maintenance Cost**	greater owing to payment rent, additional books	lower as they do away with these to staff, book maintenance, fees
• **Innovation**	casual	innovations in technology is immediately adopted to provide users with improvements in electronic and audio book technology. New forms of communication, such as, wikis and blogs are also presented.
• **Physical Boundary**	yes	no, as the user need not to go to the library physically. It is widely accessible around the globe with internet.
• **Availability**	limited	24x7
Access	limited	multiple, as the same resources can be used at the same time by a number of users.
• **Approach**	time consuming	structured access to much richer content in a more structured manner, i.e. we can easily move from the catalogue to the particular book then to a particular chapter and so on.

• **Information Retrieval**	time consuming	the user is able to use any search term bellowing to the word or phrase of the entire collection. Digital library will provide very user-friendly interfaces, giving click able access to its resources.
• **Preservation and**	difficult	an exact copy of the original can be made any number of times
• **Conservation**		without any degradation in quality.
• **Networking**	no	a particular digital library can provide the link to any other resources of other digital library very easily. Thus, a seamlessly integrated resource sharing can be achieved.

However despite the numerous advantages, certain gaps are to be looked into. Some of these success gaps are discussed below:

Disadvantages

Digital libraries:

- have problems pertaining to copyright laws, as the works cannot be shared over different periods in the manner of a traditional library;

- cannot reproduce the environment of a traditional library. Many people also find reading printed material to be easier than reading material on a computer screen although this depends heavily on presentation as well as personal preferences; and

- can see some of its content becoming out-of-date and its data becoming inaccessible due to technological developments.

However, despite these disadvantages, the future holds good for digital libraries, as service providers such as Google, the Million Book Project, MSN and Yahoo are undertaking large scale digitisation projects. As digital libraries continue to make improvements in book handling and presentation technologies, such as, through Optical Character Recognition, E-books and Internet Archive, there is a tremendous scope for e-learning today and in times to come.

8.6   DIGITAL PORTFOLIO

According to the Wikipaedia Dictionary, a digital portfolio is an evolving tool that documents ones personal, academic and professional development. It is a visual guide that maps out where one has been, where one is going and how one plan to get there. The digital portfolio can also serve as a tool to communicate one's plan to others. Hence, it as much a process as it is a product and is a 'living document' that evolves as one does.

Digital portfolio is a hypermedia document. This simply means that the portfolio is a set of screens (or pages in software terminology) that is linked by buttons on the screen.

When the user clicks the mouse to select a button, the programme reacts typically by navigating to another screen or by showing some additional information.

The opening page of the digital portfolio is an identification of the student and his/her school. In the bar along the bottom of the screen are several buttons; clicking on any of the words in that bar elicits an action. For example, clicking on the 'photo button' allows the user to see a digitised photo of the student. Clicking on the 'information button' shows a screen with additional information about the student, such as his/her years of enrollment and other administrative data. Clicking on the 'instructions button' brings up a screen that tells the user how to navigate through the portfolio.

Digital portfolios are a way of displaying student achievement through class assignments, community service and occupational experience. A digital portfolio means that students can save their work to a disk, a CD, a web page or an internet storage bin. It not only allows students to bring samples of their work to local college and/or job interviews, but it also enables them to send samples of their work at the touch of a keypad to colleges and businesses throughout the country.

Objectives

The purpose of digital portfolio is to:

- allow one to create a tool to assist in presenting what one is learning and planning in his/her personal, academic and professional life and how this learning and planning interconnect;

- provide academic plan that will help one to articulate what one is learning in classes. The portfolios embody student work from every discipline with an emphasis on future academic and career goals. It depicts what one is learning about oneself and one's academic goals;

- depict the personal/professional plan that will help one to reflect on what one is doing outside the classroom and what is one learning. One is, therefore, able to explain the skills and knowledge one has learnt as a result of one's involvement on campus;

- help one to plan professionally and explore career paths;

- serve as a tool to map out one's plan and express one to others. It can also serve as a tool that will help one to keep track of information one will need when preparing for a job or university;

- help professors view the academic, personal and professional goals of a student to get a better understanding of why one is taking a particular course and assist one with his/her personal, academic and professional development; and

- help schools to develop some preliminary answers to questions relating to school improvement plan. These questions may pertain to:

  i) What a student of the school should know and be able to do?

     The answer to this question is the 'vision' of the qualities that a graduate should possess. The vision needs to be created by the school community, led by the

faculty that will be looking for those qualities in their classrooms. Digital portfolios contain the learning goals prescribed by the schools, which the learner has to attain. When a student enters a school, he or she will be given a blank portfolio, containing only screens. The student can browse through the goals and see what it is that he or she is expected to be able to know and do before graduating. One might also expect that incoming students will want to see benchmark performances in goal areas from earlier graduates' folders.

ii) How can a student demonstrate the skills and knowledge that a common graduate should have?

Digital portfolios provide for such demonstrations by students through 'exhibitions' that provide the opportunity for students to demonstrate a skill or knowledge that is highly valued by the school. These exhibitions or performance based assessments- seminars, research projects, oral and written presentations and timed tests- are completed either individually or collaboratively in the portfolio by the student/s. It allows a school to see what its students have done and to show the community what the school itself is doing. While any kind of information could go into the digital portfolio — including the familiar transcript, report cards and standardised test scores — its strength is its ability to present authentic performance, such as exhibitions, in any media. Thus, digital portfolio, with exhibitions as its core content, presents not only the student but also the values and contours of the school community.

iii) How can the school arrange its system so that all students can exhibit the desired skills and knowledge?

On the basis of the outcomes of students in the portfolio the school can re-look at all its systems -curriculum, pedagogy, assessment, scheduling, administration, and so on -in a sincere way to determine if the decisions it makes are helping students fulfill the vision.

8.7 EDUSAT- INDIA'S FIRST DEDICATED SATELLITE FOR DISTANCE EDUCATION

Indian Space Research Organisation (ISRO) launched a communication satellite called GSAT-3 for exclusive use of education sector. EDUSAT, the Indian Satellite in Education Programme launched in September 20 2004, is India's ambitious programme to harness satellite technology to reach students in every corner of the country. It aims to provide connectivity to schools, colleges and institutions of higher learning and support non-formal education including developmental communication.

Geographical Coverage

The Edusat is designed to serve for seven years. In these years, the 1950-kg satellite will provide five transponders in the KU Band, each one beamed to cover the northern, north-eastern, eastern, southern and western regions of the country while providing a 45 MBPS broadband link. Another KU Band transponder has the whole of India as its coverage. The KU Band radio signals transmitted, especially in the spot beams, are more

powerful than that of the KU Band on the INSAT-3B. This makes the Edusat signals capable of being received with a smaller satellite dish and consequently, the reception terminals become cheaper.

Besides the KU Band, there are another six transponders in the extended C Band. This constitutes a huge resource in bandwidth dedicated to education. The purpose is to connect classrooms with each of the satellite's five spot beams, providing educational programmes to thousands of students.

Usage

Universities and educational institutions will have a studio from where the class will be taken. The teaching can be with a blackboard or even with power point presentations. The lecture is filmed live and uplinked to the satellite, which then broadcasts it to the ground terminals. All colleges and study centres linked to the universities and institutions are provided with two sorts of reception systems- non-interactive and interactive. The non-interactive ones allow the talk with all the audio-visual material to be received. However, questions from the students to the lecturer have to be sent by alternate means, such as over telephone, short message service, fax or email. The interactive terminals, on the other hand, provide a voice channel for students to ask questions.

Services

- it reaches education to remote places where there is dearth of educational institutions, especially in higher education. It can make up for the shortage of teachers, especially in technical programmes. A single teacher/lecturer is able to reach thousands of students across the country/state at the same time;

- a wide range of expertise can be rendered. This teleconferencing mode renders expert and specialist knowledge to the students across the nation by high profile academicians, IT companies, technological institutions, etc. from one place/studio/ headquarters. This ensures quality teaching learning environment;

- contents of a lecture, talk, discussion or debate can be stored in a computer file and the students can access it at any time. The content can be made available in CD to the students or learners;

- the primary and secondary schools can be equipped with reception terminals and programmes prepared by respective state education departments and agencies can be broadcast;

- the satellite system can be used to run programmes for soft skills, such as, leadership training, techno-entrepreneurship and career planning, where too the students need to compete with their peers; and

- it enables teacher training.

Edusat Initiatives

- Visvesvaraya Technological University, Karnataka became the first user, linking 120 affiliated engineering colleges to reach 1.3-lakh students in the State with a one way video and two-way audio channel. It has started the live full semester lectures;

- nearly 900 primary schools in Chamarajnagar district of Karnataka are equipped with reception terminals and programmes prepared by the Karnataka Government's Department of State Education, Research and Training are broadcast;

- Kerala has leveraged the telemetry potential of Edusat and linked 45 learning centres, spread across all 14 districts for two way audio and video interaction. Kerala's satellite backed educational initiative, 'Virtual Classroom Technology on Edusat for Rural Schools' (VICTERS), leverages the technology, bottom up, starting with school level education rather than the college and technical end;

- Kerala has launched an 'Eduserve' Project to create a large centralised repository of educational multimedia material. This will enrich the content of education material and can be shared by other states, saving duplication, time and money;

- the YCMOU, Nasik has been given reception terminals at the contact centres, especially those in remote areas. This would enable the subject expertise to reach all the students in such areas;

- the Haryana Government has launched Edusat at 151 government senior secondary schools in urban areas; and

- the nation wide beams are being harnessed by Indira Gandhi National Open University, National Council of Educational Research and Training and the All India Council for Technical Education to reach hundreds of Receive only Terminals and Satellite Interactive Terminals located in schools and colleges, many in remote areas.

Nodal Agency

The University Grants Commission funded 'Consortium for Educational Communication' and the 'Edusat Multi Media Research Centres' are the nodal agencies to help leverage Edusat's potential.

Cost

The reception terminals will have to be paid for by the users, though ISRO has helped users in the pilot phase in providing the reception terminals. Again, generating good content comes at a cost and educational institutions and universities have to pay for content generation.

What is still required is that more valuable content is to be generated to avoid valuable link time getting wasted. Satellite link, which is 24 hours every day has to be maximally used for purposes of information exchange and so appropriate material has to be produced.

8.8   CONCLUSION

It has been oft mentioned in the context of education that e-learning misses the human interaction part owing to virtual teaching and virtual classrooms and some critiques like R. S. Peters argue that the process is no longer 'educational in the highest philosophical sense.' There are others who point out that e-learning software developers tend to limit their focus on course delivery and content, while online education institutions require a much wider range of educational services, especially, the quality and feedback part of it.

No doubt these inhibitions are likely to be raised, especially, by the traditionalist. But these doubts can be solved with the help of a number of learning systems provided by the electronic mode. The web-conferencing programmes, such as, Macromedia Breeze facilitates face to face interactions between the teacher and the learner, thus enabling feedback and expert subject matter to the learners. Again 'blended learning' can be made available by either combining distance learning with direct contact 'close at hand' human educational resources; or combining software driven resources with human intervention (computer mediated- through email or chat; or non-computer mediated- face to face or telephone; or combining software driven resources with any other educational resource- TV, radio, books, tapes, etc.).

Also it is important that teachers or trainers should be made to adopt technology in their teaching styles to provide pedagogical and educational gains to the learners. Training programmes should transform the teachers from just being information consumers to that of information producers. They should not only use internet to access resources but they should be able to create, produce and expand this information and add to the information repository.

E-learning has, thus, rendered convenience of online learning to thousands of learners who can not avail the benefits of higher education due to several constraints, such as, of time, cost, geographical location, age, etc. ICT has enhanced distance learning. The teaching community is able to reach far flung areas and learners are able to access qualitative learning environment from anywhere and at anytime. E-learning has proved to be cost effective for both learners and institutions in comparison to the traditional learning. It has fuelled the growth of e-learners in the world today.

8.9   ACTIVITY

You have studied the useful role played by ICT in education and training. Narrate some e-experiments carried out by educational and training institutions in India/abroad.

8.10   KEY CONCEPTS

Computer Based Training : is a general term that relates to all training that is delivered with the assistance of a computer. Delivery of CBT can be via CD, the internet or shared files on a network.

Educational Animation : depictions that support the learning of dynamic content by providing direct information about how changes occur over time.

Hyperlinking : a hyperlink or simply a link is a reference in a hypertext document to another document or other resource. As such, it is similar to a citation in literature. Combined with a data network and suitable access protocol, a computer can be instructed to fetch the resource referenced. Hypertext is a user interface paradigm for displaying documents which 'branch or

perform on request.' The most famous implementation of hypertext is the World Wide Web.

Managed Learning Environment :   is a Virtual Learning Environment (VLE) combined with a Managed Information System (MIS).

Moodle   : is a software package designed to help educators create quality online courses. Such e-learning systems are sometimes also called Learning Management System (LMS), Course Management System (CMS), Virtual Learning Environments (VLE), education via computer-mediated communication (CMC) or just Online Education. Moodle advocates social-constructivism as a pedagogical perspective, whereby learners construct their knowledge through discussions, thereby enhancing their thinking skills. Moodle works towards a student-centred learning solution by building upon a social-constructivist pedagogy.

Blog   : is a website in which items are posted on a regular basis and displayed in reverse chronological order. The term blog is a shortened form of weblog or web log. Authoring a blog, maintaining a blog or adding an article to an existing blog is called 'blogging'. Individual articles on a blog are called 'blog posts', 'posts' or 'entries'. A person who posts these entries is called a 'blogger'. A blog comprises hypertext, images and links (to other web pages and to video, audio and other files). Blogs use a conversational style of documentation. Often blogs focus on a particular 'area of interest', such as political goings-on.

Blogs can be hosted by dedicated blog hosting services, or they can be run using blog software on regular web hosting services. In the early 21st Century, blogging has quickly emerged as a popular and important means of communication.

A blog has certain attributes that distinguish it from a standard web page. It allows for easy creation of new pages: new data is entered into a simple form (usually with the title, the category and the body of the article) and then submitted. Automated templates take care of adding the article to the home page, creating the new full article page and adding the article to the appropriate date- or category-based archive. It allows for easy filtering of content for various presentations: by date, category, author or other attributes. It usually allows the administrator to

invite and add other authors, whose permission and access are easily managed.

Wiki : the name is based on the Hawaiian term wiki, meaning 'quick', 'fast', or 'to hasten' (Hawaiian Dictionary). A wiki is a type of website that allows users to easily add and edit content and is especially suited for collaborative writing.The term wiki also sometimes refers to the collaborative software itself (wiki engine) that facilitates the operation of such a website. In essence, wiki is a simplification of the process of creating HTML web pages combined with a system that records each individual change that occurs over time. Some wikis allow completely unrestricted access so that people are able to contribute to the site without necessarily having to undergo a process of 'registration' as had usually been required by various other types of interactive websites, such as, internet forums or chat sites.

A wiki enables documents to be written collectively in a simple markup using a web browser. A single page in a wiki is referred to as a 'wiki page', while the entire body of pages, which are usually highly interconnected via hyperlinks, is 'the wiki'; in effect, a very simple, easier-to-use database. A defining characteristic of wiki technology is the ease with which pages can be created and updated. Generally, there is no review before modifications are accepted. Most wikis are open to the general public without the need to register any user account. Sometimes session log-in is requested to acquire a 'wiki-signature' cookie for autosigning edits. More private wiki servers require user authentication. However, many edits can be made in real-time and appear almost instantaneously online. This can often lead to abuse of the system.

World Links : is a global non-profit organisation whose mission is to improve educational outcomes, economic opportunities, and global understanding for youth through the use of information technology and new approaches to learning.

Microfiche : is one of the most compact analogue storage media that provides a comprehensive research library in institutions that could not otherwise afford the floor space. Each microfiche card holds about 100-130 pages depending on the size of the original. A library of 20,000 microfiche, that is, 10,000-20,000 books fits in a cabinet about 1.5×0.5×2 metres.

Synchronous	:	provides for real time communication. The learner and the facilitator are online at the same time. It is a computer-assisted training where the instructor and participants are involved in the course, class or lesson at the same time. Learners receive the content on the screen and may communicate through internet or any other media. Web conferencing is an example of synchronous e-learning. Participants can log on with a trainer and interact with participants at multiple facilities or locations.
Asynchronous	:	computer-assisted training where the instructor and the participants are involved in the course, class or lesson at different times. Participation can be through World Wide Web, threaded discussion boards, blogs and e-mail. Asynchronous mode allows participants to access training materials round the clock, even when other students and/ or instructor are not present. Rather, asynchronous communication mode may permit the learner and the facilitator not to be online at the same time.
Threaded Discussion	:	is simply a chronological listing of people's comments (with their names linked to their comments). It is a web-based electronic bulletin board. It organises class discussions into easy to read threads (a thread is a single posted message from one person, and to read the thread you simply click on the thread to read the message). The professor or instructor poses a question for the student to answer, and then each student is responsible to respond to the question. It is very simple for students to use and is simple for faculty to customise to their own particular teaching needs.
		Each threaded discussion site may have a different look and navigation and will have information on how to use and participate in a discussion.
Learning Management System (LMS)	:	is a software package usually on a large scale that enables the management and delivery of learning content and resources to students facilitating 'anytime, anywhere' access to learning content and administration. It is a system for management and tracking of the involvement of participants with specific content, usually with the assistance of a database. Typically, the system tracks who is scheduled to participate in specific training programmes, who has begun the programme, who has completed the training, and what were the

participants' test scores. At a minimum, the LMS usually allows for student registration, the delivery and tracking of e-learning courses and content, and testing and may also allow for the management of instructor-led training classes. In the most comprehensive of LMS, one may find tools, such as, competency management, skills-gap analysis, succession planning, certifications, virtual live classes and resource allocation (venues, rooms, textbooks, instructors, etc.). Most systems allow for learner self-service, facilitating self-enrollment and access to courses.

Some LMS vendors do not distinguish between LMS and LCMS, preferring to refer to both under the term 'LMS', but there is a difference. The LCMS, which stands for 'Learning Content Management System', facilitates organisation of content from authoring tools and presentation of this content to students via the LMS. LMS are based on a variety of development platforms, from J2EE-based architectures to Microsoft.NET, and usually employ the use of a robust database back-end. While most systems are commercially developed, free and open-source models do exist. All LMS cater to and focus on different educational, administrative and deployment requirements. Open source LMS is growing fast in the education and business world.

Authoring tools	:	is a software application used to create multimedia content typically for delivery on the World Wide Web. This can include several types of tools including: HTML editors and e-learning Authoring Tools.

An HTML editor is a software application for creating web pages. Authoring tools can enable, encourage and assist users (authors) in the creation of accessible web content through prompts, alerts, checking and repair functions. It is just as important that all people be able to author content as it is for all people to have access to it. The tools used to create this information must, therefore, be accessible themselves. Adoption of these guidelines will contribute to the proliferation of web content that can be read by a broader range of readers and authoring tools that can be used by a broader range of authors.

Hypermedia	:	an extension to hypertext that supports linking graphics, sound and video elements in addition to text elements. The WWW is a partial hypermedia system, since it

supports graphical hyperlinks and links to sound and video files. New hypermedia systems under development will allow objects in computer videos to be hyperlinked.

8.11   REFERENCES

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8.12 ANNEXE

A.   India Must Quickly 'Light Up' for Science

Without urgent new initiatives in cutting-edge, high-speed networking in research and education, India will fall further behind the world leaders.

Despite its claim to the status of a software superpower, India stands virtually at the bottom of the world table when it comes to high-speed networking and digital connectivity dedicated to research and education. This is the conclusion of an International Committee of Scientists dedicated to the task of monitoring and promoting networking and connectivity initiatives for research communities across the world.

Using data from the worldwide passive monitoring of networks, the Committee found that India lags at least ten years behind the world leaders, the United States and Western Europe. It is at least three to four years behind countries, such as, Brazil and China, and only two to three years ahead of the Central Asian Republics and Africa.

This gap, the Committee warns, has been widening steadily and will worsen without urgent new initiatives. The urgency of the problem can be gauged by comparing the development of networking in Brazil and India over the past six years. While both countries had 1 mega bit per second (Mbps) connectivity in 2000, the core of Brazil's research network today has 10 gigabit per second (Gbps) connectivity, the standard for high-speed networking in the United States and Europe. Indian science can currently muster only a maximum of 622 Mbps, an international link for demonstration purposes between the Tata Institute of Fundamental Research (TIFR) and Japan. Scientists at TIFR, Mumbai, where the demonstration is currently situated are hopeful of making this a permanent link. Among the networks being planned or partially implemented, the National Grid Computing Initiative GARUDA – being implemented by the Centre for the Development of Advanced Computing (C-DAC), Pune, and the Educational and Research Network (ERNET) – envisages the fastest network speeds with 100 Mbps as access bandwidth.

Harvey Newman, Professor of Physics at Caltech, USA, and the Chair of the Standing Committee for Interregional Connectivity of the International Committee on Future Accelerators (ICFASCIC) that authored the report, presented this data in his lecture at the Sixth International Conference on Computing in High Energy and Nuclear Physics (CHEP06) currently being held at TIFR. Speaking after his presentation, Professor Newman said that there appeared to be no organisation in India charged with the mission of providing leading-edge high-speed bandwidth to education and research. China, on the other hand, handed over 30,000 km of 'dark fibre' rolled out some years ago to CERNET, its educational and research network, to 'light up.' This network is currently moving to a 10 Gbps backbone. This follows the worldwide trend of national education and research networks acquiring or moving to acquire 'dark fibre' expressly for education and research purposes.

A senior Indian networking specialist agreed that the need for a dedicated, cutting-edge, high-performance research and education network, supported by government and industry, was not appreciated in India. This had led to a significant lag in development of research network infrastructure in India, affecting support to science and engineering research and education. In response to a question about Indian ownership of a good fraction of international bandwidth, Professor Newman said the 'available bandwidth does not mean just the size of the cable.' Suitable equipment and installations were needed effectively to utilise the cable for actual connectivity that would be available for other organisations to service the users.

Professor Newman said the growth of connectivity also depend crucially on the business model in place for the pricing of bandwidth. If the goal was substantially to recover cable cost by charging the initial customers heavily and utilising only a small part of the capacity, then the explosive growth of digital connectivity seen elsewhere would not happen. A better model was one in which most of the capacity was available for use early, and research and educational users were encouraged to demonstrate the potential of the high available bandwidth. A suitable concessional tariff for the research and education sector would more than repay the concession in its contribution to development work and in the demonstration effect for the potential customer base.

Senior Indian high-energy physicists at the Conference privately concurred with the assessment of their foreign colleagues on the inadequacy of networking for research and education in India. However, Professors Atul Gurtu and Sunanda Banerjee of TIFR were hopeful of starting a fresh chapter with the current negotiations for their 622 Mbps link through VSNL, which are likely to yield a price that would be competitive by international standards.

T. Jayaraman
Feb. 17, 2006, The Hindu

B. Smooth Passage from Books to Bytes

Extending the reach of libraries through e-books

Five –minutes walk away from the Bugis station of Singapore's Mass Rail Transit system, a spanking new sixteen-storey tower block is testimony to the fact that the era of digital libraries is already here. While e-books or electronic versions of books have been available for at least two decades, the island state is arguably the first to translate the

technology into a virtual reality for its citizens.

And not just for readers in Singapore. From Bangalore, I could register within minutes to become a user of Singapore's National Library at its portal, www. nlb.gov.sg and access an awesome range of resources – including its newly created digital library.

Tamil Works Repository

This includes e-books and dozens of special databases. A link took me to the National Library Board – World e-book library, where I could locate the archives of Project Madurai – a repository of rare Tamil works. In seconds, I located Kalki's classic novel 'Sivakamiyin Sabadam' and could download the first 47 chapters in PDF format.

The library's registered readers in Singapore have the option of downloading and reading at home up to four books at a time – the same number that they were able to hitherto borrow.

The collection includes many recent publications for which the library has obtained the rights to electronically distribute; the titles tend to be popular works of both fiction and non-fiction.

From India, I could also access the digital collection of the British Library in Singapore, which is linked by the National Library. This contains many rare books and pictures, which are part of Singapore's history.

Indeed the total number of e-book resources is already over 500,000. Dozens of periodicals in English, Chinese and Tamil – the island's official languages – are also available for online reference, although some are restricted to within the system's 24 libraries.

Doubling Resources

The physical collection housed in the National Library Board headquarters is just over 600,000 items – so one can see how quickly the e-library option can help a library scale up and almost double its searchable resources.

Having become the first in the world to harness the technology of RFID – Radio Frequency Identification – to tag every book in its collection, Singapore's National Library has gone where few libraries have ventured – into an e-enabled digital future.

Indian Niche

Interestingly, the mechanics of e-publishing – converting printed texts into-machine-readable electronically distributable versions – is something of an Indian niche.

Tech Books, Versaware, First BPO…these are just three in a long list of names of e-publishing specialists, which have an operation in the Maharashtrian city of Pune that involves dozens of subject experts who help fuel the electronic versions of leading international technical journals and books. Tech Books, in fact, is a Singapore-based corporate.

Anand Parthasarathy
Jan. 5 2006, The Hindu