Chapter 6

Applications of ICT in higher Education

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Chapter 6
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6.1 International status of use of ICT education

Most of the countries in the world have felt the need to incorporate the Computer Education and the use of Information and Communication Technology (ICT) in education. The developed world has a strong network, facility and curricula for computer education in their schools even at primary levels. In United States of America all the public (Government) schools are well equipped with Computers, Teachers, encourage their pupils for computer projects by using e-learning material and also using information available on Internet. This not only makes the learning interesting and joyful but also incorporate innovativeness in thinking and approach of the children and enhances their imagination power.

Australia, Canada and European nations are also not behind. European countries are attaching a very high priority to the use of ICT in Education in their national policy and seeking to adjust the way their education systems are organized and function as a result. Interesting aspects of the Computer Based Education and use of ICT in education in Europe are summarized as under:

五星 The movement of Computer Based Education and use of ICT is recent and began after 1995.
五星 All European countries have official document on use of ICT in Education, which lies at the heart of their national policy.
五星 Almost all countries have setup bodies to promote and supervise implementation of ICT policies and recommendations.
五星 Basic aim of this movement is to boost computerisation of schools and use of ICT in education for development of skills of children and training of teachers.
五星 The aim for Computer Based Education differs with the level of education. At primary level, it is aimed at development of computer skills and use of ICT as tool for education. Thereafter, it varies from use of software packages to communication via a network including CD-ROM and Internet base searches.
五星 Several countries have specified the number of hours to be devoted to ICT Education. The Average Annual Time specified to be devoted to ICT Education though varies from country to country, but on an average may be stated as 30 hours for a child.
五星 Primary school teachers regularly use computers with their pupils during lessons on regular basis.
- Percentage of primary teachers trained for use of Computer and Internet in the year 2001 is 61 and 42 respectively.
- Average number of students per computer without Internet is 13.
- Average number of students per computer with Internet is 33.
- Lack of access and problems of equipment are major reasons for not using ICT in classrooms.
- Responsibility for providing and maintaining the hardware vary from country to country depending upon the task and education level.
- Expenditure on the use of ICT in schools in some of the countries is given below.

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>POPULATION (in millions)</th>
<th>EXPENDITURE (in millions of US $)</th>
<th>EXPENDITURE (in millions of US $ per million population)</th>
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(Data compiled from different sources - OECD Report, UNESCO Report, National Statistics of Education UK, National Centre for Policy Analysis USA by Department of Information Technology for their Vidya Vahini Project)

Table 6.1 Summary of OECD Report
If we spend Rs. 500 crores a year on Computer Based Education, the average would be US $ 0.8 million per million of population as compared to 5.0 million US $ per million of population of Brazil and Mexico and 75.26 million US $ per million of population, being spent by Australia.

6.1.1 Initiative in India for Use of Information and Communication Technology in Education

The landmark policy on Computer Based Education and use of Information and Communication Technology was laid by the National Task Force on Information Technology and Software Development (IT Task Force) - constituted by the Prime Minister - in July, 1998. Recognizing Information Technology to be a frontier area of knowledge and also a critical tool for assimilating, processing and productising all other spheres of knowledge, the IT Task Force recommended that the Government should launch an 'Operational Knowledge' campaign to universalise computer literacy and also to spread the use of computers and Information Technology (IT) in education. It made four major recommendations on IT Education - which were accepted by the Government and are given below:

Recom. 58 - The Government shall soon launch three schemes - Vidyarathi Computer Scheme, Shikshak Computer Scheme and School Computer Scheme to enable students, teachers and schools respectively, desirous of buying computers to do so under attractive packages.

Recom. 59 - Computers and Internet shall be made accessible to schools, polytechnics, colleges and public hospitals in the country by the year 2003.

Recom. 67 - The concept of SMART schools where the emphasis is not only on Information Technology in Schools, but also on the use of skill and values that will be important in the next millennium shall be started on a pilot demonstrative basis in each State.

Recom. 74 - A pilot project shall be launched in some lead districts, which have already attained universal literacy with the aim of achieving universal literacy in all the secondary schools in these districts. These pilot projects will be joint initiatives of the local educational institutions, respective State Governments and Centre.

The Working Group on Elementary Education for the Tenth Five Year Plan has recommended that one or two schools in every cluster in the country should have facilities for computer based learning that could be used by children in the adjoining schools. Networking of institutions in the form of school complexes would help in promoting the sharing of infrastructure and expertise. The Group has proposed Rs. 1000 crore for Computer Based Education during the Tenth Plan (2002-2007) - Rs. 2 lakh per cluster or
Rs. 15-20 lakh per block or about Rs. 2 crore per district for 5 years. The Working Group has also recommended establishing cells in SCERTs for defining the curriculum for computer education, teacher training and ensuring quality besides up-gradation of computer facilities in DIETs. In the component for “Education of Teacher Educators”, computer literacy for teacher educators can also be ensured.

Two of the major models tried out in Computer (IT) Education at elementary state are “Headstart” programme in Madhya Pradesh and Chhattisgarh and “Community Learning Centre” by an NGO in Karnataka.

“Headstart” in Madhya Pradesh is aimed at providing computer enabled education to all students in upper primary; computer familiarization through once a week session in Jan Shiksha Kendras (JSKs) at block level to all primary school children; training of teachers in basic computing skills; and computer access to the community. JSKs, which cater to 8-10 schools, is to serve as computer learning centres. Students of class 1-5 are to be brought once in every week to JSK for appropriate demos, which would include some computer games. In the case of upper primary students some fundamental techniques using computer are introduced. To begin with, there will be one or two computer in each JSK. In the first phase, the programme is to cover 6500 JSKs in 48 districts, and 13 more districts in the second phase. In the third phase, JSKs will be open to the community after the school hours.

“Headstart” is an initiative for improving the quality of learning through the use of IT and for bridging digital divide. It has developed CD lessons on hard-spots and “knowledge areas”. The project is operationalised by the Rajiv Gandhi Shiksha Mission (RGSM) with technical collaboration of the Bhoj Open University. Bhoj Open University is training teachers, developing technical configuration while RGSM is providing financial support through DPEP, reorient elementary stage curriculum and identify/facilitate development of software. For hardware support and maintenance, young graduates have been trained, who visit JSKs on regular intervals. Teachers in JSKs are being imparted 20 days training in two 10-day sessions. “Headstart” is now operational in 648 schools in the state. The Government of Madhya Pradesh has decided to expand the programme to another 800 more schools.

“Headstart” is also in operation in 271 clusters in the State of Chhattisgarh.

Community Learning Centre (CLC) initiated by Azim Premji Foundation (APF) a non-profit organisation, is another experiment in Computer Based Education at elementary school stage. The objectives of CLCs are to: (i) attract out of school children; (ii) improve attendance of children in schools; and (iii) improve learning achievement. To begin with, CLCs have been set up in 35 government schools in rural Karnataka covering about
10,000 children of grade 3 to 6. On an average, there are 5-9 Desk Top Computer (DTC) per Government school, one DTC for 3 children. CLC is operated by a local youth, who receives Rs. 1500 p.m. Local youth, instead of a teacher, runs CLC because APF feels that most Government schools have multi-grade situation and deployment of one teacher for CLC aggravates the situation. The Foundation recognizes that in ideal situation, class teacher should use IT as an additional tool while transacting the curriculum, but such effective integration requires availability of facilities and training inputs.

The initial investment per CLC is Rs. 2.5 lakh (computer - Rs. 1,80,000, UPS - Rs. 20,000, software - Rs. 10,000, furniture Rs. 20,000 and refurbishing of room - Rs. 20,000). Apart from this, there would be recurring cost like salary of Instructor, AMC, electricity bill, security, cost of software etc. CLC is expected to operate after school hours and generate revenue. The children have been enjoying the curriculum based on the compact disks provided by Azim Premji Foundation for geography of Karnataka, environmental science, mathematics and Kanada language. The subject CDs are interactive and deal with the curriculum for 3-5th standards in the form of games, exercises and riddles.

After 12 months of existence of the CLC, Azim Premji Foundation has withdrawn its financial support for the CLCs and the centres have become self sustaining either through the community paying for the cen:res or revenue generation from the centre supporting the expenses. The community could use CLC for training of local youth in computers, as continuing education centre, downloading information about Government programmes and market information, internet connectivity etc.

A research carried out by an agency to evaluate the impact of APF's programme on use of ICT in learning has revealed that in schools with CLCs, the enrolment of students as well as their attendance has improved significantly with an improvement in their learning levels as indicated by the decrease in number of students who have recorded less than 25% marks. The interest of parents and children in schools has risen.

**Vidya Vahini** - Department of Information Technology, Government of India launched a Pilot Project named Vidya Vahini for making use of ICT in 140 Government-funded Senior Secondary Schools. This project is to be implemented by ERNET and State Governments. Under the project, selected schools would be having a Computer Lab with a network database server and 10 multi-media computers connected overland. The Lab would also be equipped with a T.V., network printer and have the facility of Video Conferencing, access to digital library, e-learning and online learning. The project is aimed to have a Central Portal to house the learning material and course material as per the NCERT/State Government approved syllabus.
Uttar Pradesh has introduced computer in Class-V textbooks. Computer Based Education has been introduced in the State under SSA in 2001-02 by installing computers in upper primary schools at block headquarter at a unit cost of Rs. 1.25 lakh. This would be up-scaled in a phased manner.

One of the prominent initiatives in the private / voluntary sector in computer based education is the K-10 Program of Schoolnet India Limited based on the framework of Networked Learning TM. The programme aims to leverage the power of IT and pedagogy through integrated approach to enhance teaching learning processes. It provides technology facilitation at schools, provides curriculum mapped content, and train teachers on use of technology for teaching and learning process. The K-10 and K-10 Regional Program is being implemented in about 770 schools, including 330 government and municipal schools, covering around 300,000 students.

6.1.2 Information Communication Technology in India: A Challenge

Information Communication Technology (ICT) has become most widely used and pronounced buzzword of the computer industry. It has helped all walks of life in one-way or another. ICT is the moderne science of gathering, storing, manipulating, processing and communicating desired types of information in a specific environment. 'Computer technology' and 'Communication technology' are the two main supporting pillars of this technology and the impact of these two in the information storage and dissemination is vital. It is next to impossible to deny the importance of Information Communication Technologies in the educational, cultural, agricultural, scientific and technical disciplines of the world. Information needs are increasing day by day and today every person is intending to be information oriented.

Information technology has geared up by the advent of major efficient and effective technological innovations. Introduction of ICT has influenced very significantly work culture in our offices. Information people are highly respected. The current developments and advancements in the ICT have also brought the offices to home as their work-places. Almost all types of organizations are going to change beyond their expectations. Information has also strengthened us in taking decisions in a more scientific way. Thus very fast technological change will definitely accelerate development in all directions.

6.1.2.1 Information Communication Technology for Automation

'Computer Technology' is similar to one face of a coin (Information Technology). A tremendous revolution has taken place in the last two decades. The networks make possible a wide range of communication services in the office environment. The modern communication services include Electronic Mail, Teletex, Facsimile Transmission, Bulletin-Board service, Teletext, Videotext, Voice Systems, Voice Message System, Teleconferencing, Audio conferencing, Audiographics Teleconferencing, Videoconferencing.
All the above services make use of the special equipments, computer based message systems and computer networks. The special equipments include: Fax Machine, EPBX, Automatic Telephone Dialler, Voice Recognition systems, Voice Synthesizers, Data Networks, Commercial Databases, Optical Disk Storage & Retrieval Systems, Telex Terminals, Communicating Word-Processors, Slow-Scan TV, High-Definition TVs, CDTVs, and so on.

6.1.2.2 Growth & Development of Information Communication Technology

Communication has a long history, as long as that of the human race. At the primitive stage people developed simple ways and means of communication. In due course of time new sophisticated technologies were invented and used to expand the ability to communicate effectively and efficiently across longer distance over longer periods of time.

The invention of printing technology was a revolution in the area of communication technology. It was, however, first used for reproduction of religious works. As early as 868 AD., the teaching of Lord Buddha was printed by the Chinese. It took centuries before the mechanized printing press came into existence and the first newspaper London Gazette came out in 1665.

Due to advancements in communication technologies, the process of printing became mechanical. More recently, computers and laser technology were added to printing technology. Today, we have the most sophisticated electronic devices to produce, store, maintain and distribute the printed text. The first printing press in India came by chance on September 6, 1556. It was set up by a Christian Missionary and used for printing religious books.

The audio-visual media are the products of the twentieth century. The audio media came in the 1920s and grew very fast after the World War II. They are now used for entertainment, education and information allover the world. The visual media came later in the sequence but expanded very fast. Now more sophisticated technologies, such as, video cassettes, cable TV, computers, videotext, video disc, videophone, facsimile, etc., are used for communication the world over. The communication satellites are geared to bring the world together for the welfare of human beings.

The growth and transfer of technology is confronted with a number of problems. The factors, such as, political will, economic strengths of a society, cultural determinants, technological complexities and the educational system itself, influence the growth and utilization of communication technologies. These factors play very important roles in the case of the developing countries, which depend on the developed countries for both expertise and financial assistance.
6.1.2.3 Technological barriers

There are various technological considerations, which influence the growth and adoption of communication technology in a country. New communication technologies are not free from technical problems. There are a number of studies that find technology itself as a barrier in its growth. For instance, lack of a regular flow of electricity can make technologies defunct. One of the major reasons of under-utilization of the television programmes in the villages during the Satellite Instructional Television Experiments (SITE) and the Indian National Satellite (INSAT) project was the irregular supply of electricity.

Appropriateness: The technology should suit the geographical conditions of the country. For instance, India's policy of having her own communication satellite to cover the entire country is justifiable.

Accessibility: Certain constraints such as lack of sufficient money, lack of interest amongst educators and administrators, lack of sufficient software/courseware, lack of political will, etc., will invariably affect the accessibility of a technology to the education sectors.

Handling: Computers need specialized operators and programmers to use them. More so, because the technologies are changing so fast that one finds it difficult to keep oneself up to date in handling and maintaining them.

Maintenance: The poor maintenance facilities, for various technologies imported or adopted from the developed countries, may be due to lack of expertise, lack of resources/infrastructure, non-availability of spare parts, or indifferent attitude of users.

Storage and use of information: The hot & humid climate (for a major part of the year) of many South-Asian countries is not suitable for computer technology. It is difficult for educational institutions in these countries to arrange venues free from dust, heat and moisture for the storage of data, software and hardware.

Software/Courseware: It is a fact that there is a dearth of relevant software/courseware (a lesson stored electro-mechanically for teaching/learning a particular skill) for educational sector allover the world, including the developed countries.

6.1.2.3.1 Educational factors

There are certain educational factors that influence the growth and adoption of the communication technology. Teachers play a crucial role in the adoption of a communication technology, or an innovation. Their attitude toward technology is thus an important determinant. Communication technology demands a change in the role of teachers. They should realize that they are no more the only source of information required to transmit knowledge. In other words, new communication technologies will ask the teachers for new roles of teaching managers, facilitators, individualizes of teaching,
advisers and so on.

There is an undercurrent of scepticism among some educators that the adoption of a technology may lead the further elitism in education: widening the gap between those who have and those who have not. Moreover, the government cannot make technology available to every student to work with.

Besides, there are, some additional factors that influence decision-makers to ignore or adopt technologies for educational purpose. Some of these are as follows:

- The teacher are usually not involved in planning and preparing the courseware (there is a difference between software and courseware- 'software' refers to computer programming while' courseware refers to all teaching materials that store information, e.g., radio and television programmes)

- It is very difficult to cover the entire syllabus by one technology (medium). Therefore, other media are required to achieve the educational objectives in their totality, but it is very difficult for many countries to adopt the multimedia approach to teaching-learning.

- There is a dearth of variety in the courseware. The material borrowed from the developed countries may not be suitable for the students of developing countries.

- The students' dependency on the books and the teachers' lecture discourage them to make use of the modern communication technology.

- Educators prefer the technology, which has the potential of solving educational problems, and consequently can improve the quality of instruction.

6.1.2.3.2 Socio-political factors

In India, it is said that telephone networking did not expand in the past because some people at the top deliberately did not want it to expand. Scholars say that development of communication failed in 60's and 70's because there was not enough political support. Whether these are facts or mere opinions, it is an undisputed fact but the communication technologies will not go for unless there is a strong political will to support them.

There are various direct and indirect problems, which may crop up as a result of the application of the new communication technologies.

Decentralization and isolation: The communication technology like satellite, television, radio, telephone, computer, videotext, etc., if adapted by the Indian society on a large scale, could make the country a well-informed one, which in turn may bring about a change in the political structure of the society. However, the desire to establish a truly democratic and egalitarian society must accept such a transition. At the same time, availability of a large number of communication channels (the large scale use of computers, Internet, telephone, fax, etc., in an office) may empower the citizens to work
independently. They may isolate the members of the same office working in small cubicles. The absence of physical communication may create psychological isolation, which will give rise to social problems.

**Unemployment:** Application of new communication technology may disturb the rhythm and pace of the society. And in the process employees may be thrown out of their job. For example, the introduction of computer worked as death knell for many typists, secretaries and clerks. Direct dialing system may throw out many telephone operators from offices and agencies. Introduction of tractors made many traditional farm workers jobless.

### 6.1.2.3.3 Human and administrative factors

If the students do not have access to the technology being implemented, the situation may cause serious problems. The situation will immediately create two classes of students: the 'haves' and the 'have-nots', which in turn will cause various human problems.

### 6.1.2.3.4 Economic factors

The application of any communication technology is a costly affair. The investment runs to millions of dollars. Such a huge investment requirement forces many of us not to use the technology.

### 6.1.2.3.5 Equipment-related factors

The problems pertaining to the equipment arise mostly with the application of the imported technologies. The equipment, i.e., the hardware is imported from various foreign agencies or from developed countries. Thus, for maintenance the adopting countries will have to rely on the foreign agencies. This dependency causes havoc, as the officials of the adopting countries cannot have total control on all the aspects of such technologies.

### 6.2 Psycho social Dimensions of ICT

ICT need to be dealt with very scientifically and carefully. Too much of media addiction is unhygienic and harmful. ICT can contribute to psycho social development if it is used meticulously. One can dialogue with the distant people through networks within no time as per needs. So there is a shift from local society to global society. It is a well known fact that very often team mind is better than individual mind. Countrywide classroom programs and World Wide Web are contributing to the enhancement of human psyche. Children/students will use their visual senses after going through sites. Their concepts will be cleared which will help in enhancing the learning ability. They will become more creative and can grasp the new technology 111 easier way.

There are inbuilt locks on the internet to prevent the adolescents to have access to pornography. If the parents are aware of these locks then they can control their children to scan the undesirable sites. But the difficulty of the present day is that the younger generations are more advanced in information technology than the older generations. At
times the ignorance of the parents comes in the way of controlling their children. If a child goes on interacting with the different media indiscriminately then at times it may result into psycho social traumas and even physical health problems. With the advent of ICT and mediated messages men has started living more with the virtual reality than with real world. Human beings are becoming socially unsocial. ICT has shattered the society to the extent that the man has to create artificial society.

6.3 Techno-pedagogic competencies in teachers

Each Teacher needs to be proficient in the areas of technical competencies required for chats, web sites, databases, audio and video links, electronic conferencing, email, picture publishing, word processing and numerical processing. Also the teaching-learning needs to be organized very carefully, such as, through virtual learning environment, net dialogue, radio, television and computers. Also there is a need to differential independent learning, inductive learning, and team learning. Technical competencies, teaching learning organization and principles of learning need to be properly integrated.

6.4 ICT: Management

The ICT oriented societies will require new management for creating environment leading to all round development of cyber society. The question is what could be the possible roles of Governments and others for speedy development of ICT in Educational systems. What can the central government do to develop professional institutions, curriculum, programs, courses, support material and general awareness? How can the state governments play their roles in harmony with that of the Central Government? How can policies be developed? How can suitable budgets be allocated? What about the creation of infra structure? How would the private sector respond to the general development of introducing ICT in Education? What would be the policy for e-learning, e-schools, e-commerce and e-governance? How do we link the man power planning inside and outside our country? The educational institutions have to provide facilities of logistics. The instructional system has to be reorganized. The issues of hardware, software and teacher training need to be taken into consideration for the ongoing development of ICT.

How can the government use new tools of communication for administration and staff development in education? How can the old tools like F2F Conferences, mobile teams, publications, missions and staff development programs be replaced with the new tools like e-conferences, discussion groups, chats, interactive groups, virtual meetings and so on?

6.4.1 Exact stage of introducing ICT in Education

It has been observed that infants of even four months can classify. A three year old child with the help of his dad has been reported to create his own web page www.microsoftkid.com His father claims that the child can use several Microsoft products,
such as, Microsoft Office 2000, Front Page 2000, and Internet Explorer. He really enjoys working on the computer.

In one of the seminars the senior vice president of NUT quoted an experiment conducted by NUT in the year 1999. It was found that the slum children learnt internet browsing by unsupervised self efforts. He further researched into this learning feat and discovered that the children played a few proactive tricks. Apart from trial and error, these learners had identified a local boy of that very slum who was working as a peon in an office where all the computers were installed. This peon boy became the "grand teacher" of the slum learners who were learning browsing on a computer installed by NUT. The researcher asserted as a result of this experience that young children can learn new things through their own efforts and further they have the capacity to teach what they have learnt to their elders including teachers. This experiment has turned down the status that the young learners can become "teachers of teachers". It has created a new environment of self reliance.

The traditions and overwhelming number of children belonging to the mainstream compel us to ignore the handicapped people in the educational system. The IT is also lukewarm towards them. The following evidence should caution us. Stephen Hawking could talk about the universe with the whole world and write his book "The Brief History of Time". This was possible only because he could overcome his physical handicap due to the availability of new technologies and his extraordinary skill to use voice synthesizer. He is handicapped. It is his right foot alone that is functional. He came to India to give a series of lectures.

So ICT should be introduced in the educational system at the earliest possible. Even informatics could be introduced as a subject.

**6.4.2 Using the internet to enhance Curriculum and Instruction**

Internet generally motivates and assists those students who may not be successful otherwise. The interactive nature of the internet entices and creates tremendous interest in leaving. Limited-English students really benefit from the internet multimedia approach to presenting information. The added dimension of responding through Email to a live audience on the internet also creates relevance for students by linking them to the real world.

Using the internet as a tool with curriculum and instruction begins with the networking plan at your school. Networking is a sharing of resources via your school wiring; students are linked to the internet through a simple phone line, and installed ISDN, or DSL (digital service line) connected to a LAN.
6.4.2.1 What is the Internet
The internet is a general term for a large group of computers all over the world linked to one and another so that users and computers themselves can exchange information. To exchange information, protocols such as Hypertext Transport Protocol (HTTP) are used. A protocol is a code that must be applied to the information for the internet so that information can be exchanged. HTTP can integrate Text, Virtual images and Sound. Older protocols such as FTP, Gopher, MOSAIC and TELNET still exists, but are not used as often because they can not format information. The WWW is a hyper media information system. Hypermedia refers to the capacity to present virtual, on screen paper combining Text, Graphics, Audio & Video that linked to the other pages. "The WEB" technically refers to the whole gamut of hypermedia/ hypertext servers that present virtual on screen pages combining text, graphics, audio and video.

6.4.2.2 What is Hyper Text
The web allows a user to access information in a non-linear way through hyper text links. The idea behind the hypertext is that instead of readily text in a rigid linear structure, a user can jump from link to link, page to page, across sites and savers. The web is also a cross platform. Access to the web can be achieved simply by a modem connected to a computer making a phone call through a phone line. A web can simply call an ISP. More sophistical communication involve a direct internet communication through ISDN, DSL or T1.

6.4.2.3 Internet Browser
Access to the web is gained through a software application called a browser. The browser interprets the HTML code contained in the document, format it and display it. The most common browsers are Netscape Navigator and Microsoft Internet Explorer.

6.4.2.4 Web search Engines
Search engines help to provide a means of sorting through information, much the same way as an encyclopedia does. Many of these search engines also have a search box that helps students with locating topics, authors or titles. Search engines, such as Yahoo, Yahooligans, Aha Vista, and web crawler, to name some, helps to provide a mean of sorting through information much the same way as an encyclopedia does.

6.4.2.5 Uniform Resource Locators (URLs)
Each website and each page or bit of information has a unique address. This address is called a URL.

6.4.2.5 Developing an Internet Connection
For a basic setup three items are necessary
- An adequate computer with modem
- An installed Phone line and
- An Internet Service Provider
6.4.2.7 For establishing an Advanced Internet Connection

Establishing an advanced internet connection in which all computers within the school are connected to the internet is also not difficult. Again, three conditions must be met.

- Establish a local area network
- Purchase an Internet Router
- Install either an ISDN, DSL, or T1 a large high speed line that can accommodate many users

6.4.2.8 Keys to using Internet with Curriculum

To start the research process, students must first be taught the basic skills to use the internet with curriculum. The first skill to teach students is to locate a web-site of URL (Uniform Resource Locator). Second, students will need to learn how to navigate within that web-site address. The last of these skills to teach students is how to work with a search engine.

6.4.2.9 Organizing Research Information from the Internet

- Downloading Text and Picture

Within the browser (Netscape/Explorer) there are copy and paste functions under the edit menu, what is copied from the internet can be pasted into a page of notes in a word processing programme such as MS Word.

- Using Email

After the students are fairly accomplished at note taking lead them to Email. Each class can have an Email Address.

- Creating Students Web Pages

Next the students need to know how to create web pages through HTML (Hyper Text Markup Language) co-ordinate Internet used with Curriculum Concepts; because the information on Internet is vast, focusing the curriculum around concepts will help to narrow the volume of information searched.

When the curriculum is not focused, the internet may become edutainment rather then a companion tool for curriculum. Allowing students to explore the internet unsupervised can open the door to inappropriate sites even with blocking software.

The students should be trained on process skills namely, Asking, Accessing, Analysis, Applying and Assessing. Each one is having essential skills, pre-requisites skills, Techniques skills, Equipment needs and Review skills.

6.5 Imperatives of web based instruction

Web pages are documents of World Wide Web and are written in HTML (Hypertext Markup Language). For what purpose you are making the site and the user who will visit your site are prime important factor. Considering this a site should be developed.
The topic should be clear and in brief. Avoid too much of text and spelling mistakes. Use simple words which will make the page readable. Entire pages should be user friendly. Point to point information and links should be introduced. Navigation between the pages and links are very important in web designing. Insert animation and make your pages/site a professional and simple look. Their should be consistency in all pages. After designing target a web for a specific browser like Microsoft internet explorer or Netscape Navigator. Security is must for any site after launching any site on the web.

Web Based Instruction (WBI) is recognized as a three stage process in practice. First stage is visualized as source level server side processing, second as transmission of the WBI -deliverables and third as user level client side processing. Most important component of WBI would depend upon development of high quality deliverables. Any WBI needs to satisfy the pedagogic - instructional and content related needs; technological - hardware and software needs, and ergonomic - socia-psychological and physical needs.

6.6 ICT: Designing, development, production and application.

It has been observed that there is a wide gap between hardware and software. Though the hardware networks are relatively better developed but they are wanting compatible software. Very intensive training is required for media scripting and production. As far as the production variables are concerned they need to be duly manipulated and moderated, such as, whether the message should be on audio-track, video track, audio-video track? Whether it should be implicit or explicit? What should be the density of naïve messages. new and simple messages and new and technical messages in a programme.

The programmes need to be mediated through suitable modes, such as, text, text cum graphics, text cum graphics cum music, as per the objectives of the programmes and the demands of viewers. Also the mode of interaction - direct, interim of talkback needs to be decided very carefully. Also there should be spatial and temporal contiguity of the messages, i.e. narration and animation, should be properly integrated. The messages need to be distributed judiciously across different media. Also there is need to inculcate various principles of mediated learning.

In this age of ICT every medium has its utility. Mediating messages requires a lot of formative research. As far as effectiveness of the mediated instruction is concerned there is a need to work out suitable feedback mechanism.

6.7 Media Implosion and Media Choice

Knowledge explosion has forced media implosion to the extent that there is a problem of media fidelity and media choice. It has become a necessity to store the information in the condensed form. There is a move from primitive media to modern media. But the rate of media acculturation is not in the tune with the changing media.
There is a move from sound film to video films to CDs, print media to electronic media, from static phones to cordless phones to mobile phones, LAN to Internet. Media language proficiency is the growing concern. B-cam is available to capture near natural views. Web-earn and TV-Satellite channels are facilitating two ways audio and two way video communications. There is a move from OHP projection to LCD projection to DVD. Graphics Workstation is providing non linear editing.

But the problem is that education has not been in a position to integrate these changes at the rate envisaged.

Libraries should be no more a house of merely books and journals but a house of media. Media rather than guest visitors should be regular features of the educational institutions. All the universities and affiliated colleges should have networking.

6.7.1 Media Crowd to media literacy to Information Technology Literacy
In this age of media implosion, the very often emerging question is that of proper media choice. There are various challenges and issues emerging with respect to the use of various media. For example, TV in India has been used more for entertainment and information than education. The ETV programmes have been wanting in terms of message type, form, track, modality, and contiguity. It has not yet got the status of a master medium. Teachers at large have not been trained in ETV scripting, presentation and utilization. The consumers have been extremely poor in television language proficiency. ETV designing, development, production and implementation lack formative research. Similarly, computer in education has not been satisfactorily utilized. Computer literate teachers very often do not have pedagogic skills and vice versa. Largely computers are being used in Educational Institutions for text editing than for Educational Management, Instruction and Evaluation. Teachers feel diffident in using computer as a medium for education. Similar is the state with respect to other media and multi-media. There is a need to move from general literacy, i. e. Reading, Writing, Arithmetic to media literacy, to information technology literacy. A newer area is the knowledge and skills needed to decode and understand messages delivered by means of electronic media like TV, film and video. Media literacy covers the ability to access, analyze, produce and evaluate information through a variety of these media. Included in media literacy is the ability to get hold of equipment, know how to operate it, gather information and understand the strength and limitations of the messages. This requires the ability to position each element within a message as a whole, to understand the relative weightage of each element within the message and judge the worth of the parts and the whole.

6.7.2 Structuring Vs Supportive Teacher Behaviour
From conducting guidance, the teachers should move to persuading guidance to participating guidance to delegating guidance. As the student grows, the teacher's
structuring and support is reduced. ICT can facilitate this modernization from conducting
guidance to delegating guidance.

6.8 ICT Programmes in Teacher Education

Information and Communication Techno-logy is one of the recent developments of the
twentieth century in India. It is an effective tool for assimilating processing and
disseminating information. Government of India took sincere view of it and its application
was initiated in 1998. The government envisaged that the computer and internet facilities
will be made available to every school by the year 2003.

NCTE has developed CDs on ICT, Jeevan Vigyan, Teacher as Transformer, New Education
for New India. ICT Literacy Camps are going on throughout India for the Teacher
Educators. Progressively it will be mandatory on the part of Teacher Education
Institutions to offer ICT in Education as a core course. The CASE has proposed to offer
"Information and Communi-cation Technologies in Education" as a two credit core course

6.9 ICT in Educational Management

Technology is becoming more important and pervasive at a rate unmatched by any
other educational development in recent years. Looking at this goal more closely, however,
we must question whether computer-dependency and being "on-line" is in the best
interest of our students.

In introducing new technologies in the classroom, educational policy-makers,
researchers, and school administrators seem reluctant to systematically consider possible
drawbacks of information more than just a feeling among teachers and school
administrators that it is the agendas of business and industry leaders and a parental desire
to advance their child's job and career prospects, rather than evidence that technology
improves learning, that are the impetus behind "techno-sizing" education.

We have very scarce time to waste in putting into operation strategies to make
certain its effectual use as a learning device in schools. It is essential to ensure that there is
a clear understanding of what we are examining and the parameters we are setting up.

According to Parker (1999) (refer Technology and schools: the principal's role),
there is little argument that enormous amounts of money have been expended on
computers and computer technology in schools. A more contentious issue is the
educational' effectiveness of its integration into the normal classroom as a
teaching/learning tool. This paper suggests that the role of the principal is crucial to its
successful introduction and use. This view is supported by research done in this field,
which lead to the conclusion that one of the key factor on whether teachers integrated
technology in their classrooms was the level of support they received from school
administrators. This view is supported by research reported by Sandholtz et al (1997).

A more recent study in Texas (USA) by Macneil and Delafield (1998) examined
principal leadership for successful school technology implementation. This study was one of the first focused research studies carried out in this area. This is a significant number and gives reasonable credence to their claims that the majority viewed technology as very important in their schools and that it was important for educators to utilize and learn technology as a curriculum tool. Some of the more important findings of the research are:

1. The main barriers to implementing technology in the classroom were lack of financial resources, poor infrastructure and lack of time for professional development and planning.

2. There needed to be a closer alignment between the amount of time given for professional development and its perceived importance.

3. At each level, funding, training and leadership issues must be addressed simultaneously if technology in the curriculum is to grow and have a significant impact on the reform of education.

4. Principals and school leaders must accept the challenge to create supportive conditions, which will foster innovative use of computers.

The "information revolution" is considered as the biggest revolution after the industrial revolution. It has changed all aspects of working, living thinking and has influenced society and the culture of the people. True, any invention, tool or technology has its pros & cons but let us consider the broader aspects and the positive side. It is paradoxical that on one side we talk of IT and on the other we lack basic amenities like drinking water in our villages and even in urban centres. Most schools in urban areas have access to IT but IT education as well as the use of IT in the educational institutions is not planned. At the most it is haphazardly planned by the person in charge of the computer section who is by and large a technical person but neither an academician nor a person with a management /systems background.

The world over, IT applications have grown in sophistication not just in terms of technology used but also in terms of an expanding range of organizational tasks they support. On the other hand, an assessment of the impact of IT on performance suggests that most organizations (business / govt. / non-business) have failed to harness the full potential of this technology.

6.9.1 Historical Perspective

The past three decades saw three overlapping phases of IT applications.

(a) Efficient processing of clerical transactions, thus reducing manpower costs.

(b) Networking & advanced database management systems changed things drastically in 1970s leading to on-line systems & detailed analytical systems (Management
Information Systems). This led to higher efficiency, cost reduction and better decision support systems.

(c) The advent of the PC and advancement of hardware and software capabilities has led to drastic reduction in computerization costs. Efficient networking and the advent of Internet have created a paradigm shift.

Modern yet cheaper data communication & processing technologies have rendered older networks obsolete.

All organizations including educational institutions can only get returns by using IT as a "competitive weapon". The top management has to define the role IT can play and thus needs a balanced approach. IT is not a panacea, but can substantially enhance the internal efficiencies. If organizations have high expectation from IT, it will deliver high results, provided there is willingness from the top management and acceptance at all levels. It is not a substitute for pool management.

Recognizing that IT is an integral part of life today, organizations would be cautious that neither the students nor the teachers become 'slaves' of IT so that their basic mental skills should not be subdued or under-developed. As mentioned above, IT is not a panacea and not a substitute for the basic inputs to get the desired output and its role should not be over-emphasized. It should not overshadow the basic attributes or the core values.

6.10 Area of Implementation in Education

The top management of an organization has to define the role IT can play and thus needs a balanced approach. In case of a school, it can be classified into:

(a) IT education for students

(b) IT as a tool for teachers

(c) IT for administrators

6.10.1 IT education for students

A planned approach right from Standard I to Standard XII, will ensure that students not only grasp IT as a subject or simply become computer literate but also have the independent ability to use the computer to its fullest capacity. Interaction with a computer for a period of time requires the user to structure its requirements in a cohesive manner, leading to development of mental faculties, logical, rational and lateral thinking which helps the student to develop his personality and creativity, which will be in line with the objectives of educational organizations.

Let us not forget that IT is encompassing every aspect of ones life and also the use of the PC and relevant peripherals in education, especially higher ed--cation makes basic IT training imperative. The thrust on IT training as a subject which subsequently becomes a "learning aid" should be balanced and not be compared to a typical "computer class (i.e. a computer training institute offering various courses) At secondary/ higher secondary
levels it may be similar to IT training institutes but from Std I to Std. VI both the curriculum for IT and the use of IT for other subjects have to be formulated considering many relevant and sensitive factors.

6.10.2 IT as a tool for teachers

Here the teachers need to be trained and made aware about the IT plan perse, besides the basic training of computer literacy in their relevant area of working or expertise. Unless they are clear about the organizational objectives and the objectives of the IT plan they cannot deliver as per the expectations of the management. These persons will not only deliver but will also act as catalysts depending upon their individual understanding ability. The use of computers by teachers will be in the following areas:

- For Teaching (educational CD-ROMs etc.) For administration (evaluation, compilation & relevant record-keeping)
- For communication (Intranet, email & administrative reporting)
- For enhancing skills (Internet, other software)

Once the teachers are exposed to IT, their effective use automatically makes it a continuous process of skill up-gradation in terms of exposure to new technologies/tools and making them aware of newer developments (use of Internet & other software).

6.10.3 IT for Administrators

The administrative functions of an educational institution like any other organization is both interconnected and inter-dependant on one another. The objective is to feed the relevant data and process it to get the required classified output or report. The system, besides reducing paperwork and eliminating duplication, should integrate all areas of the administrative function. The out-put or reports should be generated as per the needs of all levels of management. Like any Management Information System (MIS), the reports should aid in decision-making and not just generate numerous reports (which can create more confusion). Since many functional areas, a proper user access & security is needed to regulate different modules and reports.

The system should be scalable / up-gradable, to suit higher volumes of data as the school grows and should accommodate need based modifications. A system that is properly designed and implemented makes to work for administrators at all levels very convenient. It should enable them to think rationally and logically rather than being immersed in clerical tasks. A well-defined report should automatically reduce the dependence of Top Officials on junior staff.

6.10.4 It as a Tool/Teaching Aid & as Edutainment

The advent of the CD-ROMs with multi-media have established a new area in learning systems. Besides the basic curriculum students can use CDROMs in different subjects both individually and as a group. Right from Std. I students will use CDROMs in different subjects (say English Math & Science), supplementing them with more
information than what has been taught in the class. It not only is "learn while you play" but the process of individually using the CD-ROMs makes the student more creative and be able to apply and relate what he has learnt in the IT class. In fact this is the medium through which the first exposure of the PC is given.

Besides these subject-wise CD-ROMs, there are many educational CD-ROMs available (e.g. Encyclopaedias, General knowledge & other topical titles—just like reference books) that make the use of the PC more interesting while imparting knowledge and encouraging the pupils to ‘explore’ the world on their own. The sound & graphics makes this media very attractive for the younger pupils and this arouses interest & inclination to use the PC independently.

Progressive schools have already been using these learning aids and continuously strives to procure more of these for practically all subjects again keeping in mind that these tools are ‘Catalysts’ for learning and not an end within itself.

In the advanced (Std VI onwards), effective (and regulated) use of the Internet opens up a whole new world or a "knowledge-bank". The ability to browse or search for correct and relevant information or data has to be inculcated in the students. The effective and efficient (not just aimless browsing or time-wasting) use of Internet and email opens up a new horizon for the individual creating an inner urge to delve into the unexplored or to create that inner feeling that any / missing information can always be found through this medium. This in turn increases the student’s self-confidence and develops his personality and ability to think independently.

6.10.5 It to enhance the skills of teachers & their use for administrative non teaching areas

In fact a lot what has been described in the section of "TT A TEACHING AID " also applies to teachers. The use of computers by teachers will automatically enhance not only computing skills but enhance their other skills, knowledge and general awareness. This itself will make all the difference. Skill up-gradation is a continuous process and is carried on both independently as well in a guided / nurtured form .Use of the learning tools for students and effective use of Internet are the basic skill upgrading elements. For any teacher or for that matter any successful individual, learning is a continuous and endless process and such modern tools make the learning process more effective.

Exams (say multiple choice type) can be conducted through computers and specialized software. This not only saves evaluation time for teachers but also helps to identify strengths and weaknesses of each student and take further steps to improve the performance of the students to an accepted / desired level, thus helping in achieving the basic objective of any examination. Over a period of time a strong 'question-bank' can be created for each subject using these software.

The use of basic tools (i.e. word-processing, Spreadsheets, databases &
Presentation graphics) makes the teachers more efficient and methodical in their work. These tools make their own administrative work (record-keeping, compilation of data, generating reports etc.) less cumbersome eliminating repetitive tasks and making clerical work redundant.

Their use of the relevant sections of the school administrative system (elsewhere described in this document) will also save a lot of time (e.g. processing a leave application through intranet and sending a report simultaneously to several people is practically a paperless exercise and done more efficiently through one’s PC). The use of the administrative system will also have some groundrules and deadlines hence the teachers have to be punctual.

**6.10.6 Communication Technology in Educational Management**

Similarly, Communication Technology has also been playing a vital role in the educational sector. This area has also advanced at a rapid pace and vice versa has made the world a global village. Here are the major technological areas of communication technology which have been significantly playing an inevitable role in educational management:

**6.10.6.1 Internet**

1. E-mail - Strong, effective, speedy and economical communication with parents and general public thus building a strong local and international network.

2. Website - Informative and cost efficient publicizing. Information related to the organization, the admission process, various seminars / workshops / functions related to education can be disseminated timely and effectively. It can be well used for organizing of competitions and meetings at national & international levels.

**6.10.6.2 Intranet**

A better internal communication channel among the staff wherein physical efforts, time and cost efficacy can be reduced to a reasonable extent. Thus communication technology has become the most preferred media to share and experience the best practices around the globe.

**6.10.6.3 Note of Caution**

*Paradigm Shift*

Most developing educational organizations will find it difficult to mobilize resources for delivering the resource base to face the new challenge. As we witness the paradigm shift from the interpersonal to technology enhanced education, demands have started becoming small group based to individualized. To meet the demands we need new solutions. Solutions tailor made to each individual’s needs. Even though this has emerged due to the developments in telematics most educational organization find it difficult to utilize the technologies because of the paucity of both technical know-how and resources.
Computer Slavery

Utmost caution has to be taken that we do not become slaves of IT making us inevitable to handle in absence of such technology and thus restricting our creativity.

These are core areas of ICT, which can increase over-all organizational efficiency and optimize deployment of skilled human resources. Hence in order to strive to attain this full potential, it is imperative to have a plan clearly defining the objectives & tasks that can be performed with a clearly spelt out agenda. This should be backed up by a time schedule and the phase-wise monetary aspects.