CHAPTER 3

DEVELOPMENT OF ELECTRONIC MEDIA AND EDUCATION

Electronic media are those communication media that are based on electronic or electromechanical means of production and are distinguished from print media. The primary electronic media sources include radio, TV and internet. Electronic media are ubiquitous in most of the developed countries.

3.1 RADIO

Guglielmo Marconi, who designed the first radio station, transmitted photography concerts from France in 1908 and in 1910 he broadcasts a live performance from the Metropolitan Opera House in New York to nearby receiver equipments set up before a special audience. The first radio stations were set up at Pittsburg, New York and Chicago in the 1920s, to broadcast news and other events.

3.1.1 Indian Broadcasting

Broadcasting was introduced in India by amateur radio clubs in Calcutta, Bombay, and Madras. The Times of India records that a broadcast was transmitted from the roof of its building in 1921. First licence granted for transmitting a broadcast was on 1922. The Radio Club of Calcutta started in 1923, followed by the Madras Presidency Radio Club in 1924. The clubs had
come-to-gather in 1927 to form the Indian Broadcasting Company Ltd. Before Independence AIR did not have a truly national network. Introduction of the commercial channel ‘Vividh Bharati’ in 1957 further increased the interest and popularity of radio as a mass communication medium. Yuvvani or the Voice of Youth went on air in 1969 in New Delhi.

In 1976, Door Darshan was de-linked from AIR. FM services from Madras and other cities were introduced. Local stations and hourly news bulletins were introduced by the mid-eighties. By the early nineties, phone-in programmes in Delhi, Pune and other cities were experimented. In the 1990s, AIR comprised a country-wide network of 219 centres including 32 vividh bharati commercial centres, 73 local radio stations and 114 regional stations. Radio has a unique advantage of getting through to the illiterate population. Compared to TV or film, the cost of per person for using radio is relatively cheaper than per person reached. Radio broadcasts can be localized to each community, so as to cover local news events and thus appeal to local audiences. In India, radio is one of the most effective channels for reaching the vast audience.

3.1.2 Educational Radio Broadcasting

Educational programmes for schools are broadcast from the metros and other centres. However, only around 20 thousand out of more than 7 lakh schools own radio sets, but only 40% of these schools switch on the sets regularly. AIR draws up programmes on the advice of consultative panel, which has representatives from the state education department and school principals. Teachers are not on the panels, but work on the subject committees which assist the panels. The panels are set up by AIR, and educationalists are invited to serve on them for a fixed period.
AIR’s development programming repertoire is the use of entertainment education (EE) serials, the process of purposely designing and implementing a media message to entertain as well as educate, in order to increase audiences’ knowledge about an educational issue, create favorable attitudes, and to change overt behavior (Singhal and Rogers 1999). EE seeks to capitalize on the popular appeal of entertainment media in order to show individuals how they can live safer, healthier, and happier lives (Piotrow et al 1997). Since 1987, the Central Educational Broadcasting Unit (CEBU) of AIR has produced several EE serials. AIR’s serials have adopted various entertainment formats, such as soap operas, variety programmes, interactive talk shows, and features to engage and educate audiences at the same time. Jeevan Saurabh, a 13-episode radio series broadcast in 1988 employed a participatory message design strategy, using the actual ‘voices’ of the target audience (Bhasin and Singhal 1998). ‘Dehleez’ and ‘Yeh Kahan Aa Gaye Hum’ have employed a soap opera format to entertain and educate at the same time. Research evaluation showed that they reached large audiences. ‘Tinka Tinka Sukh’, for instance, had an estimated audience of 35 to 40 million people (Singhal and Rogers 1999).

BBC school broadcasts suggest that the use of their booklets along with the programmes to the students is more beneficial. Developing countries use radio as a backbone of their educational system, to reach scattered communities with few teachers. A valuable way of using radio for efficient learning is to use it as a source of material.

3.1.3 Lutsaan Radio Project

In 1996, a poster letter manifesto, initiated by a village tailor in Lutsaan, with the signatures and thumbprints of 184 villagers was mailed to AIR in New Delhi. It stated: ‘Listening to Tinka Tinka Sukh has benefited all
listeners of our village, especially the women. Listeners of our village now actively oppose the practice of dowry; they neither give nor receive dowry. Just prior to this letter, a tragic dowry death of a newly married woman that was instigated by her greedy in-laws had occurred in an episode of Tinka Tinka Sukh. Its plot centered on the daily lives of characters in Navgaon Village, who provided positive role models to the audience on educational issues such as family planning, female equality and HIV prevention. The effects of the radio’s soap operas continued. Further, male and female listening clubs were organized for AIR’s follow-up EE programme. Radio was effective in stimulating social changes in Lutsaan as exposure to radio was higher in Lutsaan than elsewhere.

3.1.4 Gyan Vani

Gyan Vani is an educational FM Radio channel launched in 2001 and operated from various places including Chennai, Delhi Coimbatore, Mumbai and Kolkata. The network is elated to expand to a total of 40 stations. Gyan Vani stations operate as media cooperatives, with the day-to-day programmes contributed by various educational institutions, NGOs, Government, UN agencies, Ministries such as Agriculture, Environment, Health, Women and Child Welfare and Science and Technology. These channels broadcast educational, curriculum based programmes.

3.2 TELEVISION

TV is a telecom system for transmitting moving images and sound over a distance. J.L. Baird in Britain in 1925 presented a demonstration of transmitted motion pictures that could be called ‘TV. The first long distance public TV telecast was from Washington, DC to New York in 1927. CBS’s
New York City station began telecasting the first regular seven days TV schedule in the U. S. in 1931. While in 1932 the BBC launched a service using Baird’s 30 line system. In 1936 the BBC began telecasting a dual-system service, alternating on a weekly basis between Marconi-EMI’s high resolution service and Baird’s improved 240-line standard from London. Later, the corporation decided that Marconi-EMI’s electronic picture gave a superior picture, and adopted it as their standard. In 1942 Guillermo Gonzalez Camarena (1917-1965), successfully invented the first color TV transmission system.

The age of satellite communication dawned in 1962, with the launch of two international satellite systems, Intelsat (1965) and Inter sputnik (1971). The first live transcontinental TV telecast took place in San Francisco, California from the Japanese Peace Treaty Conference in 1951. In 1958, the CBC completed the longest TV network in the world, from Sydney to British Columbia. In the U.S.A, the federal communications commission allowed to telecast advertisements, but insisted on public service programming commitments as a requirement for a licence. By contrast, the UK chose to impose TV licence fee on owners of TV equipment to fund the BBC. Development of cable and satellite means of distribution in the 1970s inspired businessmen to introduce channels targeted at certain audience, and enabled the rise of subscription based TV channels. By the late 1980s, 98% of homes in the U.S.A. had at least one TV set.

3.2.1 Educational Television

In the 1950s, TV became a practical reality and it was seen to have great educational potential. Many attempts were made to set up TV based mass-education systems. A large number of local ‘instructional TV telecast stations’ were set up. These early telecasts were ‘live’ transmission of
classroom lectures. University of Iowa transmitted 400 programmes over a mechanical scanning system which was developed at their experimental station. The university’s radio included lectures in art, engineering, botany and astronomy. In 1938 in New York City, C.C. Clark presented one of the first instructional programmes, when he demonstrated the principles of electronic TV for about 250 students from New York University science courses. The National Broadcasting Company (NBC) transmitted the experimental programme from the third floor of the Radio Corporation of America (RCA) building to 25 receivers watched by the students on the 62nd floor. The show was 45 minutes long and students asked questions via a two-way radio communication and were answered by the instructor on the screen.

3.2.2 Live and Recorded Broadcasting

Live approach to instruction by TV was more or less dictated by the technology available at the time. Video recording was not yet invented, so all programmes had to go out live. Errors committed during shooting would be telecast. As the resources of both time and human skills available for the early educational programmes were much more limited, there was a noticeable difference in quality between educational and general TV programmes. The long term results were not good for the acceptance of televised instruction. Live, open telecast TV continues to be used in education, but not extensively. It is used most frequently in what may be termed as educational TV.

In the 1970s, use of video recording was started. The TV stations were able to pre-record their programmes. This offered several advantages and new capabilities. Transmission time was no longer the problem it had been as the stations could record programmes at times that were convenient for them, and then telecast at times that were convenient to the schools.
Programmes could be assembled in a similar manner as films, scenes being editing with precision, errors being re-shot, effects such as flash-backs and scene repetitions being used to good instructional effect. Programmes could be field tested on samples of the student population and the results used as indicators of necessary revisions. Programmes, once recorded, could be stored for repetition to future groups on other occasions.

3.2.3 Closed Circuit Television (CCTV)

CCTV systems have been installed in many modern schools and just about all universities in the developed countries. In many cases, the programmes are locally produced. The overall success of this method of employing TV in education and training may be judged by the quantity of locally produced programmes and the growing availability of commercially produced videotapes that find a ready market. In the UK, there has, since the 1970s, existed an interchange system of videotapes between universities. By 1982, the number of programmes had shot up to over 3000 titles and it continued to rise so much that the service was taken over by the British Universities Film and Video Council, a body devoted exclusively to the dissemination of information about audiovisual materials at the university level.

3.2.4 Indian Television and Education

History of TV in India dates back to the International Industries fair held in Delhi in 1955. In that fair, three enterprises demonstrated TV on a small scale. For the first time the Indian public watched TV (Mohanty 1992). In 1959, Philips (India) made an offer of a transmitter at a reduced cost. The Government gave in, with the aim of employing it on an experimental basis. A UNESCO grant for the purchase of community receivers and a U.S. offer
of equipment made it possible for, Delhi TV Centre to go on air in August, 1959. Soon programmes began to be beamed twice a week, each of 20 minutes duration. The audience comprised members of 180 ‘teleclubs’ which were provided sets free by UNESCO. The same organization concluded in a survey conducted in 1961 that the ‘teleclub’ programmes had made ‘some impact’. Entertainment and information programmes were introduced from 1965, in addition to social education programmes. The Federal Republic of Germany helped in setting up a TV production studio.

By 1970, the duration of the service was increased to three hours, with two weekly programmes running to 20 minutes each for ‘teleclubs’, and another programme of the same duration called ‘Krishi Darshan’ for farmers in 80 villages. The number of TV sets in 1970 stood at around 22 thousands excluding the community sets. By 1980, there were more than 2 lakh sets in Delhi and the neighboring states. A significant development during the year was the separation of TV from AIR. TV now became an independent media unit in the Ministry of Information and Broadcasting, under the new banner Doordarshan (DD). The Asian Games held in New Delhi in 1982 proved to give further impetus to the rapid expansion of the national TV network. In the mid-1980s, Metro Channel (DD-2) was introduced first in New Delhi and Bombay, and later in the other metros; at the close of the 1990s, there were 58 million TV sets in the country, with around 15 million connected to neighborhood cable networks.

Planned and comprehensive TV was introduced into the schools under a project called Delhi School TV Project. The project was launched in 1961, by Delhi Administration in collaboration with AIR, and Ford Foundation. A need assessment survey was conducted to identify the problems and requirements of the students and teachers. AIR, Delhi, organized a series of workshops with school teachers for the purpose. The
school TV project was launched in 1961, with the installation of 360 TV sets in 150 schools for the benefit of 20 thousand students of secondary classes.

The establishment of a separate TV Branch in the Directorate of Education, Delhi, in 1967 marked an important step in making the instructional TV more responsive to the needs of students. This ensured better liaison between the user agencies, namely the Department of Education, Delhi and the TV unit of AIR, which is the agency responsible for planning, and production of the programmes. From 1975, Delhi DD centre introduced telecast of ETV programmes for primary school children. These programmes were of enrichment type and were designed to provide a little excitement and entertainment blended with information suited to the audience of a tender age group (NCERT report 1993). At a later date instructional TV programmes for elementary schools started going on air from other TV centers.

3.2.5 Satellite Instructional Television Experiment (SITE)

The NASA, made its Application Technology Satellite (ATS-6) available to India for SITE, experiment from 1975 to 1976. Direct Reception TV sets with dish antennae were deployed in more than 2400 remote and backward villages spread over six states namely Rajasthan, Karnataka, Madhya Pradesh, Orissa, Bihar and Andhra Pradesh. The villages selected for the experiment were such that they did not have access till then even to the simplest forms of media like the newspapers. The 4-hour telecast concentrated on education, agriculture, health and family planning.

The main objective of the SITE was to provide requisite information for national development to those who otherwise would have been deprived of such information for many years to come due to technological constraints. It was made possible with the use of a satellite to
take TV to the villages of India even before it reached the metropolitan cities. During the SITE programme, NASA had made available to India, 4 hours of satellite time per day with one video and two audio channels. In addition to that, one and a half hour were devoted to enrichment programmes. The main emphasis of the educational TV programmes was on the topics dealing with science (53%). Among the other programmes, entertainment and national awareness formed 13% and 12% respectively. Other areas covered were health and nutrition, biographies, toy making, religion, social and current problems (Mohanty 1992). SITE demonstrated the utility of satellite communication as a tool for national development in general and education in particular. The SITE continuity scheme was continued till the launching of INSAT in 1982.

3.2.6 The Kheda Communication Project (KCP)

Another pioneering experiment in using TV for educational purposes in India was the KCP. The site chosen for the experiment was Kheda district in Gujarat. Some 650 community TV sets were provided to 400 villages and installed in public places like schools, where village audiences gathered. The Project was independent of commercial interests, as it relied mainly on government funds for financial support. The Project relied heavily on audience research by conducting assessments of village audiences and by carrying out formative and summative evaluations of Kheda TV programmes. The Project represented a model of community-level, decentralized TV telecasting in India. It received the UNESCO Prize in 1984 for rural communication effectiveness. However, the Indian government did not replicate the KCP community based TV model in other parts of India. In 1985, a high powered transmitter was commissioned in Ahmedabad with a range that covered Kheda district.
3.2.7 Jhabua Development Communication Project (JDCP)

JDCP was launched in the mid-1990s by the Development and Educational Communication Unit (DECU) of the Space Application Center (SAC) in Ahmedabad. The purpose of JDCP was to experiment with the utilization of an interactive satellite based broadcasting network to support development and education in remote, rural areas of India. Some 150 direct reception systems were installed in several villages of Jhabua, which received TV telecasts for two hours every evening. In addition, 12 talk back terminals were installed in each of the block headquarters of Jhabua district, through which village functionaries asked questions, provided feedback, and reported on progress. The evening TV telecasts, on topics such as health, education, watershed management, agriculture, natural forestry, and local governance, were designed to be entertaining and educational. The programmes were made with the active participation of the local people of Jhabua. To facilitate sustainability of the project, JDCP was implemented by DECU in cooperation with state government departments, local NGOs, and officials of the Jhabua district administration. A mid-term evaluation of the Jhabua Project conducted in 1988 showed that the poor people of Jhabua district had made significant knowledge gains in several life-skills areas, enhancing the quality of their life and of the environment surrounding them (Kasturirangan 1999).

3.2.8 Countrywide Classroom (CWCR)

The CWCR project of the UGC has been the logical outcome of the successful SITE experience. Higher education in India got a fresh momentum through launching of CWCR, in 1984. The rapid expansion of TV in India facilitated the launching of the above programme, aimed primarily at the undergraduate students of colleges located at different places. The project
aimed at the widest possible utilization of TV potential to improve the quality of university level education. These educational video programmes were telecast twice a day and throughout the week over the DD network. In the initial stage, the CWCR used to depend more on educational programmes produced by other countries over a period of time the CWCR project acquired requisite resources and established several media centres, which now continue to function as EMRC’s. Currently these programmes reach a wide cross-section of society, evident from the fact that out of the feedback letters received 42% are from students, 47% are from the general public and 13% from academics (Rao 1994). Since 1991, DD has been telecasting curriculum based video programmes produced by IGNOU. The target audiences for these telecasts are primarily IGNOU students spread over throughout the country.

The National talk back experiment of 1991 of UGC proved that it was possible to linkup with various places in the country and to create a CWCR in which learners from different parts of the country interact with the teachers located at the earth station uplink location. An attempt was made in 1994 to teach a course on new communication technologies through Tele Conferencing. Currently the availability of multi channel facilities of telecoms through INSAT-2B can help educational systems to become need based and to function independently with variety, novelty, and relevance (Passi et al 1994).

3.2.9 Gyan Darshan (GD)

Gyan Darshan, a major milestone in the field of educational TV in India. It was launched as a joint venture of the Ministry of HRD, Information and Broadcasting, the Prasar Bharati and IGNOU in 2000. Gyan Darshan was envisaged as a public co-operative in which institutions such as the UGC/CEC, NCERT/CIET constituted the major stakeholders. Within the
same year of 2000 it became a 24 hour channel. The unique feature of the channel is the high degree of interactivity. Gyan Darshan is all set to usher in a learning society. It covers topics ranging from science and technology, environment, computer education to career counseling.

Gyan Darshan transmissions can be accessed all over the country. Gyan Darshan-1 carries the best selection of programmes from different sources for students, youths, homemakers and adults. The programmes are contributed by major educational institutions and development organizations. Gyan Darshan-2 is devoted to interactive distance education. Viewers can directly access the experts in the studio during an ongoing programme, express their views and have their doubts cleared as the programme goes on live. Gyan Darshan-3 (Eklavya), the technology channel dedicated to technical education, telecasts programmes generated at various IITs.

Vyas channel, which is run by UGC, evolved from CWCR and is the fourth in the bouquet of Gyan Darshan channels. Eighty five per cent of the channel content is curriculum based, the rest being enrichment programmes. With the mission of carrying knowledge to households and students, teachers and public to bridge the knowledge gap and to provide the same quality of higher education to all a separate channel on higher education was launched in 2004. Programmes telecast on this channel included E-learning, Up-gradation of technology, Career watch and Innovations in education. The Video Lecture Series covered all Undergraduate and Postgraduate areas.

3.2.10 Training and Development Communication Channel (TDCC)

TDCC using INSAT has been operational since 1995. It provides a one-way video and two-way audio system of interactive education where
teaching-end includes a studio and uplink facility for transmitting live or pre-recorded lectures. Several state governments are using the TDCC system extensively for distance education, rural development, women and children development and industrial training. Each year, the Interactive Training Programmes (ITP) is conducted for more than 60 thousand participants. The programmes are conducted for 20 to 25 days a month. The channels telecast programmes originating from various sources like IITs, for the benefit of students pursuing studies in Engineering and Technology fields. Selected programmes of Gyan Darshan are telecast on the national network of DD-1 in the terrestrial mode. For viewers of different groups, DD-1 telecasts educative and informative programmes on various subjects. The contents of these programmes provide entertainment along with information and education.

3.2.11 Latest Developments in Television

There are many means of distributing TV telecasts, including both analogue and digital versions of Terrestrial TV, Stratovision, Satellite TV, Cable TV, MMDS (Wireless cable). In the 1990s, modern TV sets diverged into three different trends, standalone TV sets; integrated systems with DVD players and/or TV sets with VHS VCR capabilities built into them. Advances have brought flat panels to TV that use active matrix LCD or plasma display technology. They are multifunctional, because they are used like computer monitors too. Some LCD and Plasma sets have SD Card slots, so users can view pictures from a digital camera. New developments include Broadcast flag, CableCARD, Digital Light Processing (DLP), Digital Rights Management (DRM), Digital Video Recorders, Direct Broadcast Satellite TV (DBS), DVD, High Definition TV (HDTV), High Definition Multimedia Interface (HDMI), IPTV, Internet TV, LCD and Plasma display Flat Screen TV, Picture-in-picture (PiP), Video on-demand (VOD), Ultra High Definition Video (UHDV), Web TV. Viewers’ dependence on schedule decreased with
the invention of programmable videocassette recorder and the digital video recorder. Consumers could watch programmes according to their own schedule once they were broadcast and recorded.

TV service providers offer video on demand, a set of programmes that could be watched at any time. Both mobile phone networks and internet are capable of carrying video streams. There is already a fair amount of internet, TV, while mobile phone TV is now being developed to mainstream.

Direct to Home (DTH) is a term that describes satellite TV service that is delivered via communication satellites. It is supposed that the TV signal is delivered from satellite’s transponder direct to the receiving antenna of a TV set, without relay of re-broadcasting stations. Direct broadcast satellite (DBS), is a relatively recent development. DTH TV offers immense opportunities to both broadcasters and viewers. These operators worldwide have been able to introduce a number of interactive applications in the TV market since digital technology permits highly efficient systems. DTH service is the one in which a large number of channels are digitally compressed, encrypted and beamed from high power satellites. The programmes can be directly received at homes. This mode of reception facilitates the use of small receive dish antennas installed at convenient locations. Users are directly connected to the service providers through DTH service. A digital receiver is needed to receive the multiplexed signals and view them on a TV. DTH, in sharp contrast to Cable TV, lends itself to easy monitoring and control.

3.3 SATELLITES AND EDUSAT

Most Communication satellites (Comsats) use geosynchronous orbits or near-geostationary orbits, although some recent systems use low Earth-orbiting satellites. Satellites communication services include: Satellite
phone, Satellite internet, Satellite TV, Satellite radio, Anti-satellite weapon, Golden-Eye and Tether satellite. Comsat is an artificial satellite stationed in space for the purposes of telecoms. Modern Comsats use geosynchronous orbits, Molniya orbits or low Earth orbits. For fixed services, Comsats provide a technology complementary to that of fiber optic submarine communication cables. Direct Broadcast Satellite (DBS) is a Comsat that transmits to small satellite dishes. Fixed Service Satellites (FSS) use the C band, and the lower portions of the Ku bands. They are normally used for broadcast feeds to and from TV networks and local affiliated stations, and for distance learning by schools and universities, Video Conferencing, and general commercial telecoms. FSS satellites are used to distribute national cable channels.

EDUSAT launched in 2004 by the Indian Space Research Organization, is the first Indian communication satellite built exclusively to serve the educational sector. It is mainly intended to meet the demand for an interactive satellite based distance education system for the country. The satellite based interactive narrow casting network has one-way video and two-way audio facility. The network is capable of data transfer from the teaching end to the remote classrooms. The data includes lecture notes, courseware, presentation material and exercises. The network consists of three major elements: teaching end, remote receiving sites called classrooms and spacecraft. The teaching end consists of a small studio and an uplink earth station. The studio, which originates live or recorded lectures, is linked to the uplink earth station. The lectures are transmitted to the satellite and beamed back to earth covering a large geographical area. In the interactive classroom, the students can interact with a subject expert at the teaching end through a voice link via satellite. The question and the subject expert’s response for that question can be heard live in all classrooms.
3.4 COMPUTER AND INTERNET

The world’s first computer, ENIAC, was developed in 1945, by the U.S. Department of Defence, for military purposes. It was used for massive number crunching tasks (Rogers 1986). With the miniaturization of computer components, the minicomputer was developed. The microcomputer was created in the early 1970s. The microcomputer was designed to be owned and used by a single person and was called a ‘personal computer’ or PC. Gradually, PCs began to be used not for number crunching but for communication messaging purposes, especially as millions of people throughout the world began to use internet during the 1990s.

The Indian Statistical Institute in Calcutta acquired the first computer in India in 1955. By 1972, there were 172 computers in India. A boom in microcomputers began to take place in India during the 1980s, and expanded rapidly in the 1990s. In the 1990s, growths in the demand for personal computers, along with the rising popularity of internet, were two major forces driving the growth of the domestic information technology industry. The installed base of PCs in the country was about five million in 2000, translating into about five computers for every 1000 people. The computer revolution began to merge print and electronic mass communication. These systems, which provide print text on TV screens, are called videotext and tele text.

3.4.1 Creation of Internet

Internet is an extensive, worldwide computer network available to the public. Internet, or the Net, is the publicly accessible worldwide system of interconnected computer networks that transmit data by packet switching using a standardized internet Protocol (IP) and many other protocols. It is
made up of thousands of smaller commercial, academic, domestic and government networks. It carries various types of information and services, such as electronic mail, online chat, interlinked web pages and other documents.

Internet began in 1969 with the implementation of ARPANET by academic researchers under the U.S. Department of Defence Advanced Research Projects Agency (ARPA). An important step in internet’s development was the National Science Foundation’s (NSF) construction of a university network backbone, the NSFNet, in 1986. In 1991 Tim Berners-Lee publicized his new web project, two years after he created HTML, HTTP and the first few web pages at CERN in Switzerland. By 1996 the word ‘Internet’ was common public currency. Most communication on internet is in English. Indians now have access to internet broadcasting also. Internet broadcasting offers certain advantages over traditional broadcasting services. In traditional broadcasting, audience cannot access their favorite stations outside the broadcast area.

Prior to 1996, few broadcast stations existed on internet. By 1999, internet had over 500 TV stations and 1,900 radio stations and several were being added each day (Kaur 1999). Technological innovations like ‘streaming’ video and audio helped this boom; audience can now watch/listen to a programme while it is being downloaded to their computer. Internet is democratizing and simultaneously commercializing learning in unprecedented ways.

3.4.2 Growth of Internet in India

Internet services were introduced in India in 1991 by the Department of Electronics through the Educational and Research Network
(ERNET) for use by public departments, universities, research bodies, and by non-profit organizations (McDowell and Pashupati 1999). In 1995 VSNL, the international phone service provider began offering commercial internet services to individuals and organizations. The ISP Policy-98 represented a bold, liberal policy for internet service provision by private telecom companies in India. Internet service providers (ISPs) in India were allowed to establish their own customer access networks and gateways to the global internet network without depending on the infrastructure of the Department of Telecoms’ VSNL. Private ISPs can provide infrastructure services for e-commerce, telemedicine, distance learning, and other IT-enabled services without paying licence fees (Chowdary 1999).

The National Informatics Centre (NIC) has set up a special purpose computer network known as NICNET which has its headquarters in Delhi. Spanning district headquarters across the country, this network facilitates real time exchange of information on various aspects of the development process. In 1998, internet had 70 million users worldwide. The U.S. and Canada accounted for 62% of all users, while Asia accounted for only 12%. India had an estimated three million internet subscribers and 15 million users. With favorable internet service provision policies of the government, these numbers have increased to more than 20 million subscribers.

A survey by the International Data Corporation (IDC) showed a high demand for internet connections in India. While only 9% of households owning personal computers could access internet in 1999, some 37% were eager to sign up for internet (India Abroad 1999). Prior to 1995, internet connections in India were only available to non commercial organizations through a Department of Electronics Education and Research Network (ERNET) scheme. In 1995, when internet connectivity became available to individuals and organizations on a commercial basis, Indian entrepreneurs
were quick to enter this business. The first cyber cafe began in 1995 in Bangalore. The main attraction of cyber cafes is Computer related services that are offered. A customer can log onto internet, surf the Net, and check email. Cyber cafes have become popular in Indian cities. In Hyderabad, 600 new internet cafes were established in 1999 (Chowdary 1999a). Now most of the organizations have internet connection and considerable number of households also has the internet connection. Every street of Indian towns has at least one cybercafé.

3.4.3 Information Technology Revolution in Education

Internet dramatically change the way of the role of universities. Students prefer to learn through participation and experimentation in a media-rich environment. Faculty members expected to act more as facilitators and designers of learning experiences than as teachers. Creating new knowledge require teams of scholars spread over a number of disciplines. Intelligent software agents that can browse worldwide knowledge networks instantly and effortlessly replace specialists. Knowledge creation includes the creation of what has never been. Universities have to be restructured in many ways to meet these new challenges.

The knowledge industries have new learning paradigms: Web based Seamless, Asynchronous, Lifelong, Affordable, Interactive, Collaborative and Ubiquitous Learning at every time, at every place, for everybody. Many students, currently enrolled in traditional academic programmes prefer to use the Net to become ‘open learners’. The real challenge in imagining and creating digitally mediated environments experimenting with the new paradigms that this technology enables. Universities network and co-operate much more than in the past. Some merge their libraries and promote student sharing and collective global educational
services. The faculty’s core competence continues to be the creation of the content for educational programmes. In the future of net distributed multimedia educational services, universities will have to outsource both production and distribution to those more experienced in reaching mass audiences the entertainment industry.

Web based courses have many distinct learning benefits. These include an attractive and convenient modular learning pattern called credit banking system that enhances learner participation through high interactivity and effective instruction. This system entitles the learners to acquire and transfer credits from their prior learning without further instructional needs. It facilitates acquiring credit for non-formal learning, assessed and recognized towards further study programmes. The greatest advantage of web based education lies in its interactive nature. Online chats, direct interaction with the instructor during and after live presentations, interaction with other fellow learners are the salient features of web based education.

3.4.4 Education and Research Network (ERNET)

ERNET was initiated in 1986 by the Department of Electronics, with funding support from the Government of India and United Nations Development Program (UNDP), involving eight premier institutions as participating agencies like NCST (National Centre for Software Technology) Bombay, IISc (Indian Institute of Science) Bangalore, five IITs (Indian Institutes of Technology) in Delhi, Bombay, Kanpur, Kharagpur and Madras, and the DoE, New Delhi. ERNET began as a multi protocol network with both the TCP/IP and the OSI-IP protocol stacks running over the leased-line portion of the backbone. ERNET operations, i.e. providing state of the art communication infrastructure and services to academic and research institutions, government organizations, private research and development
organizations, and various other non-commercial organizations. Since 1995, however, almost all traffic is carried over TCP/IP. ERNET has made a significant contribution to the emergence of networking in the country. It practically brought the Internet to India and has built up national capabilities in the area of networking, especially in protocol software engineering. It has not only succeeded in building a large network that provides various facilities to the intellectual segment of Indian society, the research and education community, it has over the years become a trendsetter in the field of networking. UNDP has lauded ERNET as one of the most successful programmes it has funded. The Scientific Advisory Committee to the Cabinet has adopted ERNET as the platform for launching an S&T network in the country. Now, the Indian government and some other bodies had taken more efforts to create large number of networks and websites for the purpose of educational development.

3.4.5 Latest Technologies in Internet

Voice over Internet Protocol (VoIP) began as an optional two-way voice extension to some of the instant messaging systems that took off around the turn of the millennium. The benefit is that the actual voice traffic is carried by the internet. VoIP costs much less than an actual phone call, especially over long distances and for those with always on ADSL or DSL internet connections.

Internet’s technologies have developed enough recently so that sufficient native language facilities are available in the internet to the world people. Public places to use internet include libraries and internet cafes. Wi-Fi provides wireless access to computer networks. Hotspots providing such access include Wifi-cafes, where a would be user needs to bring his own wireless enabled device such as a laptop. A hotspot need not be limited to a
confined location. Whole campuses have been enabled by this technology. Grassroots efforts have led to wireless community networks. New technologies such as WiMAX have the potential to enable simple and cost effective deployment of metro area networks covering large, urban areas. Till the late 1990s, most browsing occurred through desktop and laptop computers connected to an internet server through a phone line, wide area network (WAN), or local area network (LAN). Now an individual can access internet from a mobile phone. A new generation of micro browsers has made it possible to receive and send email and surf selected sites from the display screen of a mobile phone (Prakash 1999). Micro browser technology has become a de facto standard for mobile phones.

Broadband is the latest in high speed internet access technology, delivering access at speeds hundreds of times faster than a Dial-up modem can provide. Broadband is a type of data transmission in which a single medium can carry several channels at once. The whole set of channels taken together and utilized for the same communication could be described as broadband. It is a high data transmission rate internet connection. DSL and cable modem, both popular consumer broadband technologies, are typically capable of transmitting 256 kilobits (kbs) per second, approximately nine times the speed of a modem using a standard digital phone line. Satellite internet is usually among the most expensive ways of gaining broadband internet access, but in rural areas it is often the only viable option. Since the satellite is being used for two-way communication, the total distance increases to 140,000 km, which takes a radio wave 466 ms to travel. In the U.S., this is particularly a problem with large multi state conglomerates that serve mostly rural areas. This is a new technology that allows DSL to travel longer distances to remote customers. One version of the repeater is installed every 3 km or so along the trunk line, and strengthens and cleans up the DSL signals so it can travel another 3 km. This is a new service still in its infancy.
that may eventually permit broadband internet data to travel down standard high voltage power lines. T-1/DS-1 is a type of service that is possible for a rural customer desiring broadband speeds.

An optical fiber is a transparent thin fiber, made of glass or plastic, for transmitting light. It can be used as a medium for telecom and networking because it is flexible and can be bundled as cables. By using an extremely narrow spectrum laser source, data rates of up to 40 gigabits per second are achieved in real world applications. Recent advances in fiber technology have reduced losses so far that no amplification of the optical signal is needed over distances of hundreds of kilometers. This has greatly reduced the cost of optical networking. Modern fiber cables can contain up to a thousand fibers in a single cable, so the performance of optical networks easily accommodates today’s demands for bandwidth on a point-to-point basis.

3.4.6 E-Learning

The term E-Learning covers a wide set of applications including computer based learning, web based learning, virtual classrooms and digital collaboration. E-Learning is defined as the delivery of content through electronic media, be it Internet, intranet, satellite broadcast, audio / video tape, interactive TV and CD-ROM. E-Learning is defined more narrowly than distance learning, which would include text based learning and courses conducted via written correspondence. E-Learning is poised for widespread acceptance among students and faculty. It has emerged as a powerful supplement to conventional teaching-learning systems. It uses the powerful multimedia and interactivity features of currently available computing platforms to deliver learning. The growth of internet, high-capacity networks through satellite and fiber optics, and high-speed desktop computers is making learning available round the clock around the globe.
3.5 INTERACTIVE MEDIA AND CONFERENCING SYSTEMS

Interactive media refers to media of communication that allow for active participation by the recipient. Traditional information theory describes interactive media as those media that establish two-way communication. While some non-digital mass media would qualify for interactive media the term is usually applied to digital media. The significant increase in possibilities for interactivity especially over vast distances brought by internet boosted the availability of digital interactive media. These media are often designed by information designers. In computer games this is visual, acoustic communication between the user and the game. In mobile telephony, communication happens between two people and is purely acoustic at first glance. Interactive programming is the procedure of writing parts of a programme while it is already active. Dynamic programming languages provide the environment for such interaction; so prototyping and incremental development can be done while other parts of the programme are running.

Tele Conferencing is a means by which individuals or group located at different places can exchange data, speech or visual materials like graphs, diagrams, moving pictures of themselves and any other relevant information. Tele conferencing is made possible by the integration of computers and communication in such a manner as to work in real time. Experiences of advanced countries have been that, apart from economizing on time and travel, Tele Conferencing helps in improving efficiency and participatory learning. Video teleconference communication is multi-way and synchronous, as it would be if all parties were in the same room. Emergence of new forms of media is of particular interest for distance learning because of their interactive capacities. The need for communication, staff development, and expert resources makes Tele Conferencing a particularly apt means for distant education institutions. The use of telecom to facilitate two-way
communication among students located at different venues is the basis of educational Tele Conferencing. The opportunity for introduction between the experts and the students, which Tele Conferencing affords, has made it a valuable learning technique.

In India, IGNOU and the National Open School, have initiated efforts to incorporate Tele Conferencing as a component of instruction. Tele Conferencing experiment of IGNOU from 1993, essentially a one-way video and two-way audio, was conducted to explore the feasibility of telecom based interaction in Distance Education. The training programme was conducted through live lectures and discussion mode, supplemented by computer based graphics and charts, audio-visual aid and discussion. During the discussion, the participants used phone facilities for asking question in audio mode. The questions were answered using audio and video mode.

3.6 COMPACT DISC - READ ONLY MEMORY (CD-ROM)

The CD-ROM is non-volatile optical data storage medium using the same physical format such as audio compact discs, readable by a computer with a drive. John Sculley (1987) said that CD-ROM would revolutionize the use of personal computers. These reading devices are a standard component of most modern personal computers. The CD-ROM is popular for distribution of software, especially multimedia applications, and large databases. Textual data can be compressed by more than a factor of ten, using computer compression algorithms, often known as ‘zipping’, so that a CD-ROM can accommodate at least 100 yards of bookshelf space. In comparison a DVD typically contains over 4 GB of data.
3.7 CONVERGENCE

Convergence is the trend whereby a variety of different digital devices such as Radio, TVs, mobile phones and refrigerators are merging into a multi-use communications appliance employing common software to communicate through the internet. In other words, it is the convergence of content, communication and computing. Radio, TV, satellite, cable, fiber optics, wireless and internet are some of the common media. Communication is the key for convergence. Devices are talking to each other more and more. The iPod talks to the PC. The phone talks to another in the sense of being able to transmit a picture to it. Manufacturers are trying to get into consumers homes, to introduce technology solutions and consequently, their gadgets. The fine line between electronics and computing devices is almost invisible already – everything from music systems to cars have computer chips embedded in them, and they’re touted to get a lot smarter.

3.8 SUMMARY

The radio, TV, internet, compact discs and other electronic media are constantly growing in terms of technology and usage. These are continuously helping for the educational development. Modern technologies and developments of these media have been changing the Indian educational scenario.