CHAPTER V
THE NATIONAL POLICY ON INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN SCHOOL EDUCATION.

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5.1 INTRODUCTION:
India realized the role of information and communication technology (ICT) in education in 1984-1985 when the computer literacy and studies in schools (CLASS) was introduced on pilot basis, the project was later on adopted as a centrally sponsored scheme during the seventh Five Year Plan (1993-1998). The scheme was extended in eighth plan to provide financial grants to institutions covered earlier and to include new government aided secondary and senior secondary school. The financial assistance included annual maintenance grant and for purchasing equipments for new school, during this period 2598 schools were covered.

In July-1998, a national task force was constituted on information technology and software development (IT task force). To make recommendations on introduction of IT in education sector including school. The report recommended the provision of computer system to all educational institutions upto higher secondary schools by suitable investments (about 2-3 %) of total budget during the next five years. On the basis of the recommendation of task force and the advice of the planning commission, in year 2001-2002, a revised class scheme was introduced by making the provision of Rs. 845 million.

Based on the feedback submitted by the government and the evaluation study conducted by an independent agency the CLASS scheme was modified and greater flexibility was introduced. The new scheme was called “ICT@Schools”, this scheme was comprehensive and systematic initiative to open new opportunities of learning to the school students. The scheme aimed at attaining partnership of states, union territories, and other organization “in a mutual endeavor to bridge the heterogeneous proliferation of ICT across different socio/economic and geographic segments in the country.” This partnership was to cover the financial initiative encouraging development of long term computer education plans setting up of smart schools by KVS/NVS in states as technology demonstrations and for providing support to the states efforts in these areas.

India is a federal country and the subject of education is in the concurrent list of the constitution which make both the union of states responsible for it.
5.2 GOVERNMENT SCHEMES OF COMPUTER EDUCATION.
The government of India, during fourth Five Year Plan, introduced the first formal educational scheme in 1972. Radio has been used in India since last several year large numbers of learners.

In 1986 the national policy on education was announced and it was modified in 1992, so as to stress employing educational technology to improve the quality of education. The statement led to two major centrally sponsored schemes, Educational Technology (ET) and Computer Literacy and Studies in Schools (CLASS) which were more comprehensive centrally sponsored schemes. These schemes led to Information and Communication Technology @ Schools in 2004. Educational technology scheme had an important place in another scheme on upgradation of science education. The national curriculum framework 2005 also emphasized the role of Information and Communication Technology (ICT) in school education. The use of ICT for quality improvement was also included in government of India flagship programme on education, namely Sarva Shiksha Abhiyaan (SSA). The ICT was also included comprehensively in the norm of schooling recommended by Central Advisory Board of Education (CABE) in its report on universal secondary education in 2005 on account of conversions of technologies, it has become necessary to take a comprehensive view about various possible information and communication technologies for improving quality of school education in India.

5.3 VISION OF POLICY:
“The ICT policy in school education aims at preparing teachers and youth to participate creatively in the establishment and growth of knowledge society leading to all round socio-economic development of the national and global competitiveness.”

5.4 MISSION OF THE POLICY:
“To devise, catalyse, support and sustain ICT and ICT enabled activities and processes in order to improve access, quality and efficiency in the school system.”

Policy Goals:
The ICT policy in school education will try to create:
1. An environment to develop an ICT knowledgeable community.
2. An ICT literate teacher and student community who can deploy, utilize, benefit from ICT and contribute to nation building.

3. An environment of collaboration, cooperation and sharing, conductive to the creation of a demand for optional utilization of and optimum returns on the potential of ICT in education.

1. To improve universal, equitable, open and free access to state of art ICT and ICT enabled tools and resources to all students and teachers.

2. Development of local and localized quality content and enable students and teachers to partner in the development and critical use of shared digital resources.

3. To develop professional networks of teachers resources persons and schools to catalyze and support resources sharing, upgradation and continuing education of teacher, guidance, counseling and academic support to students and resources sharing, management and networking of school managers and administrators.

4. Research, evaluation and experimentation in ICT tools and ICT-enabled practices in order to inform, guide and critically utilize the potential of ICT in school education.

5. Motivate and enable wider participation of all sections of society in strengthening the school education process through appropriate utilization of ICT

5.5 SCOPe OF ICT:

“Information and Communication Technologies are defined as all devices, tools, content, resources, forums and services, digital and those that can be converted into or delivered through digital forms, which can be deployed for realizing the goals of teaching learning enhancing access to and reach of resources, building of capacities, as well as management of the educational system.” These will include hardware devices connected to computers, software applications, interactive digital content, internet and other satellite communication devices, radio and television services, web-based content repositories, interactive forums, learning management systems and management information systems.” “These also include processes for digitization, deployment and management of content, development and deployment of platforms
and processes for capacity development and creation of forums for interaction and exchange.”

5.6 INFORMATION AND COMMUNICATION TECHNOLOGIES IN SCHOOLS:
ICTs have helped in convergence of a wide range of technology based and technology mediated resources for pre purpose of learning. Hence it has become opposite to employ ICT as an omnibus support system for education.

ICT are not only delivery channels but medium providing opportunities for collaboration, sharing and peer learning and constructing digits learning resources at the various levels in the educational system. The process can result into extensive use of digital learning resources in the educational system. This will provide critical requirements of an educational system, namely reducing isolation by way of connecting teachers, schools, teacher educators and creating digital resources on very large scale in different languages.

5.7 ICT LITERACY AND COMPETENCY ENHANCEMENT:-
The policy defines ICT Literacy in terms of levels competency, based on the stage of schooling at which a student or teacher introduced to ICT. These stages are suggestive and their adoption depends on local conditions. These levels need to be revised periodically to suit the changes in the technology.

Stage 1 Basic:
This stage covers the basics of computers and includes operating a computer, storing, retrieving and managing data. Use of computer for data processing tasks, connect, disconnect and troubleshoot basic storage, input, output devices. It also includes connectivity to the internet, using e-mail, web surfing, using search engines, keeping computer updated, virus free, operating and managing content from external devices like sound, recorders, digital cameras, scanners etc. Thus various public educational software applications of different subjects should be used by teachers and students after learning to use them. These softwares should form the part of basic component. This exercise has been successfully used in the kerala’s educational system. In loss of science, Kalzium, Kstars, Stellarium, PhetKTechLab are being used. For teaching
mathematics Geogebra, Tux Math and K Bruch are useful. For English K Hangman, K anagram, K letters are used other software tools can also be used whenever required to increased competency and ICT Literacy.

**Stage 2 Advanced:-**

This stage includes “Creating and managing content using a variety of software applications and digital devices, using websites and search engines to locate, retrieve and manage content, tools and resources, install, uninstall and troubleshoot simple software applications etc.”

**5.8 IMPLEMENTING STRATEGIES:-**

The ICT literacy programme was implemented in all secondary schools in the states including government and private schools in the states including government and private schools during the period of Eleventh Five Year Plan period. Under the programme states were to develop the curriculum for ICT literacy only with course materials according to the stages discussed above in order to achieve uniformity.

These were to be in the form of self instructional materials soas to enable the teachers and students to process them by themselves. This programme was expected to provide a set of generic skills along with conceptual knowledge.

The boards of secondary education were to develop a scheme for evaluation. ICT was to be an additional subject, with separate listing of marks / grades with the award of a certificate of proficiency. The ICT literacy programme was to be extended to the upper primary stage by the end of the twelveth Five year Plan. The states having appropriate qualifications were to be engaged in various schools. These teachers were to function as the ICT coordinators of the schools. As the necessary infrastructure will develop qualified technical assistants were to be appointed.

A curriculum framework for ICT in Education(CFICT) was to be developed at national level so as to provide the basis for states to develop their curriculum. Regarding the scope of ICT enabled teaching and learning process, it was to include a variety of techniques, tools, content and resources aiming at improving the quality and efficiency of the teaching-learning process, “ranging from projecting
media to support a lesson, to multimedia self-learning modules, to stimulations to virtual learning environments, there are various options available to the teacher to utilize various modes ICT tools for effective pedagogy including digital resource creation.” Thus attempts were to be made to use ICT tools to transform usual classrooms into ICT-Enabled classrooms.

All teachers having basic competency to handle these resources were to be encouraged to adopt ICT enabled practices in teaching learning process. In order to serve this purpose appropriate software applications, digital content, tools and resources were to be made available. Through proposed digital repositories. Teachers were to participate in selection and critical evaluation of digital content and resources. They were to be encouraged to develop their own digital resources, sharing them with colleagues through the digital repositories. The schools equipped with EDUSAT terminals, DTH and other media devices relevant activities were to be planned and incorporated into the time schedule of the school initially teachers were to use computer lab for the purpose of teaching learning process and later on to develop more classrooms progressively by equipping them with appropriate ICTs so as to make way for ICT enabled classes.

States were to initiate to prepare courses in different aspects of the ICT for higher stage of the secondary stage, taking into consideration the requirements of the students in various streams. Such course were to be modular in design to enable students to select appropriate software application based on current needs of higher education, as well as job prospects. These courses were to be frequently revised to keep pace with emerging trends in ICT. To teach these students a post graduate teacher with appropriate qualification was to be appointed. An ICT lab attendant on technical assistant with appropriate qualification was to be appointed to manage the ICT/ multimedia Resource Lab.

**5.9 ICT INFRASTRUCTURE:**

ICT Infrastructure was classified into core ICT Infrastructure and enabling Infrastructure core ICT infrastructure included hardware, network and connectivity and software.
1) **Hardware:**
The states were to establish state of the art, appropriate, cost effective and adequate ICT and other enabling infrastructure in all secondary schools taking into consideration the size of the school, needs of the ICT programme and time sharing possibilities. States were to define an optimum ICT infrastructure in each school. Two students were to use one computer at a given time, and at least one printer, one scanner, projector, digital camera, auto recorders and such other devices were to be the part of infrastructure.

Each school was to be equipped with at least one computer laboratory with at least ten networked computers to start with. Each laboratory was to have a maximum of 20 computers so as to accommodate 40 students at a time. A student computer ratio of minimum 10:1 was to be progressively achieved in all schools. Exclusive laboratories with appropriate hardware and software was to be provided for higher secondary classes and at least one classroom was to be equipped with appropriate visual facilities to support an ICT enabled teaching learning. Appropriate hardware for satellite terminal was also to be proved to selected schools in a progressive manner. Computer were also to be provided at the library, teacher’s common room and head office of the school. To achieve the objective of automated school management and professional development activities.

ICT enabled education was to be extended and classroom practices were to be developed through the use of digital devices such as still and video cameras, music and audio devices, digital microscope and telescope, digital probes for investigation of various physical parameters. States were to make appropriate choices and increase the use of such devices in the classroom. Outsourcing of hardware maintenance was considered desirable but core curricular and pedagogical processes were not to be outsourced. The ICTs were to be used by teachers to teach regular subject also.

2) **Network And Connectivity:**
All the computers in a school were to be the part of a single local network so that optimum sharing of resources can be achieved. Internet connections were to be provided to the laboratory, teacher’s common room and the head office of the school. Each school was to be served with broadband connectivity of at least 2 Mbps
capacity. The number of computers with internet connectivity was to be governed by the available bandwidth, to ensure adequate speed. A mechanism to have offline access to internet content was also to be set. Teachers and students were to be educated for making safe use of internet. Firewall and other security measures were to be implemented to block in appropriate sites and to guard the school network against misuse of the ICT facilities. Appropriate guidelines for network connectivity were also to be developed.

3) Software:
A wide variety of software applications and tools are necessary for meeting the demands of broadband ICT literacy and ICT enabled teaching learning programme. In order to increase the range of skills and conceptual knowledge of the teachers and students, graphics and animation, desktop publishing, web publishing, databases and programming tools were to be used. A judicious mix of software was to be introduced in schools to keep total cost of ownership (TCO) at the minimum level. “Creation and widespread dissemination of software compilations, including specialized software for different subjects, simulations, virtual laboratories, modeling and problem solving applications” were to be encouraged, freeware, free and open source software applications were to be preferred.

4) Enabling Infrastructure:
In order to maintain the ICT facility efficiently the enabling infrastructure was to be defined, established and maintained. Regular and regulated supply of electricity, appropriate electrical fixtures, adequate power backup and support, alternative source of energy was to be ensured. Teacher and students were to be trained in the safe use of electrical outlets and fittings. Physical facilities like large room, proper lightening and ventilation, durable furniture suitable for optimizing space and long hours of working were to be established. Adequate safety precautions and rules for use were to be established. Portable fire distinguishes was to be placed in each laboratory and teachers and students were to be trained in using it. Even fire drill was to be implemented. All equipments and resources were to be insured against theft and damage.
5) Digital Resources:
The state was to provide universal equitable open and free access to ICT and ICT enabled tools and resources to all students and teachers. India has diversity of educational linguistics and social conditions; it calls for a wide variety of digital content and resources for different subjects, grade levels and languages. The states were to maintain and share e-content as per open standards which are free of royalty, non commercial and maintained publically. Sharing of digital content and resources require the development of teachers who were to function as self help groups. “Providing peer support, showcasing best practices and exchange of knowledge how”. Applications for developing content and simulations in various subjects were to be encouraged to facilitate sharing of tools, code and content, especially for easy translation into different languages and for its wide use. Digital content development was to take place in phases. Initially difficult to teach and understand concepts were to be taught, later on developing of content for all concepts and finally more sophisticated interactive ICT tools for teaching and learning of virtual laboratories. The e-content was to be in the form of e-books, animations, lessons, exercise, interactive games, models and simulation videos, presentation slides, plain text materials graphics or any combination of these. The proposed web based digital repositories were to host a variety of digital content suitable to the needs of different levels of students and teachers. Raw content resources such as photographs, video, audio and animation were to be remodeled to develop multimedia learning objects.

Teachers and students were to be encouraged to develop e-content and a collaborative way. “Text books, teachers/students guide, question banks, laboratory manuals, problem sets, activities, notes etc and other print based learning resources available in public domain” were to be digitized and deployed on national and state level web based digital repositories. Educational standards and instructional designs for a variety of digital content including interactive multimedia materials and learning objects.

Widespread sharing and dissemination of digital content was expected to promote infusion of ICT into classroom practice. Suitable open standards for inter-operability, web based sharing and appropriate norms for free access was to be defined to increase use of digital content and resources.
The school library was to search, collate and categorize digital resources and make them available to the teachers and students. The school library was to be digitized in cataloging and library automation was to be introduced for facilitating access to the digital resources. Thus an automated library with internet access was to catalyze the use of digital resources in all classes.

**Capacity Building:**
Capacity building of in-service teachers has been the key to the widespread infusion of ICT enabled practices in schools. A phased out program of capacity building was to be planned. These teachers were to be provided Induction Training and Refresher Courses. The Induction trainings were to be imported by the Regional Institute of Education, National Councils of Educational Research and Training (NCERT), State Councils of Educational Research and Training (SCERT) or such other institutes of the central and state governments, to be completed before the commencement of the academic year. The refresher trainings were to be carried out every year to enable the teachers to share, learn and keep up to date with the latest trends in ICT based teaching learning processes. After completion of induction training teacher’s evaluation was to take place to ensure that the minimum competency has been achieved.

Regarding capacity building through pre service teacher education, teacher education were to be suitably trained and oriented to use ICT in their pre service teacher training programs. National Council for Teacher Education (NCTE) has laid down guideline about availability of ICT infrastructure in each such a training institute. NCTE was to prescribe appropriate curriculum in ICT to be revised periodically, for such teachers. Capacity building of heads of schools was also considered as it plays a crucial role in establishment and optimal utilization o ICT and ICT enabled education practices in schools. All such heads of schools were to undergo orientation in ICT and ICT enabled education training programs. School heads were to be trained in processes leading to automation of administration, management and monitoring of the school system and will play proactive role in the implementation of School Education Management Information System (SEMIS).

ICT was to be used to achieve the goals of inclusive education in schools. ICT software and tools to facilitate access to persons with disabilities like screen readers,
Braille printers etc. were to be part of ICT infrastructure, in schools, similarly ICT was also to be used for open and distance learning.

5.10 AUTOMATED AND ICT MANAGED SCHOOL PROCESSES:
States were to adopt “An e-governance and automated school administration program for school, build capacities for its implementation and deploy school based management information systems (MIS). These MIS were to be integrated with the proposed state wide web based School Education Management Information System.” A school wide local area network enables automation of various processes. For example, library automation, locally cached offline access to internet resources, offline automation, maintenance of records, student tracking, resource planning etc. As the existing ICT infrastructure will be used. It will result in increasing efficiencies, save time and cost thus the school wide area network will be useful for promoting this automation.

At the system level the policy aims at creating a web enabled networked environment, in which schools, teachers, students, school staff and school managers and community participates in the process. This implementation will include the School Education Management Information Systems(SEMIS), digital repositories of tools, content and resources, professional development, and platforms of continuing education and guidance, counseling and other student support service.

Schools are to define norms for automation of school processes for administration and management. Development and implementation of an MIS system is to be undertaken in both, online and offline modes. The information collected by the MIS has to be broad in nature, and includes trucking of students and teachers, from their academic needs. States have to adopt an e-governance and automated school administration program for schools, and build capacities for its implementation and use of school based management information system. These MIS will be integrated with the national level web based school education management system (SEMIS).
5.11 SCHOOL MANAGEMENT INFORMATION SYSTEM (SCHOOL MIS):

A nationwide network will be established in which school teachers, students, school managers and community will participate. This implementation includes the school MIS, digital repositories of tools, content and resources, professional development and platforms of continuing education and guidance, counseling and other services of student support.

School MIS will be a single window clearing house on all information related to the secondary school system. The information facilitates research and analysis activities and guide decision making at different levels in the educational system which will contribute to increasing efficiencies. States will define the norms for automation of school process for administration and management MIS system development and implementation will be in online and offline modes. The norms defines standards of technology including languages, fonts, word processors, technical dictionaries etc. open standard will be adopted for facilitating universal access to information, context and resources.

5.12 IMPLEMENTING AND MANAGING THE POLICY:

In order to implement and manage the policy the following measures are to be used.

1) Program Monitoring And Evaluation Group (PMEG):

The department of school education and literacy has the responsibility of guiding the implementation of the ICT program in schools all over India. The PMEG will setup the task groups, invite institutions or professionals, to develop norms, specifications, evaluation reports, white papers etc. to guide the state governments in implementing the ICT program.

2) Inter-Ministerial Group:

An inter-ministerial group consisting of members of ministry of HRD, ministry of communications and department of space, ministry of power, ministry of new and renewable energy, ministry of labor and ministry of rural development etc. will be setup to guide technological choices and “Specifying cost effective and optimum
infrastructure and connectivity”. The group reviews the state of art technology, connectivity and inter sartorial convergence, taking into consideration, its relevance to the goals of ICT, feasibility of implementation in the school sector, appropriateness in terms of finance, environmental ‘footprints’, need for training and learning curves for use and managing the system. The group will regularly review technological choices and provide the guidance to state governments in making proper investments and to maximize educational benefits.

The reviews of technological choice includes standards and norms for computer configuration, input output devices including scanners, printers, projects, operating systems and system software applications including virus scanners, productivity applications and educational software, power conditioning equipment and other digital equipment such as camera and audio recorders. In addition it includes norms for edusat terminals, norms for pricing of infrastructure like telephone, internet and electricity. States will be guided in the context of establishment and management of the infrastructure.

3) National and State Level Agencies:

These agencies include the national council of Educational Research and Training, The Central Institute Of Educational Technology, The National Institute of Open Schooling, The State Council Of Educational Research and Training, and The State Institute of Educational Technology will develop curriculum, resources and capacity building programs. These will serve as models for adaption and implementation of the system.

All the public funded national and state level agencies will be partners in developing, compiling and making available digital content resource and tools. Norms also will be developed for quality and open access for digital contents. Public funded broadcast agencies, both at the state and national level and agencies managing the EDUSAT networks will be engaged in wider dissemination of support services and resources.

The main role of state include, defining norms, standards, guidelines and framework to Enable various aspect of the programme and to facilitate and monitor the implementation of the programme. Thus their tasks include:

1. A programme of action, a road map and feasible timeline.
2. Guideline based on national standards and norms for infrastructure, implementation process, capacity building programme, monitoring and evaluation criteria, target etc.
4. Providing facilities for widespread participation of all stakeholders, community and private partners in various aspect of the ICT programme.
5. Development and maintenance of the infrastructure and digital repositories.
6. Development and phases implementation of an appropriate capacity, building framework.
7. Mobilization private and community sources.
9. Monitor and evaluate the implementation.

4) Programme of Action:
The states are to draw up a programme of action to inform and guide about various aspects as the ICT programme such as developing infrastructure management of programme development of resources, capacity building, monitory and evaluation of the programme.

Based on suitable road map and timeline, state where the ensure coverage of all government and government aided secondary and higher secondary schools by the end of eleventh plan, and also to ensure similar development in all unaided schools through their state boards of affiliation. The programme was to be expanded to the upper primary stage, covering all the school by the twelfth plan. The state words to set up and institutional mechanism for the implementing the ICT programme under existing educational system by delegating responsibilities to the school levels, through experimenting different model based on past experience.

5) Advisory Group:
The department of education of the states was to appoint advisory group to direct the implementation of the ICT programme and also monitor and evaluate them. The
advisory group consists of repetitive of concern department, reputed engineering institute of the state, university etc. taking in to consideration the various tasks related to technical educational financial and administrative areas. The department of education of the states was to synergize with appropriate department and the state level agency to establish connectivity and electricity in all schools, which include norms for prizing quality of service and maintenance finalize through negotiation. The states were to adopt standards suggested by the inter ministerial group at the national level for all aspect of the ICT implementation especially technology mix, specification of equipments, selection of software and connectivity selection and development of digital resources and capacity building programs. Prevailing norms in the state where to b utilized to phase out, dispose of or exchange old and obsolete equipments, by way of taking care to minimum avoidable up gradation and generation of electronic waste.

States were to enter into agreements with the vendor/agency for processing software License. These MOUs/agreements were to involvestrict compliance, causes to ensure quality of equipments and service and minimum downtime.

Regarding models of ICT infrastructure, build, own, operate, and transfer (BOOT) models of ICT infrastructure was to be preferred different combination of services like equipments manpower, software were to be tried out and appropriate combination, based on feasibility and cost effectiveness were to be adopted by the states. Based on description and obsolesce norms the state can choose to use a build, own and operate (BOOT) model. However as it was decided to use free software, it cannot be a part of BOOT. Hence it will cover hardware, purchase and maintenance. Learning resources i.e., software and content should not be encouraged as its detrimental to educational aims and principles.

States were to expose the possibilities of sharing the infrastructure partly or wholly with the community to extend education or train youth after school hours or similar purpose. The states may try for community partnership models for optimum utilizations of infrastructures and resources while ensuring safety of school property. States were to involve mechanism for bulk purchase, rates contracts based on dynamic pricing and school wide licensing of software of low cost operation.
However prevention of resources is not allowed according to recent amendments in the policy. Only digital resource can be publically owned be used for the purpose. Regarding regulatory measures the policy documents states that,” access to internet enhance the risk of inappropriate content reaching children appropriate advisors for regulating access monitoring internet activity and education of teachers and children will be taken up at the instance of the advisor group. Heads of schools and teachers will be trained in appropriate and regulatory measures.”

States were to draw up an appropriate incentive scheme for teachers, students and schools to recognize and promote initiative and talent."Easy loan schemes for procuring ICT equipments and resources, awards and professional support packages and a variety of similar incentives will be considered. States will also explore the possibility of partnership and sponsorship with the government and private agencies like banks, corporations and charitable institutions.”, all states should be provide interest free loans to all teachers to purchase inexpensive laptops for them self’s”

5.13 COMPUTER EDUCATION INITIATIVES IN INDIA

Recognizing the potential of ICT many state govt. have taken initiatives to introduce students, specially high school to computer educations private sector govt. partnerships are being tried and several house NGOs are actively participating in these activity some of this initiative are described below

SIET Pune- Accordingly to the Deputy production in charge, stated that:

1. In 2009-10:- 102 video and 103 audio programmes were produced by SIET PUNE.
2. In 2009-10:- 100 learning objects were produced in consultation with CIET.
3. IT was decided to produce audio programmes for communication skills in English as it is in great demand.
4. Video programmes produced SIET PUNE are shown on DD
5. For 2009-11, SIET PUNE sought financial assistance of Rs. 408.40 lakhs for 200 video programmes for TV, 100 multimedia learning objects, 200 audio programmes, training, workshops, digitization of old programmes, repair of equipments, replacement of centralization AC plan, purchase of new technology equipment, vehicle maintenance, office expenses library.
The Bhandup Municipal School Project is the brainchild of Dr. Kusum Kamat, who retired as the Education Officer of the Mumbai Mahanagar Palika. The children in municipal schools are almost always from the marginalized classes. Knowing their difficulties, Dr. Kamat wanted to enable teachers to provide education that is multilevel, multi-graded, cooperative, and fun. This, she thought, would be possible if teachers could become educational technologists, assess the needs of each individual child, and induce the student to learn at his/her own pace, moving up to higher skills after mastering lower-skill tasks, and cooperate with other teachers and children. To test her ideas, two municipal schools in the Bhandup slum area in Mumbai were taken up as pilot experimental schools for which CASP-PLAN gave her some seed money. These schools had 2,000 children in Classes I–IV, and 38 teachers. After assessing the different problems faced by these children in respect of their homes, parental illiteracy, poverty, health problems, irregular attendance, and low achievement, Dr. Kamat looked at the problems faced by teachers. These related to large classes, with different achievement levels of children, irregular attendance, lack of interest in schooling (on the part of both parents and children), and the absence of refresher courses for teachers. Dr. Kamat believed that it was important to make teachers understand that even low achievers could become good students, that education could be made interesting, and that the learning pace should be set to suit the level of each child. If parents found that their wards were doing better at school, their cooperation would come in time. The teacher’s role was, therefore, pivotal. How to make the teacher a facilitator, manager, and organizer of instruction was the crux of the problem. Learning materials were necessary; they had to be made available at a low-cost or no-cost basis, because if the project was to be worthy of replication extra money could be provided. Dr. Kamat’s teacher-training programme aimed at improving the understanding and efficiency of teachers and sought to make them identify learning sources/experiences in keeping with the needs of pupils and their individual talents and personalities; teachers had to ensure that the children developed self-learning skills. It was necessary to prepare diagnostic tests to plan remedial measures, learn to organize learning situations to facilitate the active participation of learners, and plan/organize activities for students in such a way that they would be given opportunities to showcase their talents, increase their interest in learning, and make them feel confident. Other important goals were to establish a rapport with
parents, find solutions to improve school attendance, seek the cooperation of parents and the community in organising school activities, and cultivate the interest of parents in the academic performance of their wards. Once teachers understood that steps such as multigraded learning, the freedom to move about in class, and multilevel materials designed to suit the needs of children all help in making children learn better, both they and the children began enjoying what they were doing. The municipal corporation agreed to free teachers from teaching duties on Saturdays (which was, in any case, half a school day) so that teachers could spend their time in planning the next week’s lessons and prepare materials. Students often brought waste material like bus tickets and empty cartons and matchboxes to school, which the teachers then used to make these materials. At the pilot stage, some money was needed for teacher training. But later when the pilot became replicable and was introduced from two schools to many more schools, it became possible to provide such training within the normal budgets of schools. The training consisted in exposing teachers to new techniques by way of demonstrations by resource persons and experts, visits, seminars, and conferences. They were given scope to experiment with new methods and report their findings to others at seminars. This kind of planning, interaction, and exposure helped teachers to solve their own problems. The evaluation showed that teachers were enthusiastic, children were learning, attendance had improved, and parental cooperation was more forthcoming. After evaluating the programme, certain changes were made. It was then decided to extend the programme to 18 more schools. These had 165 teachers and 8,500 pupils. In this phase, too, the programme worked quite well and showed good results. The municipal administration then took over the programme and extended it to many more schools. But its vision was limited to the more traditional types of teaching. Further, there was more emphasis on cognitive learning. The training unit staff was also not able to train teachers independently. At the end of the first year, it was noticed that teachers were not motivated to change. During the last phase, a multimedia package of textual materials and video programmes for training purposes was developed. This package has helped experts to reach teachers independently of those organizations that are in charge of elementary education. The package is now widely used in the DPEP programme and in those districts of Maharashtra where the district education officers are interested in helping to bring about a change in the educational system.
**Gram Mangal project, Maharashtra**

The Gram Mangal project, established in 1982, works in the adivasi belt of Maharashtra that borders on Gujarat. When Anutai Wagh, who had worked for a long time with Tarabai Modak and Dr Ramesh Panse, first came to the area, there was no drinking water, no electricity, and no roads, let alone a school. The adivasis were very poor, and the two social activists realized that unless the villages become self-reliant communities, by undertaking development programmes, there was no way that conditions would improve. They started many development activities, and later also concentrated on early childhood education as part of the development programme.

After working for three years on getting basic amenities like drinking water and roads, they began working on the educational programme. Gram Mangal does not take any grants from the government, but supports all useful activities that the government undertakes in the area. They also work in collaboration with other NGOs. The organisation is supported by the larger community. Their educational efforts are concentrated on vikaswadis, teacher-training programmes, health care programmes, and technical/vocational education programmes. Gram Mangal also undertakes research programmes. They now have several vikaswadis in nine villages. The curriculum is child-centric and related to the adivasi child’s environment. In the early years, the local Warli language is used and later Marathi is introduced. A lot of educational material, both locally prepared and bought from elsewhere, is used. Gram Mangal also maintains a bank of educational materials. This project as well as the Pastapur project illustrate the need to forge close links between development and education.

**Avehi Abacus Project**

The Focus Group paper talks about the need to build knowledge content for young children in a multidisciplinary mode around what is relevant to a child. Those who support the tradition of imparting knowledge in terms of subjects may like to look at the way an NGO has organized this Shanta Gandhi, who had been engaged for a long time in early education and Bal Bhawan work. Conceived the idea of Abacus in 1952, when she was working in village Nikora on the banks of the Narmada. She began by seeking answers to the questions of adivasi and non-adivasi children relating to their surroundings, primarily through drama and song. She began discussing various themes and topics like evolution, how life emerged, why we are what we are, and how
we have reached here. In 1981, Avehi, an audio-visual research centre, was launched. In 1990, Avehi took up the Abacus programme in Mumbai and operates its programme using developing learning materials in 180 schools in two wards of the Mumbai Municipal Corporation. The materials developed are predominately visual and very attractive, and are welcomed by both teachers and students as the schools are located in slum areas and have no libraries. These are meant for students in Classes V and VI, and appear in the eight languages used in these schools. The programme also operates in 100 schools in Chandrapur and Yavatmal districts. The materials are thematic and arranged around the following topics:

• Myself, my body, and our needs. Understanding that I am unique, but so is every one of us. Still we share common needs, so we are interconnected. Understanding the world and the web of life. This helps in understanding that the earth fulfils all our needs and that our life binds us together, both the living and the non-living. How do societies develop? Where have we come from? This helps in understanding who we are and the mechanisms that bring people together. Understanding society and its structures.

• The way we live and where we are today. What are the roles of social institutions like the family, the state, class and caste? What roles do they play in our lives? How relevant are they? How do they influence us? Having understood the importance of these institutions, what do we accept, or reject, or challenge?

• Exploring change. Change is inevitable. We can either be passive and react to the change once it happens, or if we understand change, we can learn how to be proactive, and hasten a change that is good or resist a change that is unwelcome.

• Where are we going? What do I want in life? What will I be encouraged to do? What will take me further? What will determine my future and the future of the world around me? The organisation running Avehi Abacus Project consciously works with the system and uses the existing space and SUPW (Socially Useful Productive Work) time to address these themes during one-hour sessions. The first 10–15 minutes of the session are spent in introducing an ideathrough a story or flip chart. Then there is discussion or activity to connect what has been discussed to the lives of the students. This may involve group activity or worksheets. These activities emphasise values such as
working together, respecting each other and the dignity of others, respecting
labour and all living things, and working for peace. Children debate and
discuss the issues and come up with solutions.

**In-Service Teachers’ Training through the Multi-Media Approach (SITE)**

Organised by the Centre for Educational Technology (CET), NCERT in 1975–76

Educational objective: Show teachers that “Science by Doing” is a good method for
teaching science, and get them to practise it. Educational problem: The Science
Department of NCERT had launched the programme to introduce science from Class
III, but primary schoolteachers—numbering about 1.6 lakhs—did not have much idea
about how this could be done. The summer courses organised for this purpose could
not reach such a vast number of teachers quickly. The availability of the ATS-6
communication satellite loaned for a year by the USA to India made it possible to
beam television broadcasts to backward areas. About 2,400 villages in backward areas
in six states were equipped with electricity and television sets. However, as the one-
way telecast of a 22-minutes programme was hardly adequate to the task of bringing
about attitudinal change, it was decided that though the telecast would be used as a
novelty and for providing materials that were not easily available, the training
programme would consist of multi-media in the form of textual materials, activities
for illustrating how “Science by Doing” can be taught (the real mainstay of the
programme), radio programmes, and radio-vision programmes. Interactivity was also
essential. This was provided by having a facilitator (a high-school science teacher
who had received orientation in the multi-media package). Each medium was
designed to fulfill the special task assigned to it in the instructional design of the
course. All the materials were translated into the various languages of the region and
made available. Fail-safe alternative materials (in case the telecast failed on account
of the vagaries of electricity supply) were also prepared. Ten teachers from the
villages surrounding a television village were invited to attend a two week course at
every television village. Evaluation teams from CET sampled the attitudes and
knowledge of teachers prior to the beginning of the course. There were summative
evaluations as well. The deficiencies noted were rectified in the second course. This
time the course time was increased from 10 to 13 days, and two groups and two
teacher-facilitators worked in 1,200 television villages. More activities were added.
Similar formative and summative evaluations were done. Before the satellite footprint
was drawn back from India, nearly 48,000 teachers were trained in one year. The course was considered to have been successful in reaching its objectives as CET and SCERTs kept on getting letters from teachers asking for information. A study of the retention of attitudes and practices was done six months later, and it was found that a large number of teachers were teaching “Science by Doing”. Where they did not do so, it was more on account of administrative failure than the teachers’ unwillingness. Many states continued to use the materials even after the telecast was discontinued.

**Using Radio In An Interactive Mode**

The use of radio broadcasts in multi-media mode (viz., textual materials, interventions by teachers) was undertaken earlier (viz., in teaching Hindi as the first language to children in Rajasthan, or to children in Madhya Pradesh who used a variant of Hindi as their mother tongue). But in recent years, several programmes using radio in the interactive mode have been undertaken. Radio has many plus points: first, making audio programmes for both broadcast and non-broadcast modes is a much cheaper proposition than making video programmes; second, audio is very suitable for language learning; and third, given the erratic power supply in urban and rural India, battery operated radios work quite well.

The Centre is running one such programme for Learning Resources of Pune for teaching English to Classes V, VI, and VII. Approximately 85 radio lessons, each of 15-minute duration, have been broadcast since 2001, three times a week, using AIR as the conveyer. These programmes were first broadcast to all urban and rural schools in Pune district. Since 2004, the programmes are being broadcast to municipal schools in Mumbai. The Hindi–English version of these programmes is being used in Classes IV and V of the municipal primary schools in Delhi. Since 2003, the programme has also been extended to Jharkhand for Classes IV, V, and VI.

The same programme is broadcast once in the morning and once in the afternoon. The programme provides pauses for teachers and children to respond. It gives opportunities to children during the lesson to speak in English and a variety of child-friendly formats such as song, drama, and language games are used. The lessons also promote democratic values. Comparative studies show that, after listening to 90 radio lessons, children spoke far more English than Class VII students of the same school.
who had not been exposed to the programme. After three years of radio interventions, rural students from Class VII spoke far more English and wrote better English than rural students from Class IX who had not been exposed to the lessons. Teachers have been quite appreciative of these efforts.

Keli-Kali Radio Programme in Karnataka (Government of Karnataka, AIR)
The Keli-Kali radio project was initiated in 2000–01 in two districts (Raichur and Gulbarga) of North Karnataka to provide support to classroom teaching. About 2,50,000 Class III students in 5,000 schools benefited from the broadcast aimed from two radios stations. The process of the development of the radio lessons involved the following steps:

1. Identification of hard spots;
2. Teachers’ training in script development;
3. Development of scripts and editing;
4. Production of programmes by AIR;
5. Preparation of teachers’ handbooks and orientation of Block Resource Centres (BRCs) and Cluster Resource Centres (CRCs);
6. Training of all teachers by BRCs and CRCs;
7. Provision of funding by the state government for the purchase of radio sets, RCCPs (Radio-cum-Cassette Players) and dry cells;
8. Discussion in CRCs meetings about stocktaking, reporting, and sorting out problems relating to ensuring the listening of the radio lessons;
9. Organization of audio-conferencing with teachers and BRCs/CRCs for getting feedback;
10. Documentation and research to determine the effectiveness of the project.

In 2001–02, the project was extended to 13 districts covering students of Classes III and IV in about 14,780 schools. In 2002–03, the project was extended to Class V and covered 49,640 schools. In all, 258 lessons relating to EVS, Kannada, and mathematics were broadcast. In 2004–05, the project was extended to Class VI.

Radio Broadcasts in Andhra Pradesh and Himachal Pradesh—“Vindam Nerchukundam” (Let us listen, let us learn) in Andhra Pradesh, similar to the Keli Kali programme, was begun in Vishakapatnam in 2002 for Class III students. In 2003,
it was extended to Class IV and in 2004, to Class V. The programmes were broadcast from four AIR stations. The programmes benefited about 29 lakhs students and 1.5 lakhs teachers. Similarly, in Himachal Pradesh, a radio broadcast entitled “Gyankalash” was initiated in 2000 for students of Classes I–V during the evening hours.

**Interactive Radio Instruction in Karnataka, Chattisgarh, Jharkhand, and Madhya Pradesh** - The Interactive Radio Instruction (IRI) programme is a USAID-funded project and organised by the Educational Development Centre (EDC). It is similar to Keli Kali, but included interactivity during the programme. It was implemented in 2004–05 in two blocks (50 schools in each block) of North Karnataka, and 72 schools of Bangalore and Chamarajanagar district. In contrast to Keli-Kali, in the IRI programme experts developed the master plan and scripts after holding discussions with teachers. Private production agencies did the production work. Programmes were subjected to formative evaluations. The multigrade approach was adopted and was aimed at Class IV and V students. A strong research component (pre- and post-test designs with qualitative data from schools) was included. The subjects covered were science, social science, and mathematics. A total of 72 audio programmes have been developed. Almost all the steps followed in the IRI programme of Karnataka have also been followed in Chattisgarh and Jharkhand. However, the radio broadcast is meant for Class I and II students. Three blocks are covered in each state. The programme began in 2004–05. Radio sets were supplied by EDC. In Chattisgarh, a total of 115 programmes broadcasted by March 2005. In Jharkhand, a total of 86 programmes has been broadcasted. Twenty-eight audio programmes has been broadcasted in Madhya Pradesh.

**Enabling People through Educational Technology**: The Pastapur Effort - The Deccan Development Society (DDS), based in Hyderabad, is a two-decade-old grassroots organisation working with women’s Sanghams (voluntary village-level associations of the poor) in about 75 villages around Zaheerabad in Medak district of Andhra Pradesh. The 5,000 women members of DDS represent the poorest of the poor in their village communities. Most of them are dalits. DDS has a vision of consolidating these villages into vibrant organs of primary local governance and federate them into a strong pressure lobby for women, poor and dalits. This vision is
being translated into reality through continuing dialogues, debates, and educational and other activities with the people, facilitated by DDS. Over the years, the programmes have evolved from meeting the simple sustenance needs of sangham members to empowering them so that they can address the larger issues of food security, natural resource enhancement, education and health needs of the region. The integration of various activities is intended to retrieve women’s natural leadership positions in their communities and to fight their lack of access to control over their own resources. These activities, alongside ensuring earth care and preserving useful traditional knowledge, have also resulted in human care by giving the women a newfound sense of dignity and public profile in their village communities. The activities of DDS have assumed various forms, which centre around the principle of autonomy of the local community—autonomy over food production, autonomy over seeds, autonomy over natural resources and their management, autonomous markets, and autonomous media. The initiative aimed at autonomous media is particularly relevant in the context of the focusGroup’s suggestions. Transcending the barriers of non-literacy, the DDS women’s groups have successfully produced videos to conduct a dialogue with their sanghams and inform the outside world of the accomplishments of their fellow members. A stunning film, “Why Warangal farmers do not like BT Cotton”, on the ills of genetically modified cotton seeds, produced by these women, has been showcased around the world. Their compelling statements on why they should have media of their own is forcing the academic and development world to rethink media policies. The women have also established a Community FM Radio Facility, controlled and operated by them. Grouping themselves into a rural women’s media collective, the DDS Community. Media Trust, the women have been taking up social issues and concerns, video-documenting their findings, with their own original perspectives. These films have been featured in many international meets, and the group has worked with international organisations in training similar women’s communities in Third World countries like Bangladesh, Sri Lanka, Pakistan, and Peru. DDS also runs Paccheshale, an alternative school, and the sanghams run 40 balwadis. Speaking to the women, one realises the power and autonomy unleashed in the minds of these individuals; their work showcases an alternative way in which education and development can be thought of, as something that is not bogged down by narrow definitions revolving around literacy.
Internet Connectivity for Indian Villages-

The TeNet group of IIT Madras along with n-logue communications pvt. ltd., Chennai has provided Internet connectivity in the villages of India. They use this facility to drive education, health, and livelihood in the connected villages. It uses indigenously wireless technology to provide connectivity to a village. TeNet group finds a local entrepreneur in each village and helps him/her to set up a low-cost Internet and provide services in these villages. The total cost of the kiosk is Rs. 50,000, which includes wireless connectivity, computer, printer, power back-up, camera, and local language software as well as the cost of training the kiosk operator and six months’ unlimited Internet charges. The operator needs to earn Rs. 3,500 every month to break even. The kiosk provides multiple services to the village in order to earn this sum. Today n-logue has over 2,000 kiosks in about 30 districts in different states. One of the main services provided by the kiosk is educational. In addition to providing computer training and offering courses at various levels, including utility courses such as “how to make a bio-data” and “how to take good photographs”, a major area of emphasis has been coaching children to pass the SSLC examinations, especially in subjects like English, science, and mathematics. Online courses are aimed at children seeking to learn the subjects, practice for the exams and also take mock tests (which are graded) to prepare for the SSLC exams. In addition, some online live video lectures (with interactivity) are provided with the aim of putting some of the best teachers in front of rural children. At the same time, in response to popular demand a course on spoken English is being run for rural children and this has been very popular. The group is very conscious of the fact that education in rural areas through Internet kiosks is in its infancy, and that it needs to do much more to advance this project.

Initiatives in Slums of Delhi - Children learn to use computers quickly if they are allowed to play with them. Dr Mitra and his colleagues build a computer into a wall near their office in Delhi. The monitor screen was visible from the other side of the wall. They also embedded a touch pad into the wall. Children came running out of the nearest slum and stuck to the window like glue. A few hours later, Dr Mitra and his colleagues found that the children were surfing the Net. Within a period of six months, the children had taught themselves many computer operations. How did they do this? Dr Mitra observes that in playing with the pad and the mouse, an accidental
discovery is made. For example the cursor changes into a hand-shaped icon when a child hits the graphical user’s surface. Others repeat this by learning from the first child. Most of their learning is through such discoveries; they verbalize it in their own way. This vocabulary encourages them to perceive generalizations, for example, “When you click on a hand-shaped cursor, it changes to the hourglass shape for a while and a new page comes up.” They memorise entire procedures for doing something, for example, how to open a painting programme and retrieve a saved picture. They teach each other new and shorter procedures for doing the same thing whenever one of them finds such a shortcut. The group divides itself into the “knows” and the “know-nots”. However, they realise that a child who knows will part with that knowledge in return for friendship and exchange of information as opposed to fighting over the ownership of physical things, where they would use force to get what they did not have. A stage is reached when no further discoveries are left to be made, and the children occupy themselves with practising what they have already learned. At this point, intervention is required to introduce a new “seed” discovery. Usually a spiral of discoveries follows and another cycle of self-instruction begins. Within the next six months, the children of the neighbourhood had learned, mostly on their own, all the mouse operations; they could open and close programmes, and surf the Internet and download games, music, and video. When asked how they had learned to do all these operations, they said that they had taught themselves. They described the computer in their own language, often coining words to explain what they saw on screen. The hourglass symbol was “damru”; the mouse cursor was, “sui” (needle) or “teer” (arrow). The media gave this experiment considerable publicity. Dr. Mitra and his colleagues at NIIT call it Minimal Invasive Education (MIE). The media described it as the Hole in the Wall. That name has stuck. Funding and requests for information came from different governments. The programme is now operating in several places in Delhi, Madhya Pradesh, Maharashtra, and even Cambodia. The funding has helped in trying out the experiment in diverse human and climatic conditions. Wherever they found an appropriate place and a friendly panchayat or school, the NIIT engineers built a little structure with three computers facing the road. This plan is now the standard design for the Hole in the Wall project. To overcome the problems of dust, erratic power supply, the threat of adults taking over the experiment, etc., a number of modifications were made. The NIIT people are confident that their computers would work anywhere. If a computer
goes into the hang mode in a remote village in Kanyakumari, NIIT engineers can solve the problem because the NIIT software enables NIIT scientists to “see” their computers from anywhere through the Internet. Their new software ensures that nothing can be deleted, even by accident. By keeping the window (the “hole”) in the wall low to the ground, adults are prevented from using the computers. Observations were made in 26 locations, with 100 computers placed in remote villages. Focus groups were tested for nine months, and the results compared with those yielded by control groups and other frequent users. An estimated 40,000 children use these computers. They have all made themselves computer literate. The average icon test scores stand at 40 per cent in nine months. Dr Mitra and his colleagues now have proof of effectiveness of self-regulated learning, and are confident that such learning can happen anywhere in the world, to any child, in any climate. Egypt and South Africa have now borrowed this learning methodology. Dr Mitra says that groups of six- to thirteen-year-old children do not need to be “taught” how to use computers. They can learn by themselves. Their ability to do so seems to be independent of their social, economic, and educational background, literacy levels in the English language or any other language, ethnicity and place of origin, i.e. city, town or village, sex, etc. Surfing of pornographic websites by the children is quite rare. Teachers have often recorded gains in enrolment, attendance, and school examinations, particularly in subjects that deal with computing skills, English vocabulary and usage, concentration and attention span, problem-solving skills, and, above all, in working together and exhibiting self-regulation.

**Computer Education Initiatives**

As a technology, this is one of the most rapidly changing sector, requiring drastic upheaval in basic understanding. One of the aspects of this technology is the drive it provides to a variety of applications in a diverse market, creating jobs that were up till now unheard of. Makers, users, marketers and a host of service providers have found avenues of employment both in India and abroad. This in turn has catalysed the inflow of capital, fuelling an upsurge in infrastructure and services. India, having taken an early initiative in the area has emerged as a leader in the IT arena. Traditional ways of setting up and running courses cannot meet the demands of this job market. Initiatives taken by a few private bodies such as NIIT and Aptech, a number of institutions offer an enormous range of short- and long-term courses,
rapidly responding to changing technologies and market trends. The inbuilt openness of the system that they have evolved has also allowed professionals to keep pace with modern trends, re-skilling themselves in specialised hardware, software, and applications. The courses are of different levels, enabling both the new user of software applications and the expert programmer to pick and choose. The Internet and the publishing industry have also pitched in making available one of the largest and most regularly updated libraries accessible to anyone who desires to benefit from it. The computer education industry has demonstrated an ability to respond rapidly to changing needs setting up need-based courses, offering skill-based certification mechanisms, generating peer tutors and teachers all of which have implications for education in other spheres as well, especially in light of attempts to provide education for all.

**Head Start Programme in Madhya Pradesh**

The computer-aided learning programme in Madhya Pradesh was introduced three years ago. 2,718 schools covered under the Head Start programme. Each school has been given a minimum of three systems with backup power of three hours. The centres are located in cluster centres (housed in primary school buildings). The CDs are developed by the Rajiv Gandhi Shiksha Mission, Bhopal and distributed to all the schools. The programmes are developed on the hard spots identified by the teachers. The mission has trained the teachers of these schools in using the CDs effectively in the classroom. The topics cover all the subjects being taught in schools, including science, mathematics, social science, English, and Hindi. The programme is interactive in nature and has an inbuilt self-evaluation system. Research conducted recently shows significant gains in mathematics followed by science, social science, English and Hindi.

1. **Computer-Aided Instruction in Kerala**

The IT @ School Project was started in Kerala as a computer-aided instruction project in 2003 for the benefit of Class VIII students. In the year 2005 the project has been extended to Classes IX and X. The state has developed the syllabus for computer education. This project is being implemented in about 2,735 schools. 25,700 computer systems have been provided. Three students share one system. Four hours per week is allocated to computer class. Two hours are spent on theory classes and two hours on practical assignments. Students give online examinations. The funding for this project has come from
different sources, including the development funds of MPs and MLAs. Rs. 18 crore have been spent for this project. Each student is charged not more than Rs. 25 per month, and in the case of SC/ST students the state reimburses the amount.

2. **Maharashtra Knowledge Corporation Limited (MKCL)**
The Higher and Technical Education Department (HTED), Government of Maharashtra appointed the Professor Ram Takwale Committee in January 2000 to offer recommendations regarding the universalisation and integration of IT in all the institutions dedicated to higher and technical education in the state. The committee submitted its report to the government on 25 April 2000. It recommended the creation of a special-purpose agency, viz., the Maharashtra Knowledge Corporation Limited (MKCL), for the speedy, effective and self-supporting universalisation and integration of IT in higher and technical education in the state. The government appointed a Special Working Group to implement the recommendations of the committee. A unique joint venture where individuals, organisations, both private and government and educational institutions participate as equals has been initiated. The flag ship course of the corporation, the MS-CIT (Maharashtra State Certification in Information Technology) programme, is a joint venture of HTED; it trained providers initially in about 425 different educational institutions, i.e. in ITIs; arts, science, commerce, law, and B.Ed. colleges; engineering colleges and polytechnics, etc. MKCL aims to develop a world-class, globally competitive, flexible and value-based educational system that is responsive to the individual, institutional and social development needs of the people of Maharashtra and India. The mission of the corporation is to integrate in a self-sustainable manner an IT education and IT-enabled education into basic teaching, learning and management so as to achieve the goal of preparing graduates for the knowledge-based economy of the twenty-first century.

**Corporate Initiatives in ICT for Schools**
Recognising the immense potential of ICT as a job market, many state governments have taken initiatives to introduce students, especially those in high schools, to
computer education. Some of these initiatives have gone beyond providing basic computer literacy and are trying to integrate computers into education as well.

A variety of private sector–government partnerships have been tried and a large number of corporate houses and NGOs are participating in computer education in schools. Some of these initiatives are described below-

1. **Technology Initiatives by the Azim Premji Foundation**
   1. A combination of aspirations, desires, and perceived benefits resulted in over 10,000 elementary schools in India having access to computers. While this achievement contributed to heightened expectations, the lack of appropriate content for children in the local language had a dampening effect on the effective utilization of these computers. The Azim Premji Foundation has begun creating content on CDs to meet this requirement. Keeping the child as the main player in the story, the CDs aim to attract and retain the interest of children in learning through the medium of animated cartoons. Forty-minute-long modules in the local language, with options in English and Hindi have been created to make Learning Play and Assessment Fun. The modules relate to competencies that the child is taught in school like language, mathematics, science and cocurricular topics (like fan, telephone, and television) to expose the child to the urban environment.
   2. These modules are used as supplements to classroom teaching. To facilitate the effective use of this content in the schools, a detailed training programme for teachers on computer-aided learning package was developed and conducted in partnership with state governments. In January 2005, there were 69 titles for children in Classes I–VIII. Each title has three language options: regional language, national language Hindi, and international language English. The content is available in eight languages: Kannada (64); Telugu (42); Tamil (35); Urdu (18); Oriya (6); Gujarati (4); Gurmukhi (3); and Malayalam (1). Children in over 4,600 schools are using these titles across the states in India.

2. **Mahiti Sindhu Programme in Karnataka**
   1. The Mahiti Sindhu programme was initiated in Karnataka in the year 2000 and is has been implemented in 1,000 secondary schools. The
state government pays three institutions (NIIT, Aptech, and EDUCOM), which in turn take up the responsibility of training teachers and maintaining computers in schools. Each class gets four periods per week. Schools with fewer than 150 students got five computers with one server; schools with 150–250 students got nine computers with one server and schools with 250–500 students were provided with 14 systems. Subject-based CDs were supplied by the external agencies. The project evaluation is being carried out by an external agency. Similar initiatives has been taken in the schools of Andhra Pradesh, Kerala, Delhi, Madhya Pradesh, and Chattisgarh.

3. NIIT providing computer education across 1672 schools in Rajasthan

In 2009 NIIT has entered into a contract with the Rajasthan Council of Elementary Education (RCEE) to introduce Computer Aided Learning in government primary schools in 22 districts of Rajasthan within the framework of Sarva Siksha Abhiyan (SSA). The value of the contract is Rs.214,0000. It is a five-year agreement involving setting up 1,672 fully furnished modern computer labs with 5016 computers, which will benefit 33,340 teachers and 836,130 students, cumulatively.

NIIT had an IT education contract in the school segment in India of 2005 schools from the Government of Andhra Pradesh. Also it has orders from the Maharashtra and Bihar State governments to provide computer training in 900 schools.

NIIT programs are designed to enable students to acquire skills necessary for the knowledge economy. NIIT’s computer aided education programs provides effective learning environment for students in subjects like Mathematics, Science, English, Geography and History with special tools to promote critical thinking and analytical skills leading to student centric learning. Recognizing the potential of Information and Communication Technologies to transform the teaching–learning process in the non-formal and formal education and its potential in changing the way teachers and learners gain access to knowledge and information. NIIT’s ICT in Education focuses on using IT to enhance the quality of teaching and learning.
For over a decade, NIIT has worked with Governments of Andhra Pradesh, Assam, Chhattisgarh, Himachal Pradesh, Karnataka, Madhya Pradesh, Meghalaya, Tamil Nadu, Tripura and West Bengal to offer computer education in schools. Additionally, NIIT has also joined hands with many private schools in the country to help students discover the pleasure of learning through computers.

4 Intel Corporation’s Teach to the Future Programme
The Intel Corporation has initiated a programme of computer-aided instruction in coordination with 12 state governments, the Kendriya Vidyalaya Sanghatan, and the Navodaya Vidyalaya Samiti. The programme aims at a professional development for teachers. This course helps teachers to use technology in support of project-based learning and to encourage active inquiry and higher-order thinking. Participating teachers receive resources incorporating the Internet, multimedia, and assessment tools aligned with the local board curriculum framework. More than 4,00,000 teachers have been trained since the programme began in February 2000 in India. Apart from this direct initiative involving computer education, Intel has also started a National Science Fair aimed at infusing the discovery among school children and increasing their interest in science and mathematics. It allows students to improve their scientific aptitude, and experiment with everyday problems and find scientific solutions to them. It is a platform for Indian students to showcase their talent and win different awards. Intel had a tie up with different state government science exhibitions/fairs. They select two projects from each state for the national fair every year. This provides an opportunity to government school students to compete at the national and international levels. Intel India had tie up with a educational and social institutions in the country for supporting community needs; this includes a Technology Training Centre at Bharatiya Vidya Bhavan, Hyderabad to provide job-oriented training to students and unemployed youth; the Cyberskool Programme, started in association with the National Council of Science Museums, aimed at providing training to people who do not have easy access to IT; and a Technology Training Lab at the National Association for the Blind, New
Delhi, which offers basic courses in computer usage and screen reading software for the visually impaired.

5 Microsoft’s Project Shiksha

According to Microsoft Corporation India, Project Shiksha aims to accelerate computer literacy in India by providing a comprehensive programme that includes software solutions, comprehensive training for teachers and students, development of a world-class IT curriculum, and scholarships for teachers and students. Teachers are exposed to an IT literacy curriculum with the key objective that they will return to the classroom and use IT interventions in their teaching. Over 80,000 schoolteachers and 3.5 million students across government schools will be trained to strengthen their IT proficiency. This project has MoUs with the states of Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka, West Bengal, and Uttaranchal. Microsoft Corporation India is also running a programme for the teachers of the Municipal Corporation of Delhi (MCD) and the Army Public Schools through Project Shiksha.

LEARNINGS FROM THE PROJECTS

While computer education have been taken quite seriously by many state governments and by private sectors, most of these programmes are aimed at preparing students for the job market. In addition, the programmes are software-centric, i.e. they emphasise the learning of a specific set of software tools. There is an need to throw light on technology and the learning of specific tools. A balanced generic curriculum, where computers are relegated to their due place as tools, and where they extend the horizons of other subjects, is a must. The availability of appropriate software in Indian languages, and in adequate numbers catalyse this process.

Microsoft’s experience (Fourth Annual Convention, National Alliance for Mission 2007-The Grameen Gyan Abhiyan Creating Grassroots ICT entrepreneurs One of the challenges in bridging the digital divide is language - most of the people do not understand English. Today Microsoft has software in 14 Indian languages - Hindi, Oriya, Bangla, Tamil, Telegu, etc. Even Vista is now available in local languages. People should be able to interact with the computer in the language they know best. However many people don’t know even the local language. Microsoft has
engaged with NGOs to develop local entrepreneurs e.g. with Jai Kisan, Drishti, etc. There are 16000 kiosks run by such entrepreneurs all over the country. It takes six months of talking to the entrepreneurs before this can be set up. Microsoft soon realized that there was no traffic for the kiosks. After examining the reasons which are required to interact with the government an e-governance were open to the people specifically for things like employment exchange registrations, death and birth.

**a) Access and connectivity:** Currently they are in 8,000 locations set up by Microsoft, but certainly the country needs more than 100,000 knowledge centres so that the villagers can use them and get the right information. Jyoti programme is covers 17 states through 11 NGOs. Two million people have acquired vocational skills. Rs. 35 crores has been spent in providing these training. Under Siksha programme implemented with the help of state governments, 1.6 lakhs teachers and 8 million students have been benefited.

**b) Content and services:** Developing content and services is also crucial. In project Saksham, Microsoft developed technology needed for the rural community. The Rural Innovation Fund has been an initiative in the right direction because it is helping to create applications, which can be used in these kiosks by people to add value in their area.

**c) Capacity Building:** Capacity building is important for adoption of the new applications as and when these are introduced. For the system to be sustainable, the services should be relevant to the local needs. At the same time it should be profitable for an entrepreneur to run the kiosk. The main challenges in setting up successful rural ICTs are: providing good connectivity, which involves a cost factor, finding a good location for the village knowledge centre, providing power to run the computers, and making the right content available in the right language. Lack of universal literacy in rural areas complicates it further.

**Microsoft’s search for relevance: New ict initiatives in different fields**

Microsoft focuses on transforming education through various innovations in various countries and societies. In India, under its programme called ‘Shiksha’ it has trained
1,60,000 teachers across 10 IT academies in different states. About 6-7 million students have been reached through these teachers. However, the country needs 500 million teachers. Digital study hall is provided which makes it possible for children in remote villages to get the benefit of other good teachers in other parts of the country. Microsoft is working with number of different companies like Brilliant Tutorial etc.- who have been for a long time in the business of training students for competitive exams as well as companies which promote tutoring. Under the Jyoti Programme more than 600 community learning centres have been set up where 20 million people, primarily women, have benefited through training. Under this programme the traditional chikankari works of Lucknow have benefited through improved design. Under project Vikas an effort is made to bring IT to manufacturing clusters and thereby help to increase production. Three pharma clusters in Ahmedabad have been selected. In the garment sector the cycle time was brought down from 90 days to less than 60 days and the inventory was reduced by more than 20% in less than a year. The primary challenges include:

1. Ensuring relevance across all learner groups
2. Delivery through variety of channels including mobile phones, TVs, etc. in the knowledge centers
3. Creating partnerships in order to achieve more and to become more effective.

**Rural Innovation Fund (RIF)** - Rural Innovation Fund was constituted by Microsoft and telecentre.org (a collaborative initiative of Microsoft, International Development Research Centre, Canada and the Swiss Agency for Development and Cooperation) for Grameen Gyan Abhiyan (Mission 2007) with the intention of:

1. Helping communities with limited access to technology to realize their potential
2. Promoting local IT based social entrepreneurial ventures
3. Fostering ICT based entrepreneurship in rural areas among the youth
4. Encouraging organizational, individual and local software entrepreneurial endeavors towards developing cost effective, practical and innovative applications and solutions benefiting society. Collaborating & supporting organizations specializing in service
development in areas where distribution channels to reach the poor are either weak or missing altogether.