

## CHAPTER- 3

### COMPUTER SUPPORTED LEARNING AND TRAINING

*"Social, technological, and economic drivers are transforming education around the world. As globalization encompasses local economies like never before, the development of a skilled workforce becomes a genuinely international concern. And as human capital becomes the chief source of economic value, education and training become lifelong endeavors for the vast majority of workers."*

**Peter J. Stokes, Eduventures.com, 1999**

### 3.1 Emerging Trends

**3.1.1 Restructuring education and training of people is essential for sustainable growth of economies:** All over the world there is a realization that there is an urgent need for changing the way education and training are structured and to take advantage of the digital skills and technologies for employment, education, training and self development, for countries and organizations to remain competitive and grasp new opportunities. "Moreover, investment in people became an organizational priority. The knowledge society is

becoming a global force and a fundamental element of change in the global society”<sup>9</sup>.

**3.1.2 E learning readiness in developed nations:** The United States of America, Canada, the Scandinavian countries - Sweden, Norway and Finland, the United Kingdom and other north European countries, Australia and two Asian countries - Korea and Singapore are at the forefront of e learning development. A white paper on e-learning readiness, the 2003 e-learning Readiness Rankings published by the Economist Intelligence Unit in collaboration with IBM indicates that countries in which e learning has developed rapidly, the role played by the Government has been significant. The European Council (EU) had, in March 2000, set itself the goal “to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion”. The Education and Training programme envisions use of ICT “to improve the quality and effectiveness of EU education and training systems; to ensure that they are accessible to all; and to open up education and training to the wider world.”<sup>10</sup>

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<sup>9</sup> Kamel, Sherif H. “The Role of ICT in Building a Knowledge-based Society” (Online) Available: <http://www.thinktanking.idsc.gov.eg/thinkTank/ThinkTankFiles/The%20Role%20of%20ICT%20in%20Building%20a%20Knowledge-based%20Society.pdf> (accessed 12 December 2008)

<sup>10</sup> The Future of ICT and Learning in the Knowledge Society. Executive summary. Available: <ftp://ftp.jrc.es/pub/EURdoc/22218-ExeSumm.pdf> (accessed 18 February 2009)

**3.1.3 Developing nations too are embracing e learning:** While the developed countries have already made progress in e learning both in education and training, e learning is also increasingly being seen as a necessary tool by developing nations for teaching and training poor populations, educating and empowering them and for bridging the digital divide. The inevitability of a knowledge based economy and the need for using ICT for this purpose has gained currency in the last few years. Many developing countries in Asia and Africa have incorporated ICT based training in their National policy initiatives. Many African governments are designing and structuring their national e-Education systems. The Government of South Africa is in the process of finalizing the policy, norms and standards of e learning in Government departments.

**3.1.4 IT's happening in India:** In India too, the e-Governance drive is being speeded up by the Government. One lakh CSCs (Common Service Centers) are being established across the country with broadband internet. SWANs (State Wide Area Networks), with minimum 2 MBPS bandwidth capacity per link will connect all Government offices up to Block level. Technology for Software tools and fonts required to produce digital content has been developed in 12 Indian Languages. NIC is implementing the computerization of 14000 courts across the country.<sup>11</sup> Several other initiatives at the national and state levels are underway.

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<sup>11</sup> Sunday Times of India, 1 March 2009. "IT's Happening", p.21

**3.1.5 International organizations, NGOs are aiding e learning efforts:** Apart from the governments of developing countries, Non Government Organizations (NGOs) and international organizations such as UNDP and UNESCO and FAO have taken up a number of initiatives. A UNDP project in war ravaged Afghanistan has established five Pilot ICT Training Centres in three key cities (Kabul, Kandahar, and Mazar-e-Sharif) with the aim of facilitating ICT skills of the working staff and the Afghan youth, providing opportunities for the Afghan women to be the recipient of modern education and at the same time providing income-generating opportunities for the Afghan entrepreneurs. There have been a number of success stories in these initiatives, which have strengthened the linkages between e learning and development.

**3.16 Structural changes in economies are fuelling e learning needs:** Advances in ICTs have fuelled globalization which is breaking down the geographical barriers. The resulting structural changes that are underway in many economies of the world have contributed to the need for flexible systems of learning in general and e learning in particular. Many jobs of low value and low skills have become redundant. Labour, therefore, has to be retrained and reskilled. Individuals and corporations, each in their own interest, have come to look upon education and training as important. Recent research shows that in Hong Kong, for example, more students participate in tertiary education through distance learning, evening classes, the work place and continuing education than in regular programmes; the situation is almost similar in the United Kingdom and a few other OECD countries. As a result, schools, colleges and universities are

devising curriculum, delivery methods, assessment and awards. Thus, learner-centred environments are being created as opposed to one where learners had to fit in with the agenda of faculty and institution

## **3.2 E learning at Organisational level**

**3.2.1 E learning is being adopted by all types of organizations:** E Learning' is fast gaining momentum in all organizations – education, corporate sector, government organisations and military sectors, NGOs, etc. The global e-learning market is reported to be worth over \$20 billion. In India, though the Internet penetration is low, the size of the e learning market is over a 100 crores and growing at the rate of 20 per cent annually.

**3.2.2 ICT and e learning more prominent in education:** A review of literature indicates that the use of ICT for education has made significant progress. Many institutions worldwide, particularly in USA, Canada, UK, Australia, New Zealand and Europe have started to invest heavily in online education. Many courses, only offered online, are targeted at students who cannot access a conventional university or college campus. Beginnings in this sphere have also been made by many developing nations.

**3.2.3 Trend is spreading to other organizations as well:** Industry/Corporates are also increasingly turning to e learning to supplement face to face training. Post 9/11, the Aviation industry has turned to Computer based training as a

simple and cost effective solution for training employees on the latest procedures, routines and drills. Traditional means of assembling employees and training them on procedures and testing them were found to be time consuming and tedious. Even international organizations like the UN are using e learning for training geographically dispersed staff: The United Nations is getting e training material developed for training hundred of UN activists based in different countries in areas such as education, food, aid or Human rights. The training material is to be deployed on the internet and accessed through a customized learning management system.

**3.2.4 E learning is picking up in India:** India is a leader in the e learning services domain (there are at least 50 vendors in this industry) but e learning itself is yet to make an impact in the domestic arena. However, the trend has started. Education and corporate training are areas in which e learning has made inroads, particularly in the last decade in tandem with the increasing reach of the internet. Innumerable companies are turning to e learning for their training requirements. A survey of literature indicates that “every second MNC is using e learning in some way.”<sup>12</sup> Higher bandwidths have also made it possible to deliver media rich content due to which the impact of CBTs and e learning has increased dramatically.

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<sup>12</sup> Chaturvedi, Shashwat. CIOL News, “India: E-learning's knight in shining armour”, 7 January 2006  
Available: <http://www.ciol.com/content/news/2006/106010705.asp> (accessed 15 February 2009)

### **3.2.5 E learning has picked up momentum in the Indian education sector:**

The (Distance Education Council) DEC has recently allowed all premier educational institutions in the country to offer online courses. The intention is to enable learners worldwide to opt for and undergo any study programme at any institute of their preference. The IIMs and IITs in collaboration with NIIT are in the process of designing and setting up and online courses imparted in virtual campuses to reach out to a wider section of students. Among the country's elite institutions, IISc already runs an online course in collaboration with a foreign institute. Seven IITs and IISc are also collaborating for the National programme of Technology Enhanced Learning on a trial basis by developing curriculum-based video and web courses. Some 140 courses are in various stages of preparation and distribution through the Internet. The Indira Gandhi National Open University (IGNOU) in collaboration with Railtel Corporation, a PSU of the Ministry of Railways has recently decided to set up study centers at 3,000 Railway Stations in rural areas and Tier II and Tier III cities where Railtel has connectivity.

**From the above it can be observed that E learning in India is at the take off stage. The future holds good promise.**

## **3.3 E learning on Other Railway Systems**

**3.3.1 US Railway companies are using CBT:** Railroad companies like Burlington Northern Santa Fe Railway, Norfolk Southern and Amtrack in the

United States have in-house training facilities that offer Computer based training. Some other railroad companies outsource education to other companies. CBT is used to educate new hires and update employees on the latest technologies. These companies are moving away from traditional instructor led training to CBT for the basic training so that more people can be trained and more training per se can also be given. The Union Pacific Railroad, for example, uses computer based training in conjunction with instructor led/ hands on training in order to ensure compliance with increased mandatory training needs. Employees are compulsorily required to plan their training schedule and fill in the CBT Training Plan Form each year indicating how they plan to complete their computer-based training within the time line laid down. An employee can access a web-enabled computer at home; for others, there are many locations around the railway system that are equipped with computers which can be accessed for completing their courses. The Computer based Training Programme Guides of the respective departments contain the training requirements, training options, training blocks and compensation, minimum system requirements, computer resources and CBT help desk support etc. Trainers assist the employees in getting them started with their training or for scheduling their courses, to complete the courses or in one to one training.

### **3.3.2 A case study of Czech Railways (CD) :**

The Czech Railways is Czechoslovakia's largest national railway transport. In terms of output it occupies the 4<sup>th</sup> place among European Railways. It dispatches 1900 freight trains with 250000 tons of cargo and 7000 passenger trains every



day transporting 5,00,000 people. It employs about 80,000 employees with a relatively high average age.

The **goal of CD Railways was to transform itself** into a business company and one of Europe's biggest railway companies. Its objective was improvement in labour productivity and optimization of the number of employees and their training.

Training was the responsibility of the **Company Training Institute** which operates more than 90 training centres giving more than 1 million training hours to more than 45000 employees.

The railway was facing certain **problems with the standard training pattern**. Employees had to travel to training centres from 800 service points. Besides, the training was an obligatory exercise; change in attitude was not being achieved. Compulsory training had the effect of decreasing motivation and training lessons were being prepared by individual lectures which led to subjectivity. Trainings were general purpose, did not always bring in new facts and practical application.

**Barriers:** The Czech Railways decided to use e-learning but faced certain problems. Only some employees regularly worked on computers; so they could refuse e-learning citing different grounds. Only some computers were connected to the Network. Further, the network was not reliable. Training content was specific; hence it was not possible to purchase standard courses. Another perceived problem was that e-learning offers limited space for questions,

discussions and contact with the lecturer and may, therefore not be very effective.

**Solution:** Taking into account all these factors, the company training institute developed a solution. The plan consisted of micro class room network (up to 300 places). The classroom was a suitable place equipped with a computer connected to the network. The online training was made available on the internet from March 1, 2002. For the employees who had refused computer study, a regular study course was organized. However, no employee applied to the regular study, preferring e-learning. The course content also contains lecturers, recapitulation, tests and practical exercises and also simulation of actual situations. In further versions, there were plans to enrich the lessons with audio-visual effects and make them available on CD ROMs.

**Experience of Czech Railways:** The Czech railways found the actual e-learning experience to be positive. There was growing pressure from the employees to complete establishing of micro class rooms in all stations and make e training courses available. E-learning increased computer literacy and boosted self confidence and ability to accept changes and new systems. <sup>13</sup>

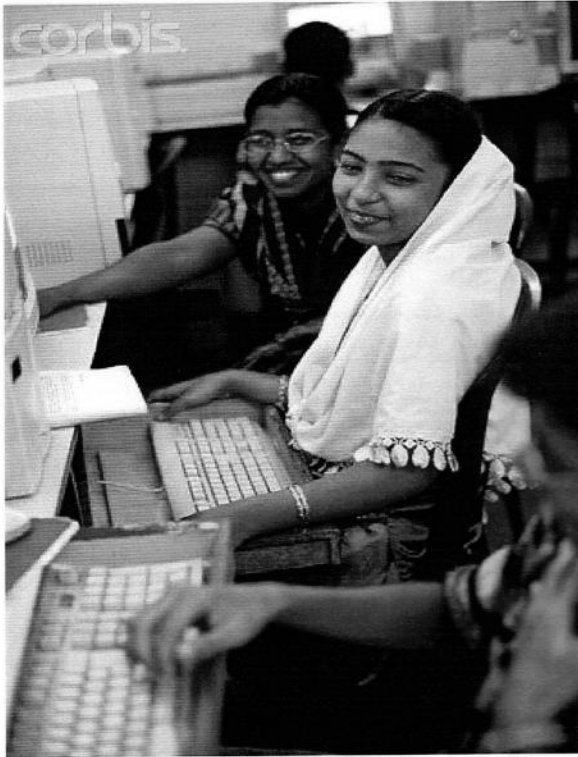
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<sup>13</sup> Case Study: Czech Railways (CD). Available <http://www3.icontis.cz> (accessed 20 August.2008).

### 3.4 E learning Initiatives in India- Government Sector

3.4.1 **ICT penetration in India is improving:** The Government of India has initiated several Government projects through its e-Governance drive. The NeGP has identified 27 Mission Mode Projects (MMPs). The MCA 21 is one of the projects which has been successfully rolled out. Government has recognized the fact that these MMPs can be successfully rolled out by training its staff through e learning. National Informatics Centre (NIC), a Government of India organization has already deployed an e learning software throughout the field units (State Centres and District Centres of NIC)

3.4.2 **Multi stakeholder initiatives for bringing IT to the citizen:** In recent years, the Government of India and several State Governments have invested heavily in IT infrastructure. Use of IT for the benefit of the common man and spreading IT literacy has become a priority. There has also been a growing realization that greater equality and wider coverage are required and that large scale IT projects can be implemented with the help of public- private partnerships and multi-stakeholder participation within shorter periods and at low costs. The **AKSHAYA** project is one such initiative of the Kerala government.



pro.corbis.com (accessed 19 February 2009)

**3.4.3 The AKSHAYA PROJECT – Government of Kerala:** This Project of the Government of Kerala is an example of a multi stakeholder initiative for bridging the digital divide and spreading computer literacy within a short time and at a low cost by using innovative delivery and funding.

**The Beginning:** The project was unveiled in 2002 by then President of India, Shri APJ Abdul Kalam. It was envisioned that one person from every family would be familiarized with the basic use of computers and in this way the lives of 65 lakh families in the state would be transformed. The project involved setting up of 3000 multi purpose Akshaya-e-Kendras, each catering to 1000 – 3000 families, within 2-3 KM of every household. Akshaya was planned to be a social and economic catalyst focusing on e-learning, e-transaction, e-governance,

information and communication. Besides, its focus was on development of skills and competencies, to enable use of IT by all sections of society, to develop content in local language and topics of local relevance. In brief, it aimed at EMPOWERMENT of all sections and creation of a knowledge society.

**A unique project:** The Project was piloted in the Malappuram District of the state and is now being replicated all over the state in phases. It makes the state the first e-literate state in India and in Mallapuram alone, the world largest computer literacy drive, claiming to reach over 6,00,000 households representing more than 3.6 million people in less than 6 months! The Project has created a unique brand of state funded computer centres and a massive wireless infrastructure providing a wide range of services such as electronic payment of bills (electricity, water), e-krisi (Agriculture trading and information portal), **e-vidya (advanced IT training for e-literates)**, e-ticketing, village kiosk online medical transcription courses, rural e-banking, **multimedia aided training programmes, IT enabled vocational training**, etc.

The computer aided learning initiatives include Vijaybheri, Intel learn programme, a proposed tie up with the Azim Premji Foundation etc. Apart from course programmes there are online evaluation packages and Govt. recognized certificates are issued and results are published in the official Akshaya website for verification.

**Constraints and Initial Activities:** Initially certain constraints were envisaged – lack of clarity regarding what to teach, the syllabus and the teaching material and

funds required. The Kerala state IT mission constituted a small team of 6 members to study ICT Developmental projects, implementation plans, business models, etc. Meetings were organized between District, Block, Gram Panchayats, Municipalities and other organizations, surveys were conducted and special mapping was done to identify locations for Akshaya Kendras.

**Multipurpose kendras:** It was decided that apart from being training centers, these kendras would also act as Information Kiosks, e-transaction and e-Governance centers, and communication hubs. They would also provide business services, health care, vocational training, travel and tourism, multimedia services etc

The project also aimed at providing opportunities to different cross section of children, empowerment of women, develop skills and employability of the unemployed and meeting challenges in Agriculture and ecology.

**Social Entrepreneurship Model:** The state recognized that it would be very difficult to set up 5000 ICT centres, manage them and dynamically update them due to constraints in resources. It, therefore, decided to start the centres with local entrepreneurs. This, apart from providing employment opportunities, would also ensure that local needs were met and the hesitation to use technology would be conquered because of the social esteem of the local entrepreneur. Parameters were however laid down by the government, training was provided and electricity provided at the rate applicable to educational institutions.

**Local flavour:** The content modules have been prepared in the local language. Social entrepreneurship has been leveraged to reduce cost and increase efficiency of dissemination. Local Bodies are playing a major role in selection of beneficiaries, entrepreneurs, allotting funds, monitoring implementation, etc. Community involvement was ensured by involving social and religious leaders, intellectuals, NGOs and activists both before implementation and during the course of implementation. The local clergy, priests, school teachers, environmentalists, women and youth in self help groups all played an important role

### **The e Literacy campaign of the Akshaya Project:**

The e Literacy campaign is the foundation on which the State seeks to 'bridge the digital divide' and to 'remove the fear of the unknown'. Initially when the door to door campaign started, people expressed apprehension that they had never touched a computer. However, Akshaya Entrepreneurs and officials together devised ways and means to overcome the resistance by means of publicity, staging plays and documentary films. "Success of e-literacy phase was important in many ways for the Akshaya Entrepreneurs"<sup>14</sup>. However, while the e literacy phase was very successful, the learners for the advanced level of computer training preferred the private computer centers.

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<sup>14</sup> Mukhopadhyay Swapna and Nandi Rajib, (2006), 'ASSESSMENT OF AKSHAYA PROJECT FROM A GENDER PERSPECTIVE', Institute of Social Studies Trust (ISST)

## Profile of Akshaya Trainees



[dqindia.ciol.com/.../2004/104040701.asp](http://dqindia.ciol.com/.../2004/104040701.asp) (accessed 19 February 2009)

The Institute Of Social Studies Trust had conducted a survey in 2004 involving a sample of 400 trainees as part of a country level study to assess the project from a gender perspective. The survey throws up some expected and certain unexpected results:

- A third of all trainees were in the 18-35 age group
- More than 50% of trainees had a secondary schooling background, about 20% each were middle school level and graduates .
- More than 50% of the women trainees were in domestic work



Table 1

## Background Details of Akshaya Trainees

(in percentage)

|                                | Women        | Men          |
|--------------------------------|--------------|--------------|
| <b>(i) Age (years)</b>         |              |              |
| Below 18                       | 2.12         | 1.83         |
| <b>18-35</b>                   | <b>77.55</b> | <b>76.83</b> |
| 36-55                          | 18.64        | 14.02        |
| 56 and above                   | 1.69         | 7.32         |
| <b>(ii) Marital Status</b>     |              |              |
| Married                        | 62.7         | 38.4         |
| Unmarried                      | 37.3         | 61.6         |
| <b>(iii) Education</b>         |              |              |
| Totally illiterate             | 0.4          | 1.2          |
| Literate without schooling     | 2.1          | 1.2          |
| Primary Education              | 2.1          | 4.3          |
| Middle School                  | 23.7         | 22.0         |
| <b>Secondary School</b>        | <b>51.3</b>  | <b>51.2</b>  |
| Graduate and above             | 20.3         | 20.1         |
| <b>(iv) Primary Occupation</b> |              |              |
| Self employed                  | 3.4          | 24.4         |
| Government employed            | 5.9          | 6.1          |
| Employed in Private sector     | 5.5          | 29.9         |
| Retired                        | 0.8          | 3.7          |
| Student                        | 23.7         | 30.5         |
| <b>Domestic work</b>           | <b>54.7</b>  | 0.0          |

|                                  |             |             |
|----------------------------------|-------------|-------------|
| Any other                        | 5.9         | 5.5         |
| <b>(v) Household expenditure</b> |             |             |
| <1000                            | 2.5         | 5.5         |
| 1001-2000                        | 19.1        | 11.0        |
| <b>2001-3000</b>                 | <b>40.3</b> | <b>37.2</b> |
| 3000-4000                        | 23.7        | 26.8        |
| 4001-5000                        | 9.3         | 14.0        |
| 5000+                            | 5.1         | 5.5         |

Source: Mukhopadhyay Swapna and Nandi Rajib,( 2006), '*ASSESSMENT OF AKSHAYA PROJECT FROM A GENDER PERSPECTIVE*', Institute of Social Studies Trust (ISST), pp18-19

The survey also contains useful insights on the motivators for joining the literacy programme. A whopping 85 percent of the trainees reported self motivation as the primary reason for joining the e literacy programme.

**Table 2**

**Primary motivations behind joining e literacy programmes**

| Reasons for joining                     | Population |            |            | Percentage  |             |             |
|---|------------|------------|------------|-------------|-------------|-------------|
|   | Male       | Female     | Total      | Male        | Female      | Total       |
| Persuaded by somebody                   | 7          | 15         | 22         | 4.3         | 6.4         | 5.5         |
| To increase social status               | 9          | 11         | 20         | 5.5         | 4.7         | 5.0         |
| Financial benefits                      | 2          | 1          | 3          | 1.2         | 0.4         | 0.8         |
| Self satisfaction                       | <b>142</b> | <b>201</b> | <b>343</b> | <b>86.6</b> | <b>85.2</b> | <b>85.8</b> |
| Utilising spare time in a better manner | 4          | 8          | 12         | 2.4         | 3.4         | 3.0         |
| <b>Total</b>                            | 164        | 236        | 400        | 100.0       | 100.0       | 100.0       |

Source: Ibid., p.20

#### 3.4.4 EDUSAT, Haryana

With this initiative, Haryana has become one of the few states in the country to broadcast education content covering the entire gamut of education at the school and college level. While the programme still faces a number of challenges, it shows how innovative and original ideas can bring about changes to benefit the citizen.

**Initiation:** Haryana experienced a rapid growth of the IT/ ITES / BPO Sector in the State which resulted in explosion of demand for IT enabled man power in the NCR region. However, the State in general, lacked a sound educational infrastructure for meeting the demand. There was a shortage of trained teachers, lack of quality teaching, especially in the rural areas and like other states in the country, teacher absenteeism. There was a need for uniform quality education and for improvement in Science, Maths and English teaching.

**EDUSAT** was launched by ISRO on 20<sup>th</sup> September 2004, exclusively for the education sector, as a collaborative project of MHRD, IGNOU and ISRO. The Government of Haryana set up the EDUSAT network in 2006.

The **Primary School channel** consists of Direct to Home (DTH) Receive Only Terminals with 29"Colour TV. It plans to cover 9080 Schools and 14.65 Lac students of which about 5000 schools are already covered and installation in the balance schools is in progress. The content comprises the regular curriculum in English and Maths for classes I, II and V. The channel is operational since April 2007.



[www.isro.org/rep2006/SpaceApplications.htm](http://www.isro.org/rep2006/SpaceApplications.htm) (accessed 19 February 2009)

The **Sr Sec School (Science) Channel** comprises Satellite Interactive terminals with LCD projector. It covers 257 Schools and 7000 students. It has the regular curriculum in Physics, Chemistry, Biology, Maths and English for class XII and a daily programme on AIEEE coaching. This channel is operational since July 2006. The **Sr Sec Schools (Arts)** channel, which covers 1232 Schools covering 66,000 students has the regular curriculum in History, Economics, Political Science, Commerce, Accounts, English, Maths, Public Admn., Geography, Sociology for class XII. The **College Channel**, apart from the regular curriculum in Science, Arts, Commerce, English and Maths for BA/BSC/Bcom IIIrd year also has Soft Skills coaching. The **Technical Education Channel** covers 15

Polytechnics and 11000 students and has the regular curriculum in applied sciences.

The Haryana Government established an independent Society UTKARSH for management of the EDUSAT programme and for content development. UTKARSH (Use of Technology for Knowledge Advancement and Reorientation of Studies in Haryana) takes up the non recurring work such as Construction of the HUB and studios, sourcing equipment for studios, power connection, purchase/installation of computers, appointment of staff and content development - AIEEE coaching/Soft Skills coaching and other supporting programmes. It also does the recurring work of preparation of regular broadcast content, appointment of external & internal evaluators to certify broadcast content, recording of lectures, conducting research on content development for different target groups, conducting research & impact studies, supervision and maintenance of terminals etc. The Society also undertakes research activities into teacher training, sustainability of networks and maintenance situation in remote rural areas, ensuring optimization of Video quality of text/slides on the IP Network, optimization of learning software etc

**Challenges:** One of the major challenges was the development of appropriate content for specific audiences especially for the primary education segment. Other challenges were to reorient the teachers and students to this medium, the management of the Hub and Studios and of the remote Network.

**Content Development:** Resource Persons are selected from amongst the teachers of the Government schools. They are given brief training in computer skills in the computer labs established in State Council Education Research and Training (SCERT), with the help of trainers from INTEL, which exposes the resource persons to the potential of multimedia content generation and enables them to acquire basic skills for developing power point presentations. Preparation of manuscripts is done by conducting a five days workshop in the SCERT campus in the supervision of both subject and EDUSAT co-ordinators. Manuscripts are written on the specific proforma developed for this purpose. The manuscripts are required to clearly indicate the requirements of photographs, video as well as audio clips and animations. Hand written manuscripts are converted in to a Word document. Slides are then prepared on Power Point to clarify the concepts contained in the lecture. The guidelines about preparing such Power Point Presentations have been finalized jointly by experts from SCERT, UTKARSH and Recording Agencies. For ensuring quality, the scripts prepared by the resource persons are checked and evaluated by the internal subject experts. After making necessary amendments/ modifications in the scripts, these are sent to external evaluators who are academicians of repute in the concerned subject. The necessary modifications/amendments in the scripts are then made and on final approval of the scripts, these are sent for further recording/live lecture.

**Recording of lectures:** Once the final edited episode is prepared by the service provider, it is again evaluated by the internal and external experts for their inputs

regarding the presentation and any factual errors which may have crept in during the recording. The process is repeated until the internal and external experts clear the content. The work of recording has been outsourced to selected agencies. Recording is done in the three studios established in SCERT campus. Since, no comparable content is available in the market or elsewhere, experimentation in this regard is being done to reach to optimum level. Different formats like classroom simulation mixed with animation, pure animation etc are being tried out.

**Content Delivery:** The content is produced and stored in digital format. The broadcast for the Science Senior Secondary Schools, colleges and Technical institutions is done on the IP SIT (Internet Protocol Satellite Interactive Terminal) channel, where limited bandwidth is available. The presentations/ slides which incorporate graphics or other text, are loaded on to a server and converted into HTML format. The teacher delivers the broadcast from the studio and controls the delivery of the HTML content through a console which operates the 'Teacher end' of the specialized software called TRAIN-NET. As the rendering of text and graphics in video format for recorded content caused significant deterioration in quality, extensive trials were conducted regarding the best suited colour background and fonts suitable for IP broadcast. Now for the DTH broadcast, innovative methods are being developed to ensure the delivery of text and graphics, simultaneously with the audio/video of the teacher.

**Research:** A Research Cell is also planned to be set up to continuously evaluate and bring about improvements. This cell would act as the think tank and conduct research in development of content specially suited for the respective target segments.

### **3.4.5 Learning from the e learning Case studies examined above**

- Political will can catapult projects of such large magnitude.
- Breadth of vision and a holistic view are required.
- Drive to initiate and tenacity to implement.
- Use of technology not for its own sake but to transform
- Innovative design of projects.
- Involvement of all stakeholders for success.
- Public private partnerships for a public scheme.