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Full Length Research Paper

On using satellite-based networks for capacity building and education for all: A case study of Rajiv Gandhi project for EduSat-supported elementary education

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One of the serious problems associated with Indian school education has been high dropout rate. The reasons are many and varied but the major constraints are: non-availability of adequate number of competent and trained teachers in most of the schools and separate room for each class. To overcome such problems and increase equitable access to all, it was considered prudent to use capabilities of satellite based teaching-learning. This network was also to be used for capacity building of in-service teachers. So an indigenously built, dedicated satellite for education—Educational Satellite (EduSat)—was launched on September 20, 2004. EduSat supports one National Hub and five Regional Hubs. This paper discusses the case study of Rajiv Gandhi Project for EduSat-Supported Elementary Education (RGPEEE) project for imparting value added education and professional development of in-service teachers. The project was implemented by Indira Gandhi National Open University (IGNOU). More than 862 schools in four Hindi speaking states chosen on the basis of physical contiguity were networked through 850 ROTs and 12 SITs. In the first phase (pilot), the project focused mainly on Sidhi district, inhabited mainly (90 percent) by tribal population and one of the most educationally less-developed districts of Madhya Pradesh. Through ten orientation programmes, 868 teachers and functionaries associated with the Project were oriented at different levels to familiarize them in imparting instruction through EduSat and their role and responsibility in facilitating child learning. They were also trained in developing content for tele-teaching; development of knowledge repositories as effective and sustainable sources of courseware. Feedback studies undertaken to judge the effectiveness of EduSat reveal that it is being well received and making steady progress towards improvement in attendance and academic achievement of children and creation of better learning- environment in schools.

Key words: Information and Communication Technologies (ICTs), Educational satellite (EduSat), Indian National Satellite (INSAT), Receive Only Terminals (ROTs), Satellite Interactive Terminals (SITs), Education for All/ Univeralisation of Elementary Education- Sarva Shiksha Abhiyan (SSA).

INTRODUCTION

India has one of the largest elementary education systems in the world. As of 2007, the elementary school system (classes I to VIII) comprised nearly 16.8 million learners in the age group 5 - 14 years, about 1.1 million primary and elementary (upper primary) schools and 4.7 million teachers (NUPEA, 2006 - 2007). Of these, 41.9% were female teachers and pupil-teacher ratio improved to 34:1 in the year 2006 - 2007. The average number of teachers per school was up from 3.94 to 4.36 in the same period. To fulfill its obligation of attaining Universalization of elementary education by 2012, India launched Sarva

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Shiksha Abhiyan (Education for All) with the financial help of World Bank. This initiative helped to increase school enrolment by about 5% in the last five years. One of the serious problems traditionally associated with Indian school education has been, and continues to be, high dropout rate/ wastage. According to available statistics, out of every 100 students starting in a school (in class 1 as six year old), 50 drop out by the time they reach elementary stage (class 5 at the age of 10 year) and another 30 fail to reach +2 ('O' level) stage. This is a serious issue and is partly due to non-availability of adequate number of trained teachers in our schools. In several districts/ states, we have one or two teacher schools. Other major issues of concern include non-availability of separate room for each class in most of the school buildings. And the quality of classroom transactions vary considerably across schools. Such factors impede the interest and progression of students in their studies.

When desired results eluded and a significant section of child population, particularly from the marginalized groups, continued to be out of school, the GOI as well as state governments initiated several focused schemes (Ahmed and Garg, 2007) to fulfill their obligation to the people as also the international donor agencies/ communities. These helped in creation of greater educational opportunities at different levels and showed positive results. In the series of these initiatives, the Indian Parliament enacted in 2006 a historic legislation: Education became fundamental right of every child in the age group 6 - 14 years and reiterated that they will receive free and compulsory education. It was approved as Right to Education Bill for all, including the physically challenged for inclusive education. To achieve desired results, centrally sponsored 'Sarva Siksha Abhiyan Project', which was initiated in 2001, was further strengthened for implementation in mission mode (The project was first funded with the help of the World Bank and helped to enhance enrolments in schools by about 5%). Now it is hoped that the goal of elementary education for all shall be achieved by 2012 since the birth rate has declined significantly from 40.8 child births per 1000 in 1951 to 23.1 in 2007, the fertility has dropped from six children per women to 2.7 in the corresponding period (Thaindian News, 2009) These factors have contributed to bring down the rate of population growth to 1.8%, in spite of drop in child mortality to 24 per 1000 births (Commonwealth Book, 2009).

The destiny of a nation is shaped in its classrooms (Education Commission, 1966). This has implications for the quality of curriculum/ content, quality of transaction and quality of individuals involved in delivery of education directly or indirectly. Experience reveals that to realize equity with quality, opportunities must be created for continuous professional development of in-service teachers and no compromise need be made on merit for the new entrants in the system (Sharma, 2006; Ahmed and Garg, 2007). Therefore to ensure equitable access to good quality education at least up to the elementary level, Ministry of Human Resource Development (MHRD), Government of India and Indian Space Research Organization considered it prudent to make good teachers available to all using the capabilities of satellite based communication (Dikshit, 2006).

The idea of launching a dedicated satellite for education, conceived in 2002, was translated into reality when an indigenously built Educational Satellite (EduSat) was put in a geostationary orbit on September 20, 2004. EduSat supported one National Hub for national communication networks and five Regional Hubs for regional/ State level networks in the country. These capabilities enabled creation of networks for interactive multicast and on-line modes of communication in all 28 states and most of the union territories in the country. This paper reviews the case of Rajiv Gandhi project for EduSat-Support Elementary Education (RGPEEE) project for imparting value added education. The project was implemented by Indira Gandhi National Open University (IGNOU) in collaboration with Indian Space Research Organization (ISRO) under the guidance of the Union Ministry of Human Resource Development.

EduSat

EduSat is essentially dedicated to meet the felt-need for an interactive satellite-supported learning and act as an interface between face-to-face and open flexible learning. It is an improved version of the satellites launched under the Indian National Satellite (INSAT) series and has several new features/ technologies. It has been specially configured for audio-visual medium, employing digital interactive classroom and multi-centric system. It carries multiple regional beams covering different parts of the country: five Ku-band transponders with spot beams covering Northern, North-eastern, Eastern, Southern and Western regions, one Ku-band transponder with its footprint covering the mainland region and six Extended C-band transponders with their footprint covering the entire country (Figure 1).

The satellite facilitates a variety of telecommunication, transmission and retrieval of data. The most remarkable feature of EduSat is its capability to create a network of all schools/ colleges/ universities through the national and regional hubs. It facilitates a link between urban educational institutions imparting quality education to rural and semi-urban educational institutions which lack necessary resources and infrastructure.

ICT networks and their applications

EduSat has enormous capacity for providing a variety of options for broadcast/ telecast/ interactive modes and online communication networks at the national, regional

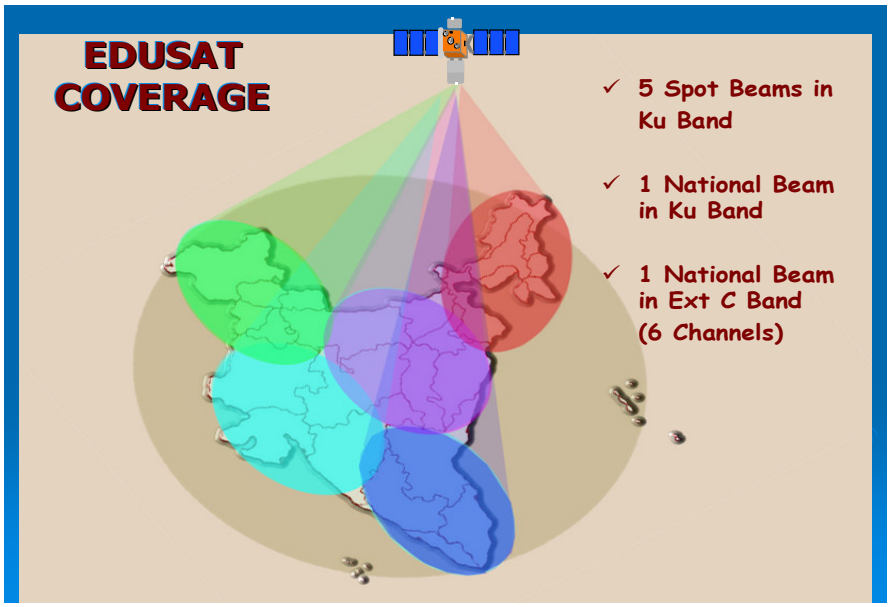

Figure 1. Foot prints of EduSat in different parts of India.
Source: ISRO, 2004.

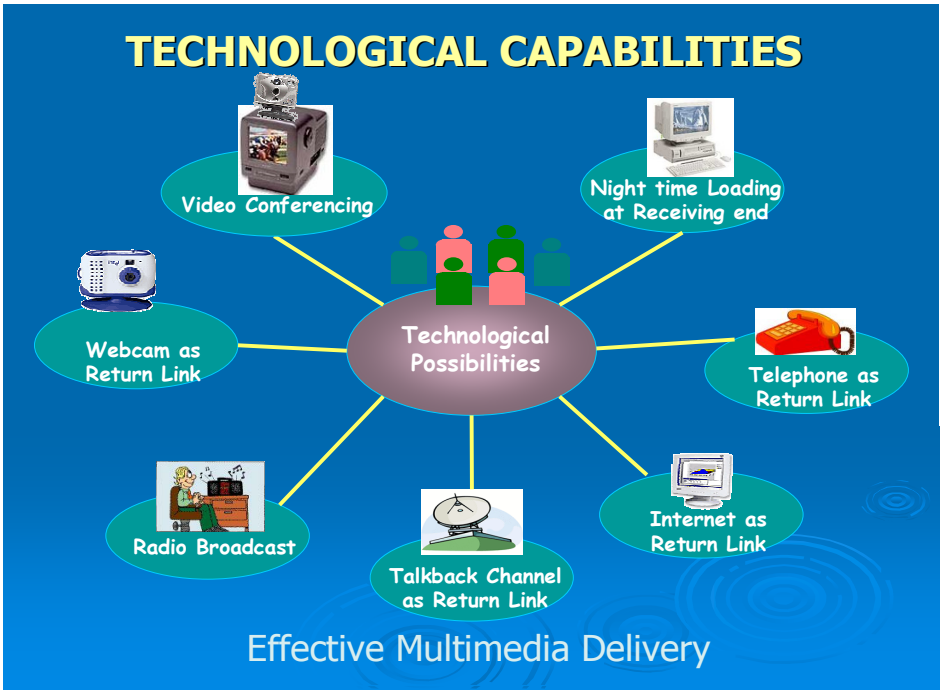

Figure 2. Technological capabilities of EduSat.
Source: Bhatia and Dikshit (2004).

and state levels. The technological capabilities of EduSat are depicted in Figure 2.

Telecast

Like INSAT series of satellites, EduSat is being used for broadcasting audio and video programmes: one-way audio and one-way video (1A and 1V). These are Receive Only Terminals (ROTs). Audio-video signals are sent by hub/ sub-hub/ uplink located at the national, regional or state level and received at the learning centres equipped with downlink facilities or through local cable operated networks. However, no talkback facility is available in this mode. Therefore, ROTs are useful for

transmitting information-based programmes and replicate good lectures at several locations for learners and empowerment of the society on issues such as law, health care, human rights, disaster management, consumer protection, entrepreneurship and the like.

Interactive network I

Interactivity is the key element of the EduSat network. In two-way audio and one-way video (2A and 1V) also, the audio-video signals are transmitted through EduSat hub/ sub-hub/ uplink and received at the tele-learning centres equipped with downlink facilities or through local cable operated networks. The centres equipped with talkback facility can interact through EduSat network. This defined a milestone in the way education could be delivered.

Interactive network II

In two-way audio and two-way video (2A and 2V), both the audio and the video signals are sent and received by the hub/ sub-hub/ uplink at the national, regional or state level. This system is particularly useful for demonstration of experiments, microscopic as well as macroscopic processes and situations, which need visual support. The learners can interact with experts to clarify their doubts. In this system, both the uplink and the downlink centres have studio facilities. The learning centres also have EduSat-based connectivity. The main limitation of the system stems from the fact that not many learning centres can be linked simultaneously.

A major strength of EduSat is that it can provide connectivity to all schools, irrespective of their location and help create a nation-wide distributed classroom-like situation, where teachers and students can see and interact with an expert, wherever he/she may be situated. For this to happen, an essential pre-requisite with availability of appropriate technology, that is, the institutions under reference must possess or be equipped with necessary e-gadgets to receive and transmit information. This marks a paradigm shift in the quality of teaching-learning; the expertise of the best resource person available in the country is extended to all.

To be precise, EduSat is a vehicle for ensuring same quality of education to all recipients. In a pluralistic society endowed with cultural diversity, EduSat is intended to off-set the impact of heterogeneity on inequality in educational opportunities, outcomes and success. For example, about 6,000 primary school teachers of 22 states from rural areas could interact through EduSat with national-level experts in training workshops organized by the National Council for Educational Research and Training (NCERT) on implementation of Curriculum Frame Work, 2005. Similarly, the distance learners residing in the remotest areas of the country got opportunity to resolve their difficulties when they assembled at District headquarters, where EduSat network had been installed.

Two-way data transmission

EduSat also provides computer connectivity between hub/ sub-hub/ uplink. This system can be used for transfer of data to and from the central, regional and state level centers located in schools/ colleges/ District Institutes of Educational Research and Training (DIETs)/ Block Resource Centres (BRCs). This ensures a minimum of e-mail connectivity to interact as also two-way audio-visual transmission (Figure 3). Amongst various other advanced options, at the school level, the EduSat is being used to strengthen and up-scale the virtual classroom initiatives.

RAJIV GANDHI PROJECT FOR EduSat SUPPORTED ELEMENTARY EDUCATION

While designing the project, we were aware that in the past, efforts and initiatives taken for universalisation of elementary education had failed to improve the quality of education and reach most of the primary/ elementary schools (Bhatia and Dikshit, 2004; Panda and Garg, 2005). In particular, poor communication and infrastructure facilities hindered a system of additional inputs continuously to both the children and teachers. Therefore, a lot more was required to be done and that too differently. So it was considered prudent to harness the extensive reach of satellite communication to address some of the major issues.

For long, Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh, the so called BiMaRU states, have remained educationally backward; they lag in most indices of economic and educational growth and are at the bottom of human and infrastructural development (In 2002, Chhattisgarh and Jharkhand were carved out of Madhya Pradesh and Bihar, respectively. This helped to change the educational indicators of Chhattisgarh and Madhya Pradesh). For instance, the current national literacy rate is 65.38%. But the same figures for Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan and Uttar Pradesh are 47.53, 65.18, 54.13, 64.11, 61.03 and 57.36% respectively. While the enrolment in primary schools in Kerala, Tamil Nadu, Delhi and some other states is cent per cent and national literacy is about 65%, the literacy level of BIMARU states is below 50%, particularly due to low enrolment of girl child, SC / ST, ‘major’ minority and rural population. These are Hindi speaking states and this linguistic commonality offered a unique advantage for sharing content and other resources for teaching-learning, particularly at the primary/ elementary school level. It was also seen as an opportu-

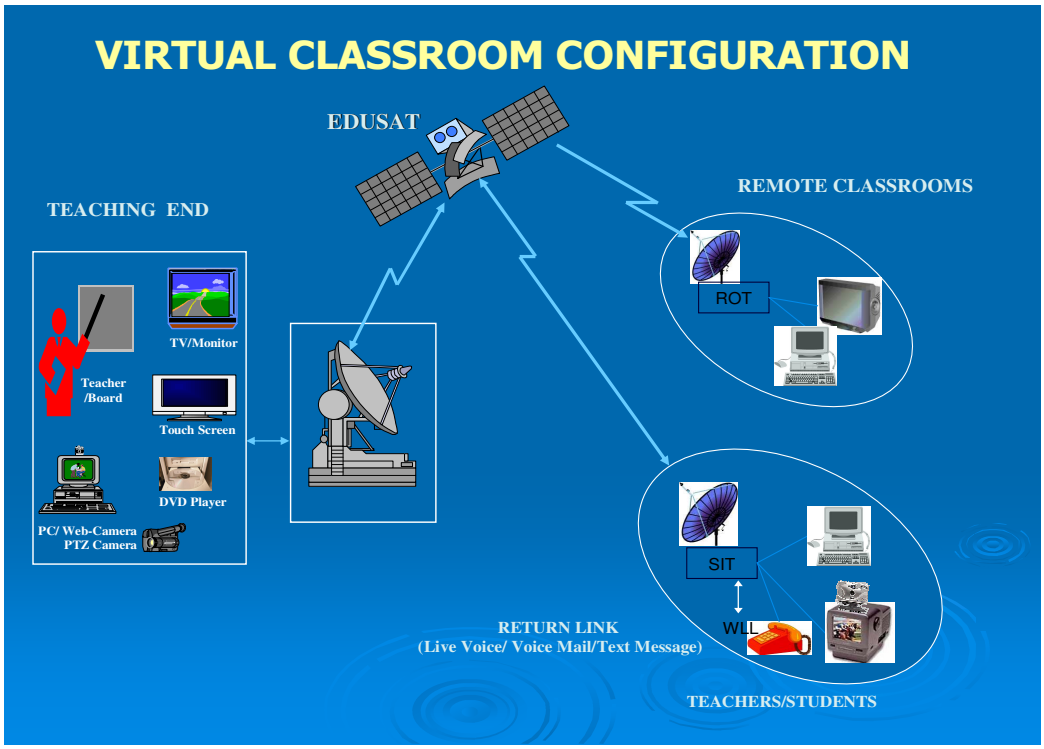

Figure 3. Virtual classroom configuration offered by EduSat.
Source: Bhatia and Dikshit (2004).

Table 1. Number of ROTs and SITs.

S/No	States	Districts	ROTs	SITs
1.	Madhya Pradesh	Sidhi	700	9
2.	Chhattisgarh	Koria	50	1
3.	Uttar Pradesh	Sonebhadra	50	1
4.	Bihar	Vaishali	50	1
	Total		850	12

nity for extensive reach at relatively low costs with scope for fairly wide expansion.

IGNOU was mandated by the MHRD, Government of India, to initiate a pilot project to use EduSat for strengthening elementary education in educationally less developed districts. One district each from four Hindi speaking States (Madhya Pradesh, Chhattisgarh, Uttar Pradesh and Bihar) was chosen based on physical contiguity. The pilot project was formally launched jointly by the MHRD, Government of India, IGNOU and ISRO on December 17, 2005. It was later named Rajiv Gandhi Project for EduSat-supported Elementary Education (RGPEEE). The teaching-end (with a small studio, recording and transmission facilities) for transmission was set up at Government College of Education, Jabalpur (Madhya Pradesh) as well as at the DIET. In this project, we intended to develop district level networks with initial focus on classroom-based learning, teacher training, literacy and development of knowledge repositories, as effective and sustainable sources of courseware. The district networks connected more than 862 schools, District Institutes of Education and Training (DIETs), Block Resource Centers (BRCs) and Cluster Resource Centers (CRCs) within a Block to meet district level requirements for education and training of school children and teachers.

In the first phase (pilot), the project focused mainly on Sidhi district, inhabited mainly (90%) by tribal population and one of the most educationally less-developed districts of Madhya Pradesh. (The female literacy rate here is about 36%). In Sidhi district, eight Blocks and in other States one Block each of the adjoining districts were selected and ROTs and satellite interactive terminals (SITs) were installed (Table 1). These terminals, known as learning-ends, were powered with solar energy so that their working was not hampered by elec-

Figure 4. Orientation programmes for the elementary school teachers on utilization of EduSat capabilities organized by Distance Education Programme (DEP) of Sarva Shiksha Abhiyan, IGNOU during September 2005 to March 2006.

tricity failure. (In the rural areas where most of the ROTs are located, there is erratic or no electric supply).

Objectives of the project

The project envisaged to impart value-added ICT-enabled education for improving the quality of education and support literacy as well as adult education initiatives. The main objectives of the project were:

1. Ensuring availability of quality content online and through a variety of other access devices in elementary schools and DIETs.
2. Enriching existing curriculum and pedagogy at different levels by employing available technologies, including virtual classrooms and video on demand through the EduSat.
3. Promoting a shift from passive instruction to active learning.
4. In-service and recurrent training of elementary school teachers for their professional development and breaking isolation.
5. Training teachers and master trainers in multi-skills for handling IT-supported and ICT-enabled education through EduSat.
6. Supporting total literacy/ adult education and compulsory education for children in the age group 6 - 14 years.

Orientation of teachers in utilization of EduSat capabilities

To work towards the achievement of project objectives, a network of ROTs and SITs was created in primary/ elementary schools. The Project Core Committee decided that for smooth implementation, initially one teacher from every school should be oriented in ICT-enabled education in general and in the potential of EduSat in particular. With this in view, Distance Education Programme (DEP) of Sarva Shiksha Abhiyan, IGNOU organized ten orientation programmes for the elementary school teachers on utilization of EduSat capabilities during September 2005 to March 2006 (Figure 4). After each workshop, a questionnaire was administered on the participants to gather their feedback on the quality of the workshop and its impact on the

participants. The feedback served as useful input for the following workshops.

In all, 868 teachers and functionaries associated with the project were oriented at different places/ levels. The objectives of these orientation programmes were to familiarize teachers in imparting instruction through EduSat and their role and responsibility in facilitating child learning. The topics such as ICT-enabled and IT-supported education, EduSat; its characteristics and capabilities; implementation, monitoring and feedback; role and functions of teachers; designing tele-teaching and teleconferencing sessions/ lessons; developing interactive multimedia CDs, etc. were deliberated in these programmes.

All the teachers responsible for operation of EduSat-supported systems (ROTs and SITs) were given technical training by ISRO technologists/ officials in handling the equipments. They were also oriented in attending to minor snags in the systems.

Feedback study on the quality of orientation programmes (2005 - 2006)

A feedback study was conducted on 856 (out of 868) participants to assess the usefulness of orientation programmes. Data were collected on all aspects of the orientation programmes through a specifically designed questionnaire. Based on the feedback of the participants, necessary changes were incorporated in subsequent orientation programmes. The feedback data were analyzed to understand the strengths and weaknesses of different inputs provided in the orientation programmes. The following major findings emerged (Mathur and Saxena, 2007);

1. The participants were highly motivated and desired to learn innovative ways of delivery of education.
2. The participants perceived the orientation programmes as very useful and these were helpful in executing specific role in utilizing EduSat.
3. The tools and techniques such as video cassettes, telecast/ teleconferences, group discussions, activities, demonstrations and question answer sessions were highly appreciated and rated by the majority as 'very effective'.
4. The performance of resource persons was reported as 'very good' by the majority of participants in all programmes. However, most of them were not happy with the use of English as the medium of instruction/ interaction; they suggested that if the transactions were in Hindi, they could express themselves more creatively and intelligently.
5. About equipment such as TV, solar panel, dish antenna, battery, etc, the participants were apprehensive of theft.
6. For the success of project, they highlighted the need for continuous dialogue and interaction through periodical training/ workshops so that deficiencies in implementation and utilization of EduSat facilities at different stages could be overcome by sharing experiences in the group. In fact, they suggested that as a follow-up activity, re-orientation of the teachers responsible for operation of the systems should be organized after every three months.
7. Many teachers had no experience of working on a computer. Therefore, they suggested that hands-on computer training be imparted to them. The participants also indicated that practical experiences on using ROTs will be highly beneficial to them.
8. The majority of participants had no previous experience of technology enabled education. They therefore desired that more time be spent to explain the domain of their responsibilities for optimum results.

GENERATION OF E-CONTENT

Once preparation in the sky was complete, the major challenge presented itself in the form of avalability of quality courseware/ software. By 2004, technology had not entered the school classroom in a big way in India and the mindset of conventional teacher was fixed on 'Chalk and Talk'; multi-skilling them for use of a visual medium to provide rich learning experience was seen as a formidable task. Therfore, a priority area was to identify resource persons and train them in communication and presentation techniques.

Training of resource teachers in presentation techniques

A cohort of 130 potential resource teachers, out of the group of 868 teachers, was identified by a team of experts/ resource persons. After working on their communication skills and judging their mastery of the subject, the size of the cohort was reduced to 50 for intensive training in live teaching through EduSat. A dedicated group of media experts and producers were also involved in this exercise. Out of the 50 resource teachers, 42 teachers participated in the intensive training workshop organized from December 9 to 13, 2005 at the Electronic Media Production Centre at IGNOU in New Delhi (Figure 5). These teachers were exposed to the process of production and delivery of ICT-enabled education. They were trained in teaching and interacting with learners through the visual media.

EduSat-enabled teaching has continued un-interrupted. The programmes are telecast from 11:00 am to 01:00 pm (with repeat telecast from 02:00 to 04:00 pm for those schools which operate in the afternoon shift) from the Teaching-end, Jabalpur. Academic calendar for primary classes was taken into consideration while preparing the schedule of live teaching. The special feature of the

Figure 5. 42 teachers out of the 50 resource teachers, that participated in the intensive training workshop organized from December 9 to 13, 2005 at the Electronic Media Production Centre at IGNOU in New Delhi.

project was that the expertise of primary/ elementary school teachers from the region was harnessed in live teaching. This helped to minimize problems arising from dialect, expression and language comprehensibility. To begin with, the elementary school teachers from Sidhi district and Jabalpur city concentrated on the hard spots identified through mutual agreement of all the four participating States.

To achieve the objective of training in-service teachers and break their isolation, one hour transmission on every Saturday during working hours was devoted to teacher education. As such, it was not made mandatory but the interaction patterns revealed that more and more teachers became interested in the programme and participated in the sessions. It was further strengthened after the installation of more ROTs/ SITs at schools, Block/ Cluster Resource Centres and DIETs

MONITORING AND FEEDBACK

The project was closely monitored by MHRD. Periodic meetings of BRC Coordinators were held to know road-blocks and work out a viable strategy to ensure smooth implementation. Printed inland letters were distributed among teachers for obtaining regular feedback from them. On the basis of feedback and regular monitoring from the users/ stakeholders, meaningful improvement was effected in the learning materials and their delivery continuously. On the basis of such periodic feedback, it

was hailed a successful experiment.

For the implementation of a new technology successfully, it is an established national policy that for long-term sustainability, the responsibility for maintenance is ultimately borne by the indigenous workforce on turn-key basis. To facilitate this, technically competent personnel, who had to ultimately do the task, were to be trained by the supplier agency. Moreover, the supplier was required to create a maintenance unit of its own and station qualified and competent individuals in adequate number since the entire equipment was under warranty for a period of three years. Accordingly, the vendor opened a repair/ maintenance cell at the district headquarters. As equipment was new and thoroughly tested before installation by the ISRO scientists, there were not many complaints of malfunctioning. And the arrangement worked well.

Utilization of EduSat-supported education

Since it took a lot of effort, resources, time and funds to identify hard spots, prepare high quality tele-lessons, identify and train good tele-teachers, keep the ROTs functional, among various other routine tasks, it was considered important to assess how far the stakeholders (children, teachers, parents, headmasters, parent-teacher association members, community representations, block/ cluster resource centre coordinators (BRCCs/ CRCCs) found these relevant, useful, motivating and interesting. It was also desirable to identify weak points in the design, production and delivery of the content, and seek suggestions for improvement. With this in view a utilization study was conducted by Mathur and Mittal (2007) to:

a. Get information on implementation of RGPEEE in primary schools.
b. Obtain feedback from stakeholders on various elements of the project.
c. Know how well BRCCs, CRCCs and other functionaries had been oriented about their roles and functions for optimal utilization of EduSat.
d. Get suggestions for improvement in the operations.

Feedback was collected from 60 ROT schools of different Blocks of district Sidhi, M.P. Out of these, 26 schools were personally visited by the project team, and the information about the remaining 34 schools was collected through school teachers, BRCCs and CRCCs in a focused group discussion meeting at DIET, Sidhi. The information was collected on school variables (number of teachers, number of classrooms and number of students), ROT related variables (installation, functioning, training of teachers, suitability of ROT rooms, operational difficulties and reasons for non-functioning), transmission related variables (advanced information and transmission suitability of transmission timings, duration of transmission, quality of audio-video, disturbance in transmission), tele-lesson related variables (methods/ formats of presentation, utilization by teachers and children, discussion with children and viewing pattern, class management, timings and tele-teacher).

Analysis of the data collected by Mathur and Mittel (2007) revealed that majority of sampled schools had fewer teachers than actually required. More than 60% schools had a maximum of two teachers. Most of the schools did not have separate room for each class. More than 50% primary schools had up to three rooms and more than 50% middle/ high schools had up to six classrooms. The salient findings of the study are:

1. Sixty Seven percent ROTs were functional two years after the initiation of the project when the team visited; remaining 33% were reported as non-functioning or not in use. Out of 20 non-working ROTs, 12 (60%) were non-functional due to dust storm in the area, 6 (30%) due to technical reasons and 2 (10%) due to indifferent behaviour of school headmasters and/ or teachers. (One ROT was installed in a Senior Secondary School which had no primary class). Ten schools (17%) faced difficulty in regular operation of ROTs due to lack of appropriately trained teachers, who could not locate and correct even minor technical snags. Some schools (about 10%) reported lack of clarity in audio/ video transmission due to minor technical snag such as change in the direction of antenna, etc. It means that only half of the installed ROTs were functional after two years. This is quite encouraging in view of the fact that the region under study is predominantly tribal with little appreciation for education; literacy level being below 10%.
2. The ROT rooms, where children viewed programmes were well lit, ventilated and spacious.
3. The timings of transmission suited the majority of sampled schools, a few schools had different school timings because they were running second/ double shift. About seven percent schools, which were not satisfied with the existing duration of the transmission suggested subject/ topic-wise more time.
4. In majority of schools, PTA chairperson/ *Sarpanch* (elected village chief) and other members of community, who visited the school to view teaching through EduSat, reported almost no participation of PTA members or community in the transmission.
5. More than 60% schools did not maintain any record of the transmission. Moreover, the records maintained by some teachers were not in the format suggested during their training workshops or mentioned in the project booklet.
6. Transmission was generally viewed class-wise. However, 12 (20%) schools reported that children of all the classes were allowed to view the transmission together.
7. About 8% schools reported that they experienced

disturbances during change over of classes from one transmission to another.
8. Almost all schools preferred to have prior information of the presentations so that they could teach/ discuss the topics to be covered on a particular day before hand. This, according to them, would have resulted in better understanding of the hard spots by the children.
9. Majority of the teachers discussed tele-lessons with their students and clarified their doubts/ queries.
10. The teachers found the tele-lessons and their presentation highly motivating and helpful in using teaching aids and making lessons interesting; presentation of hard spots through the visual medium attracted the imagination of the children. Moreover, being based in instructional design principles, these presentations created a favourable learning environment. It was most satisfying that retention of children in the school increased to four hours. Moreover, increased interest among children and teachers helped to improve learner performance.
11. Presentation of captions/ titles/ topics on the screen should be for larger duration so that children were able to read/ write/ note the learning points. This has important implications for learners as well as the success of the project.
12. In some presentations, teachers observed that use of local dialect and entertainment programmes in between two presentations helped to sustain the interest of learners for even longer duration.
13. Security of ROTs was a major concern for every school in the region as thefts of equipment was reported by some schools from the beginning of the project.
14. The arrangement of repair and maintenance of equipments was not adequate.

July 1 was identified as the preferred date for starting transmission for children every year. Most of the teachers, CRCCs and BRCCs were of the view that first two-three weeks should be devoted to co-curricular areas like values, games, health, general knowledge, etc., and curriculum related programmes should start only after 15th July. This recommendation was based on their perception that starting transmission with interesting topics would motivate children to join school. The teachers, BRCCs and CRCCs suggested that in tele-teaching, greater focus should be on English, Mathematics and Science. But the transmission should include all the subjects for all-round coverage and development.

EFFECTIVENESS OF RGPEEE ON ACADEMIC ACHIEVEMENT OF CHILDREN

To assess the success of EduSat network in terms of the academic achievement of primary school children (Classes III and IV), Dash (2007) compared the academic achievements of children of ROT schools with those of their counterparts of non-ROT schools. The study was conducted in seven EduSat network Blocks. From each Block, three schools were selected, two ROT and one non- ROT. Both types of schools were comparable on variables such as neighborhood, socio-economic status of the children, educational background of the community, etc. Keeping the size of population and nature of stakeholders in view, purposive sample was selected. Competency-based achievement tests on the topics of Hindi, English, Environmental studies and Mathematics taught to classes III and V children were administered on them.

The analysis of data indicated that EduSat transmission was making steady progress towards improvement of academic achievement of children and creation of academic environment in schools. However, the study revealed that there was a need to employ strategic planning and its effective implementation for desired impact of EduSat-supported education on the overall quality of primary/ elementary education.

None of the sampled schools had adequate facilities for seating or study materials. This highlighted the need to mobilize Block and District level authorities to provide required facilities/ encouragement to teachers for optimum realization of EduSat potential. This study indicated that more and more teachers should be trained in ICT-enabled education so as to create a bigger pool. Teacher educators (DIET faculty) were trained and involved in capacity building of teachers and monitoring the implementation of EduSat-supported education. They were also involved in developing content for tele-teaching. Suggestions of classroom teachers were invited and to the extent possible, incorporated in the development of e-content. In this process, need was felt to depute a nodal teacher-educator at each Block, who would make necessary arrangement and utilization of EduSat-supported network and make it more effective to improve the quality of education. Some limitations of the use of EduSat as a supplementary material were identified and interventions proposed:

1. Support material prepared on each topic should be supplied to all schools in advance.
2. Teachers working at the elementary level should be trained to initiate pre and post tele-lesson discussion with children to facilitate their understanding and relate to their environment.
3. The resource persons should use more familiar examples and activities to develop curiosity in them and make them active participants in the teaching-learning process.
4. SITs and ROTs should be installed at Block/ Cluster resource centers also so that master trainers and teacher educators can monitor their utilization as well as quality of content.
5. Local community should be involved in the supervision

and monitoring the project so that the problems associated with safety of equipments did not pose a serious threat and children were motivated to come to school.

6. Periodic three/ six monthly reports on utilization of EduSat, quality of content and its receptivity by the children should be presented to the Central project monitoring Committee Chaired by the Union Minister for Human Resource Development. The problems faced in implementation should also be highlighted for remedial action.

CONCLUSION

To achieve the target of Universalisation of Elementary Education, the Indian Parliament, passed the Right to Education bill, which provides for free and compulsory education to all children in the age group 6 - 14 years. And to support these efforts towards quality education, the MHRD, GoI decided to use the capabilities of satellite based teaching-learning. Accordingly, an Educational Satellite, EduSat, was launched in 2004 to provide an interface between face-to-face and open-flexible learning. The Rajiv Gandhi Project for EduSat-supported Elementary Education was launched to strengthen elementary education in four educationally less-developed states. Initially, the project focused mainly on Sidhi district in M.P, which is predominantly inhabited by tribal people, who have remained on the margins of development, and 700 schools, DIETs and BRCs were connected. For the achievement of project objectives, multi-pronged strategy to identify hard spots, develop e-content and beam programmes at pre-decided schedules, train school teachers from within the district in presentation skills was adopted. Within a year of the launch of the programme, EduSat supported education helped to increase attendance of students in schools and their retention for more time, apart from empowering teachers in teaching hard spots and motivating them to make their teaching more effective using innovative methods and aids.

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