Tele Education through EDUSAT in Karnataka Primary Education - A Case Study

N Ramesha Reddy

Department of Computer Science, Government Science College, Nrupatunga Road, Bangalore – 560 001, India

Currently on Special Duty as Informatics Officer, Department of Collegiate Education, Government of Karnataka

Abstract

EDUSAT program has been implemented in the Department of Primary Education in Karnataka since 2005 and has been studied and outcomes have been evaluated. Karnataka is one of the states to use EDUSAT facility provided by ISRO from the beginning and has implemented the program in over 3400 Schools across the state and has reached annually over 10 lakh students. Both two-way interactive SIT channel and one-way ROT channel were used for content delivery. It is learnt that a more serious approach is required for making the unique EDUSAT program to be effective at primary education institutions. Use of hybrid technology, Internet along with satellite facility, can make the program more effective.

Key Words: *EDUSAT, ICT, SIT, ROT, Tele-education, Primary Education*

1. Introduction

The Information and Communication Technology (ICT) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer, and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. When such technologies are used for educational purposes, namely to support and improve the learning of students and to develop learning environments, ICT can be considered as a subfield of Educational Technology. ICTs in primary education are being used for developing course material; delivering content and sharing content; communication between learners, teachers and the outside world; creation and delivery of presentation and lectures; academic research; administrative support, student enrolment etc.

In the current information society, people have to access knowledge via ICT to keep pace with the latest developments. In such a scenario, education, which always plays a critical role in any economic and social growth of a country, becomes even more important. Education

not only increases the productive skills of the individual but also his/her earning power. It gives them a sense of well being as well as capacity to absorb new ideas, increases their social interaction, gives access to improved health and provides several more intangible benefits. The various kinds of ICT products available and having relevance to education, such as teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counselling, interactive voice response system, audiocassettes and CD ROMs have been used in education for different purposes.

Integrating ICT in teaching and learning is high on the educational reform agenda. Often ICT is seen as indispensable tool to fully participate in the knowledge society. ICTs need to be seen as "an essential aspect of teaching's cultural toolkit in the twenty-first century, affording new and transformative models of development that extend the nature and reach of teacher learning wherever it takes place".

The Information and Communication Technology (ICT) provides a broad perspective on the nature of technology, how to use and apply a variety of technologies, and the impact of ICT on self and society. Technology is about the ways things are done; the processes, tools and techniques that alter human activity. ICT is about the new ways in which people can communicate, inquire, make decisions and solve problems.

Enhancing and upgrading the quality of education and instruction is a vital concern, predominantly at the time of the spreading out and development of education. ICTs can improve the quality of education in a number of ways: By augmenting student enthusiasm and commitment, by making possible the acquirement of fundamental skills and by improving teacher training. ICTs are also tools which enable and bring about transformation which, when used properly, can encourage the shift an environment which is learner-cantered.

Satellite communication technology using EDUSAT satellite is one of the tools for the development of distance education. The students visualize the teaching and methods from the video programs delivered through EDUSAT[3]. Important advantages of satellite-based distance education are:

- Reaching the unreached
- Cost-effective & Quality Education using emerging ICTs
- Need-based education
- Increased access to learning and training

2. The EDUSAT System

GSAT-3 satellite, more commonly known as EDUSAT, was launched on 20th September 2004 by the Indian Space Research Organization (ISRO). This ambitious project was mainly intended to meet the demand for satellite communication-based distance education system for the country. It was aimed at providing connectivity to schools, colleges and other academic institutions[1]. The program is primarily meant to support non-formal education. EDUSAT was the first dedicated "Educational Satellite" that provided the country with satellite based two-way communication to class room for delivering educational materials with the following objectives.

- Providing effective teachers training
- Supplementing curriculum-based teaching
- Strengthening distance education efforts initiated by various agencies
- Access to Quality Resource Persons (Primary, Higher & Professional Education)
- Providing Access to New Technologies
- Taking Education to Every Nook & Corner of the Country

EDUSAT was a Geo-synchronous satellite developed on I-2K bus. GSAT-3 is co-located with METSAT(KALPANA-1) and INSAT-3C at 74^{o} E longitude. Table 1 shows the technical parameters of GSAT-3[4].

Table 1:

Mission	Education
Spacecraft Mass	1950.5 Kg mass (at Lift - off)
	819.4 Kg (Dry mass)
Onboard power	Total four solar panel of size 2.54 M x 1.525 M generating 2040 W (EOL), two 24 AH NiCd batteries for eclipse support
Stabilization	3 axis body stabilised in orbit using sensors, momentum and reaction wheels, magnetic torquers and eight 10 N & 22N reaction control thrusters.
Propulsion	440 N Liquid Apogee Motor with MON - 3 and MMH for orbit raising
Payload	Six upper extended C - band transponders

	Five lower Ku band transponders with regional beam coverage
	One lower Ku band National beam transponder with Indian main land coverage
	Ku beacon
	12 C band high power transponders with extended coverage, covering southeast and northwest region apart from Indian main land using 63 W LTWTAs
Launch date	20-Sep-04
Launch site	SHAR, Sriharikota, India
Launch vehicle	GSLV-F01
Orbit	Geostationary (74oE longitude)
Mission Life	7 Years (minimum)

EDUSAT set up consists of Transmission and Receiving systems. Content production studio, Uplink facility (HUB) and Satellite form Transmission system and Receive Only Terminal (ROT) and Satellite Interactive Terminal (SIT) with dish antenna, LNB and set-top-box, along with the Display and Audio system at the school/ college end constitute Receiving System. Currently operational networks and other systems are as in Table 2[2].

Table 2.

Tele-Education Networks	**Ku-Band**	**Ext. C-Band**	**C-Band**	**Total**
Deployed Networks	64	18	1	83
Operational Networks	56	13	1	70
HUBs	28	8	1	37
SITs	2268	344	10	2622
ROTs	44956	1086	-	46042
Bandwidth Allocation	113 MHz (INSAT – 4CR & GSAT -8)	42 MHz (INSAT - 3A, 3C & GSAT -12)	10.5 MHz (INSAT-4A)	178.5 MHz

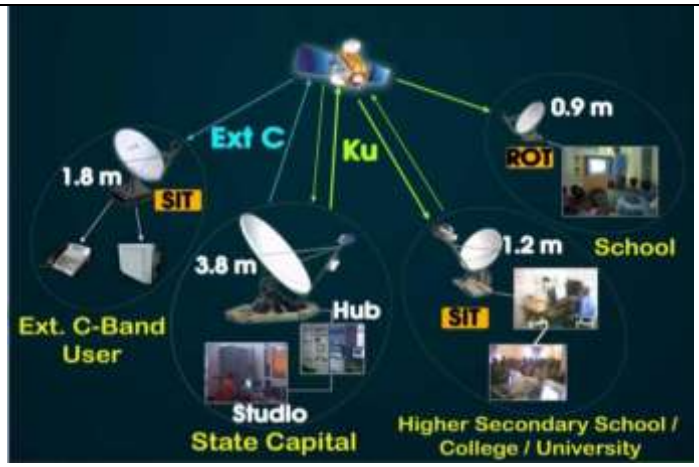

Figure 1: A schematic of EDUSAT System

The ambitious EDUSAT project has been implemented in 26 states and 3 union territories and has a network of 54030 ROT and 3778 SIT centres supported by 37 HUBs across India [Figure 2].

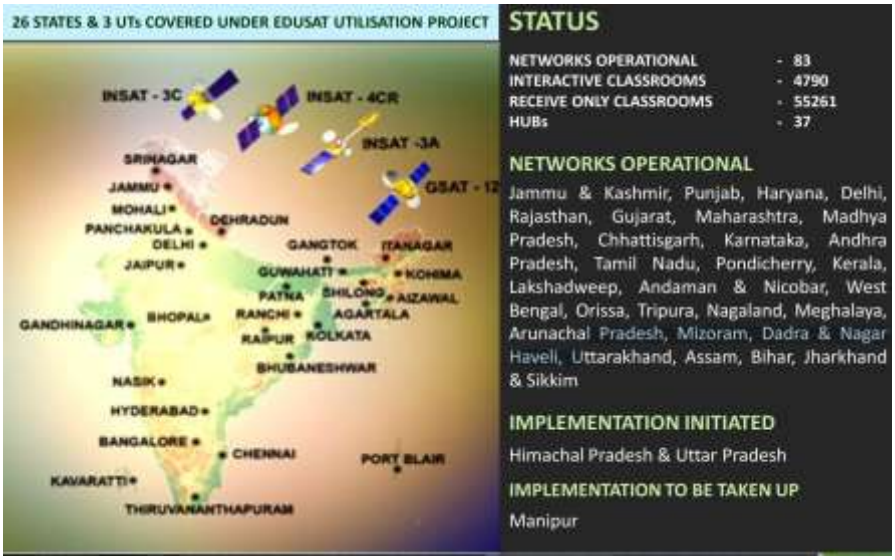

Figure 2: EDUSAT Network at National Level

3. EDUSAT Program in Karnataka

Karnataka wan one of the earliest states to adopt EDUSAT facility and has implemented the program in both Primary and Higher Education and is reaching annually over 10 lakh students. Both two-way interactive SIT channel and one-way ROT channel are being used for content delivery to Primary Education institutes.

Karnataka has been provided with one uplink (HUB) facility with the following details:

Uplink Facility Details:

- 6.3M Ku- Band Hub at DSERT, Bangalore
- Capacity: 2 Interactive & 2 ROT Channels
- Interactive channel
  - Outbound: DVB –S2, ACM, Symbol Rate – 1.25Msps
  - Inbound: Data rate – 819 Kbps, FEC – 4/5, Symbol Rate – 512Ksps
- ROT Channel: Data rate – 4.10 Mbps, FEC – 3/4, Symbol Rate – 2.96Msps

Primary education department has installed EDUSAT facility in 3480 schools out of which 2615 use ROT channel and 175 use SIT channel. Two Studios are being used for content creation and telecasting lectures, both online and off line, to remote locations. Primary education department was first to use EDUSAT facility in Karnataka when the services were extended by ISRO in 2005. The department uses both One-way non-interactive and two-way interactive modes for content delivery. Primary Education has provided Televisions for display of content at school levels and transmits both live and recorded lectures for about 4 hours daily on week days. Primary Education Department is also using its studios and SIT channel for group discussions and tele-conferencing with its stakeholders.

Important challenges and issues with EDUSAT system are:

- Lack of ownership by users due to low priority
- Tele-Education programs are not part of curriculum
- Unavailability of trained & dedicated manpower for network operations
- Longer down-times due to erratic power supply
- Lack of centralized repository for content
- High dependency on ISRO for continuous technical support/ consultancy
- Lack of Central Govt. sponsored schemes or earmarked funds for Tele-Education
- Interactivity during lecture delivery is not possible with ROT system
- Limited number of SIT channels available for adopting interactivity

Both Collegiate and Technical Educations departments, and VTU are using EDUSAT system for successfully delivering educational content to the remotely located institutions.

With the recent trends in GSM technologies and easy and affordable access to internet technologies, internet can be leveraged for improving the effectiveness of EDUSAT system by having hybrid system of satellite for content delivery and internet connectivity for interactivity [Figure 3].

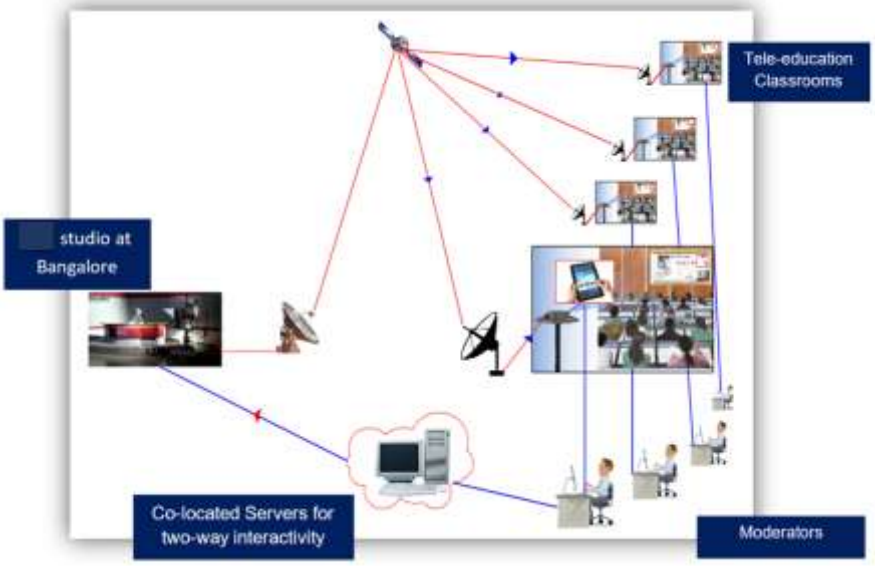

Figure 3: A schematic of EDUSAT and GSM Hybrid System

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EDUSAT program implementation in the state of Karnataka, in the Department of Primary Education, has been studied and outcomes have been evaluated. Tele-education network in Primary Education consisting of 2615 ROTs and 175 SITs is being implemented using dedicated ROT and SIT channels since 2005 and each has successfully telecasted over 500 programs using the two studios exclusively set up for Tele-education purpose. Programs are conducted regularly for 4 hours daily on all week days and the department is planning to expand the facility for more schools. Interactivity with audience during telecasting of lectures was clearly a missing factor. Use of Internet technology for interactivity and satellite technology for lecture delivery can be an easy solution both in terms of best use of available ROTs for interactivity and cost effectiveness.

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