

## A Satellite EDUSAT: Changing the State of Education in India

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### Abstract

*The developing countries can attain sustainable growth by improving their literacy statistics. Knowledge makes a person literate enough to read and write, as well as it also improves the overall quality of life. There are a few Asian countries like India, Pakistan, Bangladesh, etc. where population is enormous, so any sudden change to increase the rate of literacy in the society is futile. The same was the case of Indian education system; which is/was suffering from very low literacy rate. The illiterate racy is so high that the conventional infrastructure present during earlier times cannot bring about a sudden change in the society. The extreme regional variations in culture, language, development and presence of very few well qualified teachers were some of the other limitations that were proving to be a big hindrance in solving the problem of illiteracy.*

*To solve this problem, Indian Government made use of the technology in the best possible way and launched a satellite named EDUSAT. It is solely designed, developed and launched to serve the exclusive purpose of imparting education to the entire India which includes both the rural and urban population. It is the first of its kind in the entire world and exemplifies how the use the technology can bring about a change in the society. It is used in all the levels for education from primary to secondary and also till the college. All the colleges which come under VTU are using it to provide a quality technical education to its student as there as is a dearth of high quality teachers in the country. Through EDUSAT, live audio- video interactive sessions are held between student and faculties. Through EDUSAT, live audio- video interactive sessions are held between student and faculties. Online classrooms, virtual schools, evening coaching classes, radio and television based classes are the new modes of educating people living in areas with poor infrastructures, electricity and efficient teachers It has not only improved the quality of technical education in these colleges but has also provoked an intense interest in the student in technological innovativeness.*

*This satellite has also proved to be very useful for primary and high school students and teachers as in the states of Gujarat, Tamil Nadu, Karnataka, etc. By this paper, we would like to highlight that how technology can change the entire face of a country. The approximate life of EDUSAT is just a decade but it has bring about a change in the status of the Indian education which otherwise would have taken more than a century by using conventional methods of teaching. The paper also highlights that how a country can improved its literacy with minimum resources. The use of technology in education has revolutionized the whole system of education.*

## Introduction

India is the second most populous country and holds one sixth of the total population of the world. It has the world's largest youth population with 50% of the total younger than 25 years of age. [10] This reflects that there are more than 610 million people, getting ready as a workforce who will change the course of not only India or Asia but entire World. The main challenge that India is facing is providing a resourceful education to this emerging workforce. This can only be possible by providing them a quality education so that they are skilled enough to not only earn their livelihood but can contribute to the development of the society as a whole.

India is among very few countries whose population is highest in the range of 15-19 as depicted by the population pyramid [11]. This pyramid helps us to understand the pattern of age distribution in the country. Below is the population of the 3 most populous countries of the world i.e. China, India and USA [12]. China shows an irregularity in the curve due to its stern one-child policy adopted in the last 2 decades. India has a broad curve till the age of 25 and then goes down smoothly. United States has almost constant distribution of age.

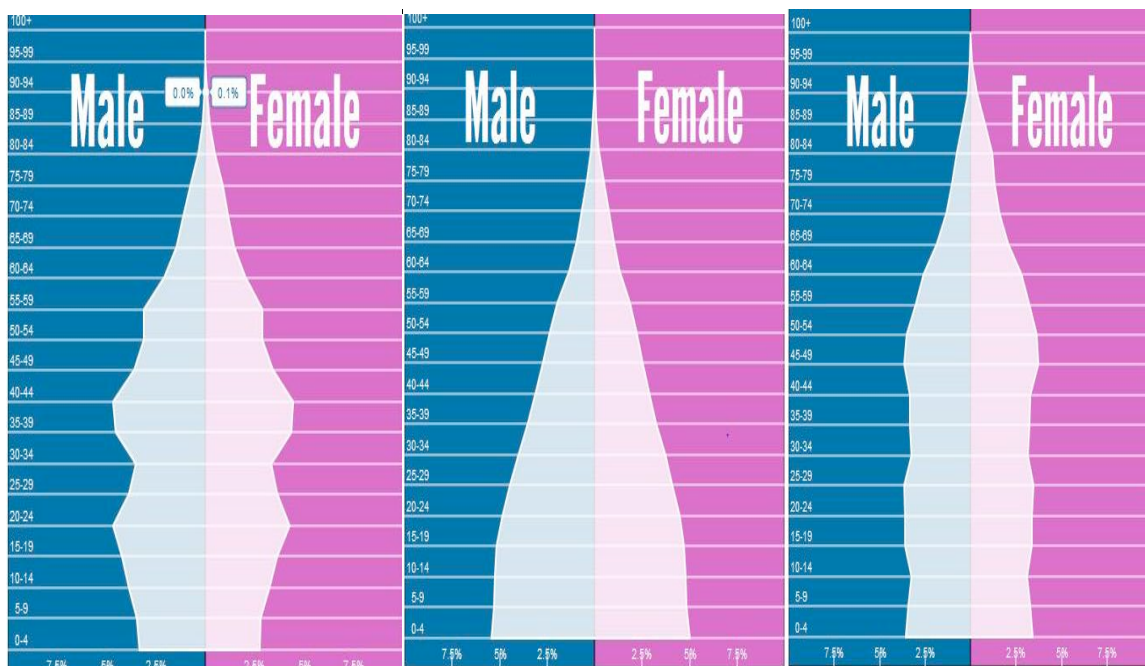


Fig 1.1: China

Fig 1.2: India

Fig 1.3: US

Fig 1: Population Pyramid of the three most populous countries of the World

Fig 1 depicts that India immediately require to strengthen its education policies as the majority of the population lies below the age of 30 which can only be done by using technology and e-learning. [13][14]

The country has nearly 86% male and 69% females literate with only 16% having more than 11 years of education. [15] The major drawbacks in long term education are the unavailability of proper education centers like schools and colleges in sub-urban and rural areas. At the student level, there is very unsustainable economic condition of the family.

On the other side, the basic infrastructures like school building, labs, etc. are not present in every locality and many villages are not connected with cities through concrete roads. These small towns and villages have no access to the resources available in bigger and metropolitans cities. Even after the government's initiatives of constructing roads and enhance the infrastructure, skilled teachers remain scarce.

Furthermore, there 8 north-eastern states of the country are home to 39 million people. The literacy level here is 68.5%. The states of Assam, Arunachal Pradesh and Meghalaya have literacy rate less than the national average. The land terrain, language barriers and other activities have prohibited easy entry of people from these states into other states and vice-a-versa. But the advent of internet, communication channels via phones, satellite and video conferencing into these states has opened new doors for advancement.

Fig 2 clearly depicts that one out of every four person in India is an illiterate. As more than 70% of the total population of India lives in rural area, the status of literacy cannot improve without targeting them.

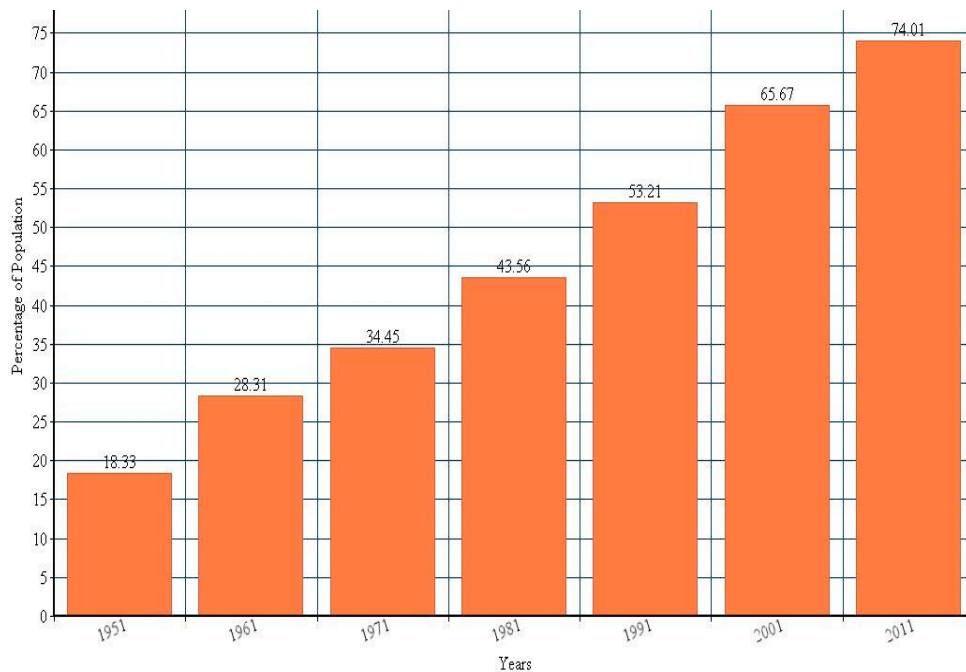


Fig 2: Literacy in India from 1951-2011

It is estimated that by 2020 more than 50% of the world's illiterate will reside in India. This made the government to take an initiative to introduce a mechanism through which education in the rural India is influenced the most. This paved the way for launching a satellite for spreading education to the remote areas and the under privileged people. EDUSAT thus came into existence and today promotes education to all parts of the country.

## Education in Rural India

India is a federal government with 28 states and 7 union territories. The literacy rate varies a lot in the states as there are several states with more than 90% literacy rate like Kerala at the same time there are several where literacy is just over 60%. The same variation holds good in the rural and urban population.

According to the 2001 census of India, there are around 638,596 villages in India. These villages hold more than 68% of the total population of India. Although after the green revolution in India, the condition of villages has improved but still there is a long way to go. The literacy rate of rural India is just 68.9% and there are few states where literacy rate of rural population just touches 60%.

Year	Percentage of Rural Population	Year	Percentage of Rural Population
1960	82.1	1990	74.5
1965	81.2	1995	73.4
1970	80.2	2000	72.3
1975	78.7	2005	71.3
1980	76.9	2010	69.9
1985	75.7		

Table 1: Percentage of Rural Population in India with respect to total population

The condition becomes even worse if we take into account the female literacy in rural India. Out of 100 females only 58 are literate and there are several states like Rajasthan, Jharkhand and Bihar where this count is even less than 50. This is the most alarming situation, as with the conventional system of education it will take a long time to curb illiteracy.

States	Literacy Rate in Rural Female (in percentage)	Overall Literacy Rate (in percentage)	Difference in Literacy Rate
Rajasthan	46.3	67.1	20.8
Jharkhand	49.8	67.6	17.8
Bihar	50.8	63.8	13
Andhra Pradesh	52.1	67.7	15.6

Table 2: States with the Lowest Rural Literacy Rate in Female and their difference with Overall Literacy Rate

To summarize, the following demand for an inevitable technological overhaul which can solve all the above mentioned problems:

1. Huge youth percentage in total population. [Ref Fig: 1]
2. Literacy rate in India is quite low. [Ref Fig: 2]
3. A huge population resides in rural India [Ref Table: 1]
4. There is inadequate road network in villages.
5. Literacy rate of women is too low; specifically in rural area. [Ref Table: 2]
6. No proper infrastructure for schools.
7. The number of well qualified teachers is very less. [16]

For the above mentioned problem there was a requirement of a technique which could solve the entire problem in a quick span.

## EDUSAT- A New Beginning

EDUSAT was launched on 20 September 2004; it is the first of its kind designed solely for the purpose of education. [1][2] It was launched to have an impact on the entire education system of India. It provides virtual classroom for the primary students located in remote areas, high quality and technical proficient lectures of reputed people in college and universities which lacked proper well qualified teachers. It also provides training to teachers and aids them with the current knowledge.

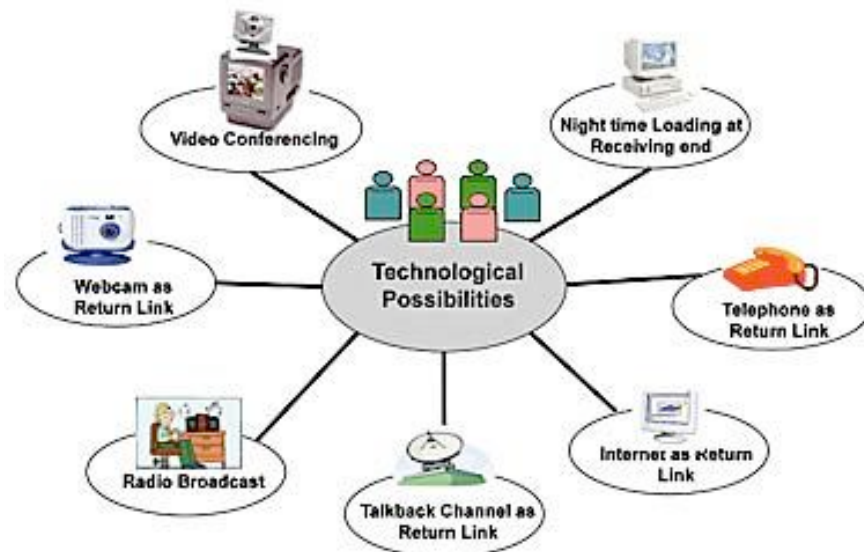


Fig: 3 Potential Use of EDUSAT

## Specifications of EDUSAT

The geo-synchronous satellite, co-located with METSAT and INSAT-3C has total 4 solar panels of size  $2.45 \text{ M} \times 1.525 \text{ M}$  generating 2040 W (EOL), two 24 AH NiCd batteries for eclipse support [3]. It incorporates 3 axis body stabilized in orbit using sensors, momentum and reaction wheels, magnetic torques and eight 10N and 22N reaction control thrusters. Its propulsion capacity is 440N Liquid Apogee Motor with MON-3 and MMH for orbit raising purpose. Other details include five lower Ku band transponders for spot beam coverage-effective isotropic radiated power (EOC-EIRP). Six upper extended C-band transponders for national coverage with 37db W EOC-EIRP. One Ku band Beacon to help ground users for accurate antenna pointing and uplink power control. The mission life is minimum 7 years. Its uplink facility has been developed at DSERT Bangalore. The downlinks provided in schools are provided with solar power facility. This takes care about the power problems.

## EDUSAT- Changing the conventional education system

The mission is monitored by ISRO (Indian Space Research Organization) and also the Sarv Shiksha Abhiyan. [4] [5] In these states also, specific geographic regions and areas are identified for the virtual classrooms. The hardware required at community level is a computer system with a webcam, mike and speaker and LAN for internet connection. Projectors, screen, Osprey Card, NVidia Card are the technical requirements.[6][7] Its network is spread through schools, higher secondary and colleges, professional

universities, state capitals and places with only its receiving terminals. The schools have only RECEIVING terminal, higher secondary and colleges have satellite interactive terminal, state capitals have hubs and for the already existing networks, direct reception system to cater televisions and landline phones.

As mentioned above, there are various uses of the satellite EDUSAT in the field of interactive communication and spreading education along with awareness about social issues, health sector and entertainment. Other sectors include night time loading, video conferencing, Talkback channel as return link, asymmetric TV Internet through TVRO. [8][9] Since the satellite functions throughout the day, people can study at any time, any place and any topics of interest. The mobile education has been successful in enhancing the reading and writing ability of people in rural areas where no school exists. It does not require the students to pay any fee and motivates enthusiastic study in the field of interest of the student.

The minor drawbacks are very few and are only at the receiving side. The users are naïve computer users and technically sound people are very few. For this, the governments in various states have started facilitating non-government organizations that send their teams in remote areas and help in the setup of such technical systems.

EDUSAT is an interactive medium. It uses videos, web based seminars, chats etc. By these, the students are able to convey their point of views and also let the instructor enhance their mode of teaching. Such virtual coaching has also taught various people to operate minor injuries and ailments in rural and remote areas. These places do not have proper amenities such as city development authority and dispensaries. They are also spread awareness about the need to build washrooms in the house. By these classrooms, not only literacy, but living standards and societal norms are also improving. It appears to bring a digital revolution in lives of those, who are still untouched by the advances in technology. There are two ways, synchronous and asynchronous. Asynchronous is through CD-ROM, document and e-books, bulletin boards etc. these can be used at any intended time. The synchronous mode is under use when a teacher is guiding and the students have to be present in the temporary classroom to listen and reciprocate his views and answers.

The communication satellite provides interactive classes to the people living in remote areas. Here electricity, school infrastructure and skilled teachers are scant. Since such basic resources are unavailable, the respective students also show low enthusiasm and morale to join such study programmes, where they have to attend a virtual class. Their self-motivation is the only driving force. All the states used EDUSAT for its own unique needs to improve the condition of education in their respective states. Moreover, it was a very economical investment for improving the literacy rate in the state and improves the quality of education imparted to the students.

## Role of EDUSAT on Students

### In Haryana

EDUSAT was launched in Haryana with 3.8 meter antenna for uplink at Panchkula. The teachers take the class from the studio at Panchkula, which is transmitted to the EDUSAT satellite. This is then further transmitted by EDUSAT to entire state of Haryana.

These lectures are received by 9000 Primary Schools, 1250 Secondary Schools and 92 Government- aided College through Satellite Interactive Terminals. Initially live lectures were provided which was further enhanced to record as well [17]. Apart from prescribed course several various other course like training for engineering entrance exam and soft skills development courses were also provided. Moreover a test was also conducted periodically to evaluate the progress of students. To propitiate interests among teachers, coordinators and students; prizes like “Best Questions Asked by Student” & “Best Teacher/ Coordinator” are given.



Fig: 4 An Interactive virtual class where teacher is teaching from studio to the college students transmitted through EDUSAT

### Impact in Haryana

1. Better performance of students in exams.
2. Timely coverage of syllabus.
3. More interests and involvement of students.
4. An increase in the attendance status of students.
5. Uniform standard of teaching to all the students both urban and rural.
6. High class and reputed teaching staff took the classes.

### In Gujarat

EDUSAT is extensively used in Gujarat to provide educations to masses. A total 22,000 primary schools were linked to the satellite to improve the education. The Chief Minister of Gujarat is using EDUSAT as a channel to interact with 40,000 teachers once every month [18]. This mode of education was so popular among the student that ISRO has to increase the bandwidth by six times as per the request from the Gujarat. A network for blind people’s association was formed using this satellite covering 10 schools. EDUSAT aims to provide the following functions in Gujarat:-

1. A uniform primary education to all the rural schools.
2. Provide training to teachers about the latest teaching technologies.

3. Providing training to health-care staff especially nursing.
4. Increase the interests of students in studies.
5. Helping the blind students by making specialized lectures for them.

### **In Karnataka**

EDUSAT is used by most in Karnataka. Here a separate e-learning center is established in Visvesvaraya Technological University (VTU) where all the 120 engineering colleges are linked up via EDUSAT [19]. Here the engineering students have the benefit that can interact with the best resource person for their subject. More than 1000 lectures have been completed. Web-based e-learning have prepared the course for 12 full semester subjects. For the primary education too, EDUSAT with the help of a scheme named “Sarva Siksha Abhiyan” has covered 885 primary schools.



Fig: 5 E-Learning to college students

### **In Kerala**

Kerala was the first state which made use of EDUSAT in 2004 [20]. A dedicated EDUSAT lab was set up and introduced the concept of virtual university. After being associated with Kerala University, live interactive sessions have started with students to impart quality education.

### **In Punjab**

Punjab is one state which is most efficiently utilizing the satellite. A studio is built to facilitate the smooth working of the e-learning activity. A special grievance section is working to regularly note the evaluation process. A special programme for the students giving engineering entrance examination is prepared which is helping the students who are unable to pay heavy fees to private organizations. Recently 2960 schools of Punjab were linked to EDUSAT to get the service of live interactive lectures [21]. A special study material for all the lectures were prepared to have a better understanding of the lectures.





Fig: 6 A lecture being prepared at a studio to be broadcasted by EDUSAT

### **In Madhya Pradesh**

This was the most advanced use of EDUSAT. Here EDUSAT was introduced by the forest department in Jan 2008. This was done to provide training to the forest officials to increase efficiency of forest officers, employees, and dwellers through online training and discussion. 52 Satellite Interactive Terminals (SITs) have been set up for 27000 forest employees and forest communities.

### **Including Artificial Intelligence in Satellite for future**

The huge data that is constantly being transmitted and received by the satellite gives opportunities to the scientist to test the new patterns of education to the young students. One such way is the use of artificial intelligence into the satellite. It can simulate and recognize the change in number of students per class. They also store information on the level of questions being asked by the students in a class. This makes the class more dynamic in terms of interaction. The inclusion of artificial intelligence make possible to revise the syllabus of the students based on their own interests. The interactive tests provide a clear idea about the topics which require further attention by teachers. Framing of questions, their evaluations, allotment of faculties, deciding the syllabus all can be done in an automated manner by including advance technology in this satellite like AI.

### **Conclusion**

In being a developing country is using the technology in the best possible way to increase the education status. This is mode of providing education to masses with very less resources proves to be highly beneficial for all the countries who want to raise their stand of education. A small investment that was done for development of this satellite has proved to be the best asset in the Indian Education. Here through this paper we have been

able to understand that how technology can change the whole scenario for education. This satellite is proved to be beneficial for all the sections of the society and service a large variety of audience. Due to its over-whelming success, we should expect that there would be more countries which will involve themselves and there will be a day where a group of satellite can serve the whole of world for all its educational need.

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