AN ANALYTICAL STUDY OF INDIA'S SATELLITE INSTRUCTIONAL TELEVISION EXPERIMENT

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PREFACE

The purpose of this dissertation is to analyze India's Satellite Instructional Television Experiment (SITE) that was conducted during the year 1975-76. It was an example in the application of a direct broadcast satellite to reach remote areas directly with educational information. This study highlights the educational aspects of this experiment. The study also compares the evaluation techniques of the SITE with the Appalachian Education Satellite Project (AESP) that was carried out in the United States of America during the year 1974-75. The implications of the broadcast satellite technology have been studied to provide a data base for planning future satellite-based television systems in developing countries.

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CHAPTER I

INTRODUCTION

Alfred Russell Wallace, who with Charles Darwin formulated the Theory of Natural Selection, said:

> Man is the only animal capable of purposeful evolution; he makes tools. These tools bespeak human needs and values. They give us new performance and new survival capacity. They make us, in effect, a different animal. Thus, they pose new human options, create new opportunities, and demand new human answers.[1]

Technologies are not created by nature or elves in the Black Forest. They are created by humans. They are extensions of Man, to be used by humanity.[2]

> Great new adventures and explorations have often, through history, concealed beneath the initial excitement and novelty the hard core of real utility and practical benefit to mankind. The discovery of new continents, and of new technologies, has commonly followed a pattern in which the form and scope of application emerge slowly as men gain knowledge, experience, and confidence in the new field.[3]

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[1]John G. Burke, ed., Article Booklet For the Eleventh Course By Newspaper, Connections: Technology and Change (San Francisco, 1979), p. 6.

[2]Ibid.

[3]W.Deming Lewis, "Summary of the National Academy's Summer Study of Space Applications," Space Exploration and

The exploration of space is such a great adventure. The rapid development of space technology has left little doubt in the minds of planners and explorers that important practical benefits will follow.[4] Of all outcomes of applied space technology, satellite communication is one of the most immediately accessible and potentially important areas.

Communication Satellites are one of the communication technologies which are capable of transmitting and distributing electronic information (radio, television, digital computer data etc.) for use in education.[5] The application of communications satellite technology to educational development is a major and highly significant milestone in the history of communications. This has generated considerable interest and enthusiasm in developing countries. It is conceivable that a satellite could distribute a full curriculum of educational broadcasts to 100 percent of the population within its view (or "footprint").[6]

A satellite communication system is comprised basically

Applications papers presented at the United Nations Conference on the Exploration and Peaceful Uses of Outerspace, Vienna, 14-27, August 1968, Volume I, United Nations, New York 1969, p. 1106.

[4]Ibid.

[5]R.P. Morgan, et al., A Guide to the Literature on Application of Communication Satellites to Educational Development (Washington University, 1972), p. 1.

[6]Richard R. Garcia, "Education for National Development: The Use of a Broadcast Satellite in Brazil." Masters' Thesis, George Washington University, 1974, p. 1.

of a satellite with necessary controls and tracking facilities (space segment) and an earth station (ground segment). The type and kind of earth station utilized is one of the basic factors in differentiating between various satellite communications systems in terms of patterns of use.[7]

Satellite Systems for Communication Purposes

There are three main types of satellite systems for communications purposes: Point-to-Point Communication satellite systems, Distribution satellite systems and Direct Broadcast satellite systems.

In the case of point-to-point satellite systems, satellites relay signals received from one earth station to another earth station; whereas in a distribution satellite system, satellites relay the signals received from the emitting ground station to specially equipped receiving-stations. A point-to-point system serves a group of the general public at one location in a limited area.[8] The direct broadcast satellite system is a space service in which signals are transmitted by satellites intended for direct reception by the general public.

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[7] UNESCO, "A Guide to Satellite Communication," <u>Reports and Papers on Mass Communication</u> ,66 (1972), p. 9.

[8] Ibid., p. 10.

Direct Broadcast Satellite System

Direct Broadcast Satellite Systems can be divided into two categories: systems that allow individual reception, and systems that are designed for community reception. The latter type uses receiving equipment with large antennas intended for group viewing and listening.

The use of a direct broadcast satellite makes possible the massive transmission of modern educational techniques and programs to those areas where educational facilities are limited or do not exist. For countries with large territories, large populations, and inadequate communications, direct broadcast satellites may offer more rapid and less expensive means of providing these services to their peoples. The rapid development of satellite communication systems has resulted in wide speculation concerning a variety of potential applications.[9] Planners have been experimenting with possible applications that take advantage of the particular capabilities of this technology.

Experimental Satellite Programs

Since 1966 experimental communications satellites in the non-communist world have been launched by the United States,

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[9] J. Hanessian, Jr. and J.B. Margolin, "Broadcast Satellites: Their Potential Use for Educational Purposes and Their Relationship to International Understanding and Cooperation," Occasional Paper no. 3, Program of Policy Studies in Science and Technology (The George Washington University, Washington, D.C; July 1969), p. 1.

Canada, the European Space Agency (ESA), Germany, France, Italy, and Japan. The most far-reaching and elaborate experimental satellite programs thus far include the Appalachian Regional Commission Project, as well as the Alaska experiments in the U.S., the Memorial University Telemedicine Project in Canada, and the Indian Satellite Instructional Television Experiment (SITE).[10]

Of the experimental satellite programs to date, perhaps the most encompassing has been the National Aeronautics and Space Administration's (NASA's) Applications Technology Satellite (ATS) program. In 1966, NASA began the launching of a series of six Applications Technology Satellites (ATS) to test and improve satellite communications. The last of the series, ATS-6 was the largest and the most powerful communication satellite. ATS-6 was launched on May 30, 1974 to conduct an extensive series of both technical and non-technical experiments. It was designed to test, among other things, educational broadcasting to dispersed rural populations. The Appalachian Educational Satellite Project was one such experiment. The experimental effort was designed to deliver programs to meet diverse educational needs of the Appalachian region. The success of these ATS-6 experiments demonstrated that this technology can play a major role in educational applications.

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[10] Anna Casey-Stahmer, "The Era of Experimental Satellites: Where to go from Here," Journal of Communication, v. 29, n. 4, (Fall 1979), p. 138.

The capabilities of this technological medium to deliver the instructional television messages to remote areas and to many places at one time was realized by the Government of India. The United States agreed to provide one of its applied-technology satellites (ATS-6) to India for a period of one year. India, in conjunction with the United States, planned the Satellite Instructional Television Experiment (SITE).

Statement of the Problem

During August 1975-July 1976, India conducted a pilot project known as the Satellite Instructional Television Experiment (SITE). India was the first country to use a direct broadcast satellite capable of transmitting television programs directly to community receivers. SITE is the first application to include education of a mass rural population as a major component. Its importance lies in the fact that it was the first large scale project undertaken by a developing country in the broadcast satellite technology area. It was considered as a pioneering project in the developing world.

The main purpose of this study is to make a thorough analysis of the Satellite Instructional Television Experiment that was conducted in India during the year 1975-76. It was an example of an experiment in the application of a direct broadcast satellite to reach remote areas directly with educational information. Experiences and outcomes of the project will be identified and studied. The implications of this new technological innovation will be studied to provide a data base for planning future satellite-based television systems in developing countries.

Also, the evaluation techniques of the Satellite Instructional Television Experiment will be compared with those of the Appalachian Education Satellite Project that was carried out in the United States during the year 1974-75. Such a comparison will serve to bring out the similarities and differences in the use of a direct broadcast satellite. Further, this could provide a comprehensive picture of the extent and nature of its use from which other countries may benefit. A logical background for recommendations for future endeavors can be developed from such a study.

From this analysis, information could emerge pertaining to a host of problems that may be faced by countries seeking to develop similar projects. Some of the knowledge from the experiments can and perhaps will be used for developing broadcast satellite systems around the world. It could provide answers to many of the questions that communication experts, educators, and others have asked about the operational feasibility of using satellites in developing countries.

Research Procedures

Both historical and descriptive research procedures have been adopted in this study to accomplish the stated purpose. Every attempt has been made to match the procedures to the type of problem under investigation.

The historical research procedure has been applied to trace the origin, implementation, and implications of the SITE in order to provide a background for later analysis. This procedure requires extensive utilization of primary sources. Secondary sources have been cited to provide additional or supplementary information.

The following three major steps of historical research suggested by Good (1963) have been taken into consideration for analysis, treatment and presentation.

1. Collection of data, with consideration of documents and remains or relics of primary and secondary sources of bibliographical procedure and of organization of material.

2. Criticism of the data collected including the process of external criticism and internal criticism.

3. The presentation of the facts in readable form involving problems of organization, composition and interpretation.[11]

Classification, the recognition of similarities and differences among experiences is a basic process in descriptive study.[12] Hence, this procedure was used in

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[11]Carter V. Good, Introduction to Educational Research, 2nd Edition, (Meridith Publishing Company, New York, 1963), p. 190.

[12]Ibid., p. 247.

identifying the major similarities and differences between the Satellite Instructional Television Experiment (SITE) and the Appalachian Education Satellite Project (AESP). The evaluation techniques of the SITE have been compared with those of the AESP to make possible recommendations for future developments in broadcast satellite technology.

Data Collection

The relevant data were obtained from primary as well as secondary sources. Primary sources included official circulars, documents, official speeches, bibliographies, United States and Indian Government documents, the documents of the Indian Space Research Organization, and the National Aeronautics and Space Administration.

Secondary data were gathered from books, articles (periodicals), reports, case studies, literature reviews, published sources and other publications. In addition to a manual literature search, a computerized procedure was employed to identify research reports, documents, and periodical articles on the application of broadcast satellite technology to educational development. Computer services offered by Educational Resources Information Center (ERIC) for acquiring, selecting, abstracting, indexing, retrieving, and disseminating educational research reports from within and outside the United States were employed. The computer printout provided abstracts of 41 related studies.[13]

Tables, maps, diagrams and statistical charts have been used where necessary and/or desirable.

Significance of the Study

This study will analyze India's satellite instructional television experiment. It will discuss the way in which experiences gained in India can be shared by other developing countries. The educational aspects of the experiment will be highlighted. Such an analysis will be required to examine whether a direct broadcast satellite is a desirable and feasible solution to the development of education.

A study of the experiment will provide real evidence of the value of satellite broadcasting and will stimulate greater interest in the development of satellite systems. The future of such systems depends on the outcomes of related studies. It can act as a catalytic force for new endeavors in satellite applications.

The present study would be of value in providing guidelines to administrators, policy makers, and broadcasters in developing countries who have not had previous experience in broadcast satellite technology. It will be of relevance to the growing awareness among peoples

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[13]The author used the ERIC system for literature search at the Oklahoma State University Computer Center. Search Topic: Communications Satellites and Developing Nations

and national governments of the need to provide education to the large masses of the world population. Developers and administrators of developing countries may think of adopting the new technology to their nations' educational development.

This study also compares the evaluation techniques of the Satellite Instructional Television Experiment with those of the Appalachian Education Satellite Project. It is hoped that this comparison will provide an enhanced capability for addressing many of the questions associated with the operational feasibility of using direct broadcast satellites in various parts of the world.

Thus, the significance of the study lies in the value of information that would be generated and discussed. The present analysis in no way represents a final analysis. It represents the author's opinions on this instructive experiment. These will be clearly identified as such, and should not be construed as being reflective of the views of those persons or government agencies who were actually involved in the project.

Limitations of the Study

This study will deal with the Satellite Instructional Television Experiment (SITE) conducted in India during the one year period August 1975 - July 1976. The scope of the study will be limited to the educational aspects of the experiment. Neither extensive analysis of technical equipment operation nor of hardware is viewed as a major concern of this study. It will restrict itself to a discussion of the evaluation techniques of the SITE as well as the Appalachian project aimed at pointing out their similarities and the major areas in which they differed.

This study will attempt to provide a comprehensive picture of the extent and nature of the application of a broadcast satellite to the educational needs of a country. It is intended to point out the issues and options to be considered in the integration of a future educational broadcast satellite system.

Organization of Dissertation

Chapter II deals with the main features and the existing patterns of the present educational system and mass media in India.

Chapter III examines the development and application of broadcast satellites for education. This chapter also reviews the controversies and effectiveness of broadcast satellites for education.

Chapter IV focuses on the Indian Experiment with Satellite Instructional Television. It provides a description of the experiment, problems encountered, and the planned outcomes of the project. A section of this chapter is also devoted to a discussion of the similarities and major differences between the evaluation techniques of the Satellite Instructional Television Experiment (SITE) and the

Appalachian Educational Satellite Project (AESP).

The final chapter (Chapter V), presents a summary of the study along with a discussion related to lessons learned, potentials, implications, and observations regarding probable future developments.

Definition of Terms

Satellite: A relatively small body, natural or artificial, which revolves around another larger body and which has a motion primarily and permanently determined by the force of attraction of the larger body.

Communications Satellite: A communications satellite is a radio relay in the sky. Signals are sent to it from antennas on earth; it amplifies the signals and sends them back. Satellites can handle a large amount of traffic simultaneously.

Broadcasting Satellites: Satellites which are capable of transmitting radio and television programs directly to home receivers are called broadcasting satellites.

Education: The aggregate of all the processes by means of which an individual gains knowledge or insight or develops skills, attitudes, and other forms of behavior of positive value in the society in which he lives.[14]

Formal Education: This includes organized instruction by teachers in institutions such as schools or universities.

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[14] Carter V. Good, ed., Dictionary of Education 1973, (McGraw-Hill Book Co., New Jersey, 1973), p. 202.

Informal Education: This involves learning from people and agencies whose primary purpose is something other than organized instruction (for example: spreading the knowledge of innovations for improving health, nutrition, etc.). These agencies include the family or other social groups or contacts with communications media such as newspapers, books, radio, films, or television.

Instructional Television: Instructional television refers to any planned use of video programs to meet specific instructional goals regardless of the source of the programs (including commercial broadcasts) or the setting in which they are used (including business/industry training).[15] For the purpose of this study no distinction is made between instructional and educational television.

All India Radio (AIR): All India Radio is a wing of the Department of Information and Broadcasting of the Government of India responsible for radio and television broadcasting. It is a national broadcasting network. The television set-up was separated from All India Radio on April 1,1976 and was named Doordarshan, which was responsible for most of the SITE programming.

The Ministry of Information and Broadcasting: The Ministry of Information and Broadcasting is the name of the official department of information and broadcasting headed

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[15] Robert Heinich, Michael Molenda, and James D. Russell, Instructional Media And The New Technologies of Instruction (New York: John Wiley and Sons, 1982), p. 215.

by a minister who is a member of the council of ministers in India. The main function of this ministry is to maintain official control over radio, television, imported and locally produced films, and providing guidance to press and publications. It produces, distributes, and shows informational motion pictures, documentary films, pamphlets, magazines, and other printed materials. It establishes the policy of the communications media.

Department of Atomic Energy (DAE): The Department of Atomic Energy is an organization of the Government of India which is responsible for research and development in the area of nuclear technology. The responsibilities include generation of commercial nuclear power and application of nuclear technology in the areas of agriculture, industry, medicine, etc.

Indian Space Research Organization (ISRO): The Indian Space Research Organization is an organization of the Government of India which plans, manages, and executes the growing activities in space science, space technology, and space applications.

National Aeronautics and Space Administration (NASA): The National Aeronautics and Space Administration is a United States Government Agency responsible for civilian aeronautical, and space research programs.

Applications Technology Satellite-6 (ATS-6): Applications Technology Satellite-6 is the sixth and the last of NASA's experimental satellites intended to demonstrate major advances in communications and spacecraft technology. It is the most powerful, most sophisticated, most versatile communications satellite.

Earth Station: A station located either on the earth's surface or within the major portion of the earth's atmosphere for communication:

____with one or more space stations; or

____with one or more stations of the same kind by means of one or more passive satellites or other objects in space.[16]

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[16] Kenneth A. Polcyn, An Educator's Guide to Communication Satellite Technology (Washington D.C: Academy for Educational Development, September 1973), p. 92.

CHAPTER II

INDIA - HER LAND AND HER PEOPLE

Introduction

Before attempting to discuss India's educational system and communications systems, it is necessary to have some understanding of its geographical, topographical and climatic conditions, as well as an introduction to the people, and languages within the country.

> The triangular peninsula jutting into the Indian ocean with its apex pointing southward from the continent of Asia, delineated in the north by the steeply rising Himalaya Mountains, and in the east and west by its flanking off-shoots, has been historically known as the Indian sub-continent.[1]

India is the seventh largest country in area and the second most populous in the world. The country is divided into 22 states and 9 union territories. It has an area of 3,287,782 square kilometers, about one half that of the United States. It measures 3,214 kilometers from north to south and about 2,933 kilometers from east to west. It has a land frontier of about 15,200 kilometers and a coast line of about 6,100

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[1]Ranjit Tirtha, Society and Development In Contemporary India: Geographical Perspectives (Harlo Press, Detroit, Michigan, 1980), p. 24.

kilometers.[2]

Physical Background

The massive Himalayan mountain wall is to the northeast side of India along which India shares borders with the People's Republic of China, Nepal, and the small mountain kingdoms of Sikkim and Bhutan. Mountains also separate India and Burma, on the eastern border. Bangladesh is wedged in between the Indian states of Assam and West Bengal. In the northwest, Pakistan and Afghanistan border on India. In the south, the country stretches across the Tropic of Cancer and forms a peninsula with the Arabian sea to the west and the Bay of Bengal to the east. Sri Lanka lies just off India's southern tip in the Indian Ocean (see Figure 1).

The Land

The mainland has three well-defined regions, namely, the great mountain zone, the Indo-Gangetic plain, and the southern peninsula. In the northern parameters of the subcontinent lies the long, sweeping mountain chain of the Himalayas. Some of the highest peaks in the world are found in these ranges.

The Indo-Gangetic Plain is formed by the basins of three river systems, the Indus, the Ganges, and the

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[2] Ministry of Information and Broadcasting, India: A Reference Annual 1981 (New Delhi, December 1981), p. 2.

Figure 1. A Physical Map of India

Brahmaputra. This plain is over 2,400 kilometers in length and 240 to 320 kilometers in width.[3]

The peninsular plateau is separated from the Indo-Gangetic Plain by mountains and hill ranges. It is flanked on both the eastern and western sides by mountain ranges. Coastal strips exist between these mountain ranges and the ocean on both sides.

Climate

India has a great diversity of climates with many striking contrasts of meteorological conditions characteristic of the Tropics as well as the Temperate zones.[4] The climate is controlled by the seasonal winds known as monsoons. The Meteorological Department of India divides the Indian year into four seasons.

i. Cold Weather season (December to March)

ii. Hot Weather season (April to May)

iii. Rainy season (June to September)

iv. Season of the retreating south-west monsoon or post-monsoon period (October to November).[5]

In the south, a year-round tropical climate prevails. In the north, the sub-freezing winters of the Himalayan area present the other extreme. The rainfall is erratic and ill-

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[3]Ibid., p. 2.

[4]Supriya Sarkar, ed., Hindustan Year-Book And Who's Who 1981 (Calcutta, 1981), p. 18.

[5]Ibid., p. 19.

distributed. It varies from place to place and from year to year.

The People

India is the second most populous country in the world. Containing over 15 percent of the world's population on only 2.5 percent of its area, India's population of 746 million (estimate for 1983), far exceeds the combined populations of the United States of America and the Soviet Union. Its current annual rate of growth of 1.9 percent (World Population Data Sheet, 1979), has been steadily increasing. The country is adding 12 million persons - almost Australia's total population to its existing numbers every year.[6] Table I shows population growth since 1911.[7]

The average density of population per square kilometer in 1981 was 221, one of the highest in the world for countries of equal or larger size (see Table II).[8] It varied considerably from state to state (see Table III[9] and Figure 2[10]).

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[6]Ranjit Tirtha, Society and Development In Contemporary India: Geographical Perspectives (Harlo Press, Detroit, Michigan, 1980), p. 20.

[7]Ministry of Information and Broadcasting, India: A Reference Annual 1981 (New Delhi, December 1981), p. 7.

[8]Ibid., p. 8.

[9]Ibid.

[10]Area Handbook for India 1975 (U.S. Government Printing Office, Washington D.C., 1975), p. 95.

TABLE I

GROWTH OF POPULATION (1911-1981)

State/Union Territory	1911	1921	1931	1941	1951	1961	1971	1981
INDIA . .	25,20,93,390	25,13.21,213	27,89,77,238	31,86,60,580	36,10,88,090	43,92,34,771	54,81,59,652	68,38,10,051
States								
Andhra Pradesh	2,14,47,412	2,14,20,448	2,42,03,573	2,72,89,340	3,11,15,259	3,59,83,447	4,35,02,708	5,34,03,619
Assam	38,48,617	46,36,980	55,60,371	66,94,790	80,28,856	1,08,37,329	1,46,25,152	1,99,02,826
Bihar	2,83,14,281	2,81,26,675	3,13,47,108	3,51,70,840	3,87,82,271	4,64,47,457	5,63,53,369	6,98,23,154
Gujarat	98,03,587	1,01,74,989	1,14,89,828	1,37,01,551	1,62,62,657	2,06,33,350	2,66,97,475	3,39,60,905
Haryana	41,74,690	42,55,905	45,59,931	52,72,845	56,73,614	75,90,543	1,00,36,808	1,28,50,902
Himachal Pradesh	18,96,944	19,28,206	20,29,113	22,63,245	23,85,981	28,12,463	34,60,434	42,37,569
Jammu And Kashmir	22,92,535	24,24,359	26,70,208	29,46,728	32,53,852	35,60,976	46,16,632	59,81,600
Karnataka	1,35,25,251	1,33,77,599	1,46,32,992	1,62,55,368	1,94,01,956	2,35,86,772	2,92,99,014	3,70,43,451
Kerala	71,47,673	72,02,127	95,07,050	1,10,31,541	1,35,49,118	1,69,03,715	2,13,47,375	2,54,03,217
Madhya Pradesh	1,94,40,965	1,91,71,750	2,13,55,657	2,39,90,608	2,60,71,637	3,23,72,408	4,16,54,119	5,21,31,717
Maharashtra	2,14,74,523	2,08,49,666	2,39,59,300	2,68,32,758	3,20,02,564	3,95,53,718	5,04,12,235	6,26,93,898
Manipur	3,46,222	3,84,016	4,45,606	5,12,069	5,77,635	7,80,037	10,72,753	14,33,691
Meghalaya	3,94,005	4,22,403	4,80,837	5,55,820	6,05,674	7,69,380	10,11,699	13,27,874
Nagaland	1,49,038	1,58,801	1,78,844	1,89,641	2,12,975	3,69,200	5,16,449	7,73,281
Orissa	1,13,78,875	1,11,58,586	1,24,91,056	1,37,67,988	1,46,45,946	1,75,48,846	2,19,44,615	2,62,72,054
Punjab	67,31,510	71,52,811	80,12,325	96,00,236	91,60,500	1,11,35,069	1,35,51,060	1,66,69,755
Rajasthan	1,09,83,509	1,02,92,648	1,17,47,974	1,38,63,859	1,59,70,774	2,01,55,602	2,57,65,806	3,41,02,912
Sikkim	87,920	81,721	1,09,808	1,21,520	1,37,725	1,62,189	2,09,843	3,15,682
Tamil Nadu	2,09,02,616	2,16,28,518	2,34,72,099	2,62,67,507	3,01,19,047	3,36,86,953	4,11,99,168	4,82,97,456
Tripura	2,29,613	3,04,437	3,82,455	5,13,010	6,39,029	11,42,005	15,56,342	20,60,189
Uttar Pradesh	4,81,54,908	4,66,72,398	4,97,79,538	5,65,35,154	6,32,19,655	7,37,54,554	8,83,41,144	11,08,58,019
West Bengal	1,79,98,769	1,74,74,348	1,88,97,036	2,32,29,552	2,62,99,980	3,49,26,279	4,43,12,011	5,44,85,560
Union Territories								
Andaman & Nicobar Is.	26,459	27,086	29,463	33,768	30,971	63,548	1,15,133	1,88,254
Arunachal Pradesh	--	--	--	--	--	3,36,558	4,67,511	6,28,050
Chandigarh	18,437	18,133	19,783	22,574	24,261	1,19,881	2,57,251	4,50,061
Dadra & Nagar Haveli	29,020	31,048	38,260	40,441	41,532	57,963	74,170	1,03,677
Delhi	4,13,851	4,88,452	6,36,246	9,17,939	17,44,072	26,58,612	40,65,698	61,96,414
Goa, Daman & Diu	5,19,222	5,00,904	5,41,710	5,83,736	5,96,059	6,26,667	8,57,771	10,82,117
Lakshadweep	14,555	13,637	16,040	18,355	21,035	24,108	31,810	40,237
Mizoram	91,204	98,406	1,24,404	1,52,786	1,96,202	2,66,063	3,32,390	4,87,774
Pondicherry	2,57,179	2,44,156	2,58,628	2,85,011	3,17,253	3,69,079	4,71,707	6,04,136

TABLE II

THE DENSITY OF POPULATION AND THE PERCENTAGE INCREASE OF POPULATION BETWEEN 1921 AND 1981

Year	Density per sq km	Decade	Percentage Increase in population
1921 . .	81		
1931 . .	90	1921-31	11.0
1941 . .	103	1931-41	14.2
1951 . .	117	1941-51	13.3
1961 . .	142	1951-61	21.5
1971 . .	177	1961-71	24.8
1981* . .	221	1971-81	24.7

Note: Density worked out after excluding the population and area figures of Jammu and Kashmir.
*Provisional

India's efforts to raise its living standards and develop its economy has continued to be seriously impeded by the unchecked growth of its massive population. Inaugurating the Asian Population Conference at Delhi in December 1963, the late Prime Minister of India, Pandit Jawaharlal Nehru said:

> Our countries go in for planning for economic and social growth; but it is obvious that planning depends upon how you plan for; how many people you plan for? Unless you have a fair idea of the population of a country as it is going to be, it is difficult to plan in the air. Population growth becomes highly important, not only for planning but for general welfare, social well-being of the country.[11]

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[11]S.L. Ogale, The Tragedy of Too Many (Academic Books Ltd., Bombay, 1970), p. 41.

TABLE III

AREA, POPULATION AND DENSITY BY STATES

State/Union Territory	Area[2] (sq km)	Population[1] 1981	Density[1] of population per sq km
INDIA . . .	32,87,782[5]	68,38,10,051	221[3]
States			
Andhra Pradesh .	2,76,814	5,34,03,619	194
Assam . . .	78,523	1,99,02,826	254
Bihar . . .	1,73,876	6,98,23,154	402
Gujarat . . .	1,95,984	3,39,60,905	173
Haryana . . .	44,222	1,28,50,902	291
Himachal Pradesh	55,673	42,37,569	76
Jammu & Kashmir[4]	2,22,236[5]	59,81,600	NA
Karnataka . . .	1,91,773	3,70,43,451	193
Kerala . . .	38,864	2,54,03,217	654
Madhya Pradesh .	4,42,841	5,21,31,717	118
Maharashtra . .	3,07,762	6,26,93,898	204
Manipur . . .	22,356	14,33,691	64
Meghalaya . . .	22,489	13,27,874	59
Nagaland . . .	16,527	7,73,281	47
Orissa . . .	1,55,782	2,62,72,054	169
Punjab . . .	50,362	1,66,69,755	331
Rajastan . . .	3,42,214	3,41,02,912	100
Sikkim . . .	7,299	3,15,682	44
Tamil Nadu . .	1,30,069	4,82,97,456	371
Tripura . . .	10,477	20,60,189	196
Uttar Pradesh .	2,94,413	11,08,53,019	377
West Bengal . .	87,853	5,44,85,560	614
Union Territories			
Andaman & Nicobar Is.	8,293[6]	1,88,254	23
Arunachal Pradesh	83,578	6,28,050	7
Chandigarh . .	114	4,50,061	3,948
Dadra & Nagar Haveli	491	1,03,677	211
Delhi . .	1,485	61,96,414	4,178
Goa, Daman and Diu	3,813	10,82,117	284
Lakshadweep . .	32	40,237	1,257
Mizoram . .	21,087	4,87,774	23
Pondicherry . .	480	6,04,136	1,228

[1]Provisional; [2]Provisional, as on July 1, 1971.
[3]Jammu & Kashmir figures excluded (not available).
[4]Projected figures for 1981.
[5]Includes area under illegal occupation of Pakistan & China.
[6]As on January 1966; N.A. - Not Available

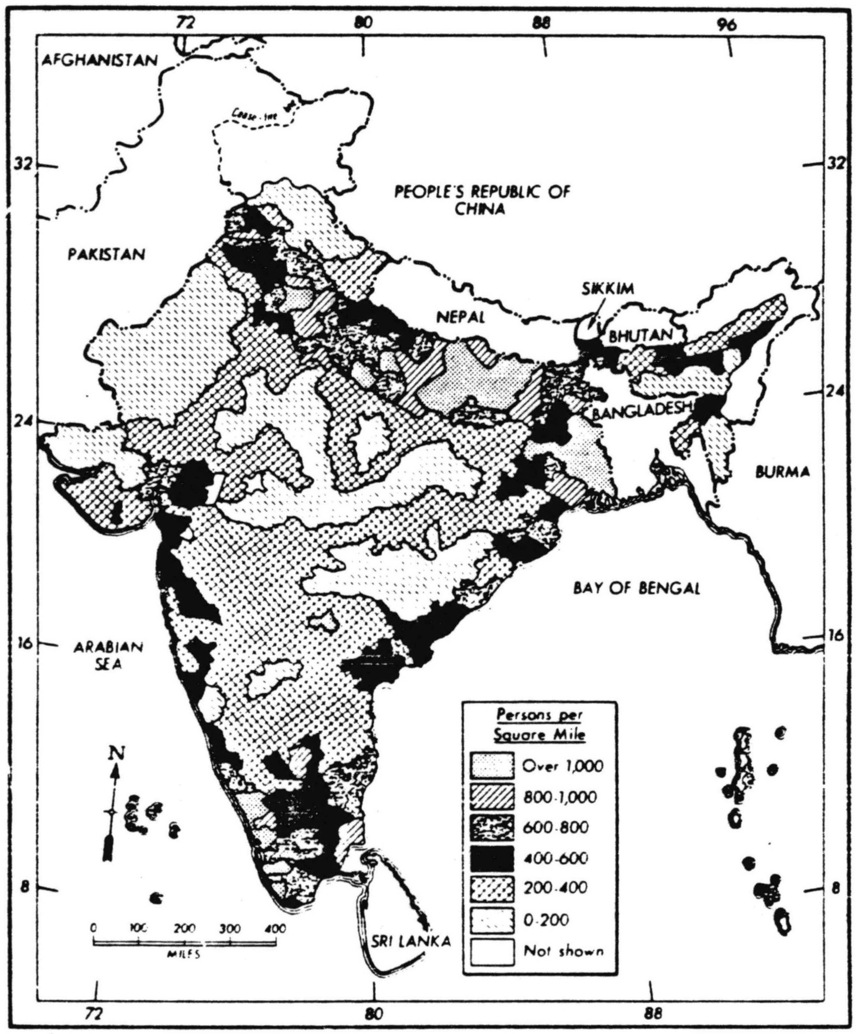

Figure 2. Density of Population

Population explosion is a primary factor in most of the country's major issues such as high illiteracy rate of the general population, inadequate supply of food, urbanization squalor, lack of universal education at the primary level, unemployment, etc. The campaign to promote family planning has had limited success in comparison to the size of the problem.

Literacy

India has one of the largest illiterate populations in the world. An overwhelming majority of the Indian people live in villages (80.1 percent in 1971).[12] With a great majority of the population being rural and with the absence of a national network of rural schools, the problem of literacy has been a formidable one.[13] Despite improvements in the literacy levels during the recent years, only 36.2 percent of the total population could read and write in 1981. Tables IV and V present the literacy figures for the country at each census year.[14]

The tables indicate that nearly half the males and three fourths of the females in the country are illiterate.

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[12] Ranjit Tirtha, Society and Development In Contemporary India: Geographical Perspectives (Harlo Press, Detroit, Michigan, 1980), p. 243.

[13] Girilal Jain, ed., The Times of India Directory and Yearbook Including Who's Who 1980-81 (The Times of India Press, 1980-81), p. 272.

[14] Ministry of Information and Broadcasting, India: A Reference Annual 1981 (New Delhi, December 1981), p. 9.

Nearly 64 percent of the people are still illiterate.[15]

Literacy differences between urban and rural populations are very striking. In 1971, urban literacy was 52.4 percent compared with the rural literacy percentage of 23.6.[16] Figure 3 shows the distribution of literacy indicating the broad regional disparities.[17] Areas of higher literacy are concentrated in the urbanized areas.

Languages

Because of the great diversity of languages, India is commonly referred to as a multilingual nation. A number of languages and dialects are spoken in the country. The Linguistic Survey of India of 1927 listed 179 languages and 544 dialects spoken within the country, while the census of 1961 recorded 1,018 different languages and dialects.[18] The Constitution of India recognizes 15 major languages. These are: Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Malayalam, Marathi, Oriya, Punjabi, Sanskrit, Sindhi, Tamil, Telugu and Urdu (see Table VI).[19] These languages are used by over 90 percent of the population and have been the

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[15]Ibid., p. 11.

[16]Ranjit Tirtha, Society and Development In Contemporary India: Geographical Perspectives (Harlo Press, Detroit, Michigan, 1980), p. 96.

[17]Ibid., p. 97.

[18]Ibid., p. 119.

[19]Ibid., p. 120.

TABLE IV

PERCENTAGE OF LITERACY 1901-1981

Year	Persons	Males	Females
1901	5.35	9.83	0.60
1911	5.92	10.56	1.05
1921	7.16	12.21	1.81
1931	9.50	15.59	2.93
1941	16.10	24.90	7.30
1951	16.67	24.95	7.93
1961	24.02	24.44	12.95
1971	29.45	39.45	18.69
1981	36.17	46.74	24.88

TABLE V

LITERACY RATE PER 1000 IN INDIA BY SEX

Year	Males	Females	Persons
1901 . . .	98	6	53
1911 . . .	106	11	59
1921 . . .	122	18	72
1931 . . .	156	29	95
1941 . . .	249	73	161
1951 . . .	249	79	167
1961 . . .	344	130	240
1971 . . .	395	187	294
1981 . . .	467	249	362

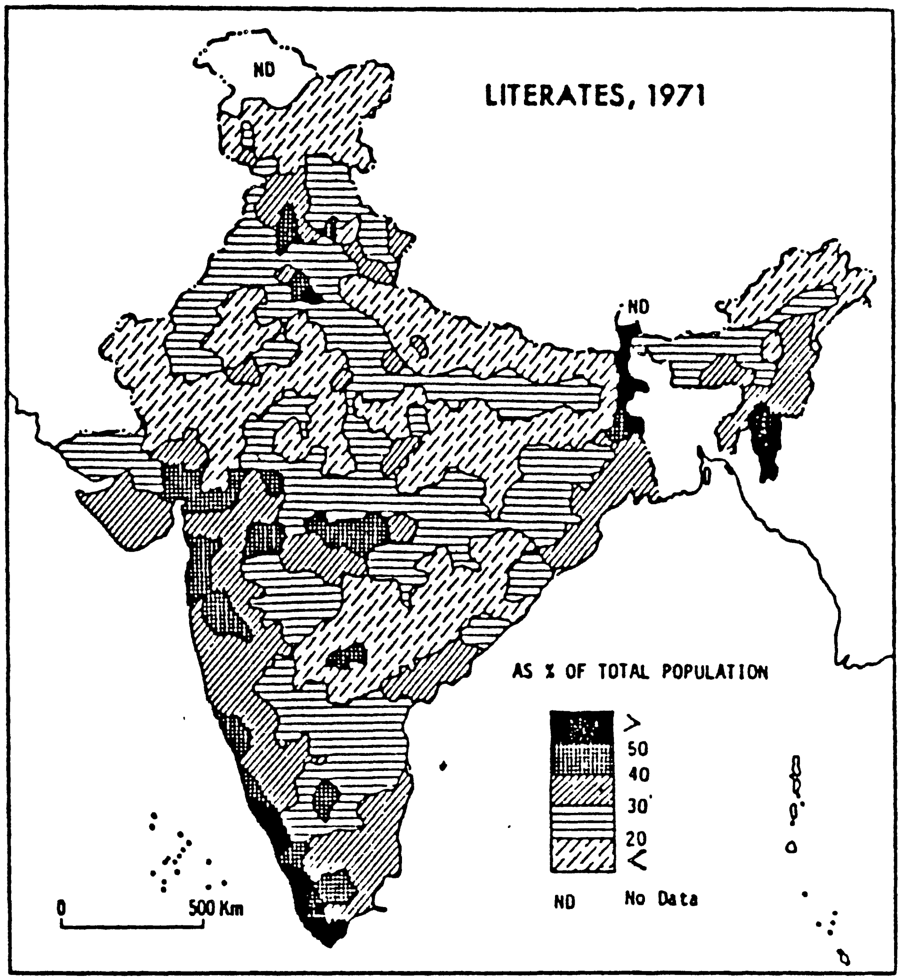

Figure 3. Distribution of Literacy

TABLE VI

LANGUAGES SPECIFIED IN THE CONSTITUTION

Language	Speakers in Millions	In percentage of Total Population
Hindi	163	30.0
Bengali	45	8.0
Telugu	45	8.0
Marathi	43	8.0
Tamil	38	7.0
Gujarati	26	5.0
Malayalam	22	4.0
Kannada	22	4.0
Oriya	20	4.0
Punjabi	15	3.0
Assamese	9	1.6
Kashmiri	2	0.4
Sanskrit	(2212 persons)	(2212 persons)
Sindhi	2	0.4
Urdu	29	5.0

linguistic basis for the Indian States.

As a result of this profusion of linguistic forms, language is a highly problematic element in national cohesion. The English language is accepted as an official associate language of the central government along with Hindi, the official language at the central level. English is the "link-language" between various states and is the most important language of academic communication at higher education levels.

Religious Communities

India's amazing diversity is also shown in her religions. According to a recent census (Central Intelligence Agency - The World Factbook, 1983, U.S. Census Bureau), Hindus numbered 83.5 percent of the total population and Muslims formed approximately 10.7 percent. Christians (2.6%), Sikhs (1.8%), Buddhists (0.7%), Jains (0.5%), and other religious communities constituted the rest of the population.[20]

Educational System

The Indian educational system is highly decentralized. Under the Constitution, education is the direct responsibility of the state governments. The state governments are fully autonomous in regard to their educational programs except those for which they receive grant-in-aid from the central government. By a constitutional amendment in 1976, the state and central governments were given the joint responsibility to coordinate technical, medical, and university level education. However, certain specific powers and responsibilities are reserved for the central government. The Central Ministry of Education is directly responsible for administration and maintenance of seven national universities, institutions for professional, vocational and

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[20] USA Today, (November 1, 1984), p. 2A.

technical training or research, and the University Grants Commission (UGC). The UGC is responsible for determining standards in higher education.

The states and the central government share responsibility for the provision of free and compulsory education for all children up to the age of fourteen years and the promotion of education of the weaker sections, scheduled castes, and tribes.

The central government exercises its responsibilities for education through the Ministry of Education. The Minister of Education is assisted by a Minister of State, a Deputy Minister, and an Educational Secretariat. The agencies that discharge central government obligations are: the University Grants Commission (UGC), the Council of Scientific and Industrial Research (CSIR), the National Council of Educational Research and Training (NCERT), and the Central Hindi Directorate. The Ministry of Education with its subsidies and grants carries out its educational responsibilities of advising and coordinating the states through specialized agencies (see Figure 4).[21]

At the state level, education is handled by the state ministries of education, and in the cities by school boards under the supervision of the state ministry of education and the municipal governments. Local school boards are

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[21] Alexander Melzer, The Social Use of India's Television Satellite: A Technology Assessment of the INSAT Proposal (Center for Economic Research, Swiss Federal Institute of Technology, Zurich, 1974), Volume II, p. 58.

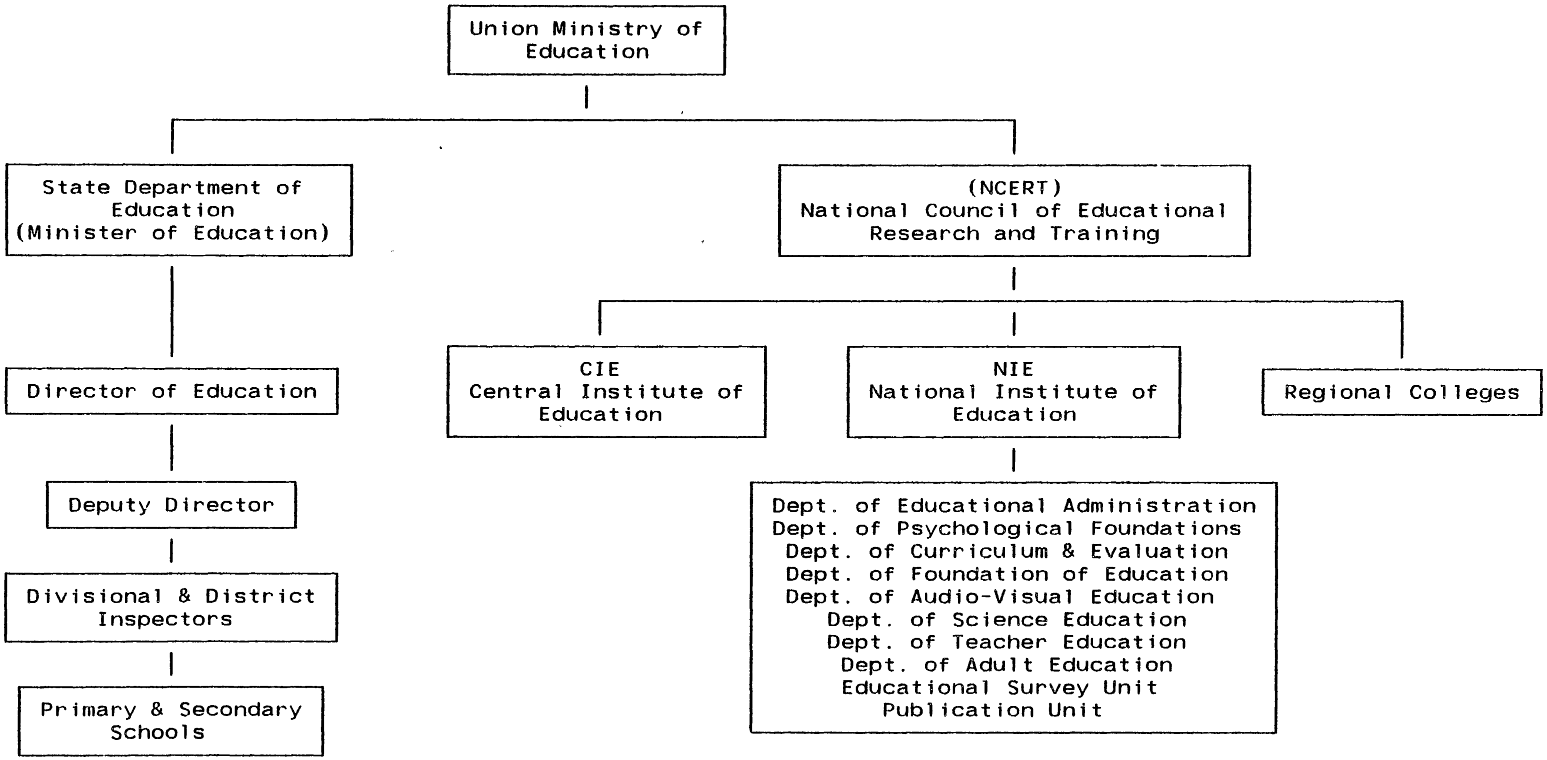

Figure 4. Administration of Education in India

supervised either by the district board or the Panchayat (village council) and are responsible for education in the rural areas.

Education is funded mainly by state governments. The central government does provide financial assistance at the higher education level.

A national pattern for school education was adopted in 1968 upon the recommendations of the Education Commission of 1964. A uniform pattern of 15 years of education with a formula of 10+2+3, was introduced. The duration of 15 years is comprised of 10 years of primary and secondary education, 2 years of higher secondary education, and 3 years for the first university degree.

Education is free and compulsory from age 6 to 14. The most common levels of schools are the Primary, the Secondary, and the College or University. Education at the primary and secondary levels in each state is conducted in the language of the state except for a minority of missionary, private, and central government schools. Although most states have accepted the three-language formula for education - regional language or mother tongue, Hindi or English, and another Indian language - not all have implemented it.[22]

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[22] Area Handbook for India 1975 (U.S. Government Printing Office, Washington D.C., 1975), p. 234.

Primary Education

Primary Education begins at the age of 6 (in some states at 5), and it generally lasts 5 years.

Secondary Education

Secondary Education starts at the age of 11 and usually lasts 7 years. There are differences among the states with regard to duration, age of entrance, etc.

University and Higher Education

Education at the University level is characterized by a unique pattern of universities and affiliated colleges. Higher education is imparted through universities and through a large number of arts, science, commerce, and professional colleges affiliated to them. There are at present 108 universites.[23] Arts and science colleges offer general education and professional colleges provide instruction in the fields of commerce, medicine, engineering and education.

The colleges and universities offer a three-year degree program. This bachelor degree is referred to as the first degree. The master's degree in the arts, science and commerce requires a two-year program after the first degree.

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[23] Ministry of Information and Broadcasting, India: A Reference Manual 1981 (New Delhi, December 1981), p. 48.

Adult Education

Illiteracy among adults is receiving special attention through the National Adult Education Program introduced in 1978. This program provides basic literacy skills to the vast majority of illiterate persons in the age group 15 to 35. Informal education programs in both urban and rural areas have helped millions during the 1970s. But the needs of the country far exceed the available resources.

Teacher Education

Teacher training for lower primary education (classes I to IV) is a two-year program. High school graduates, after completing two years of training in teachers' school, start teaching at the pre-primary and primary levels. Training for teachers at higher secondary levels is given by universities and colleges or institutions affiliated to them. The prospective teacher is required to hold a bachelor's degree in arts, science, or commerce. The training is for a period of one year. The teacher training program is supervised by the university though the instruction is conducted in the affiliated colleges or institutions.

There are in-service courses to reduce the number of untrained teachers. However, the professional education of teachers has been neglected in India. The curricula and methods followed in the teachers' colleges are highly traditional. A large proportion of the teachers are untrained at all levels and there are regional differences too.

Problems in Education

The educational problems of India are of great magnitude. Though developments in education have taken place, they cannot cope with the growing population of the country. The failure to achieve universal primary education has affected the literacy rate. 64 percent of the people are still illiterate.[24]

Poverty, shortage of trained teachers, widespread adult illiteracy, inadequacies in the number of libraries and school buildings, lack of adequate funding, etc. have affected the fundamental quality of education. At the primary level, the main education problems are irregular attendance, high drop-out rates, over-crowded classrooms, lack of equipment, text books, health and nutrition deficiencies, etc.[25]

The most acute and persistent difficulties are in the rural areas. Eighty percent of the schools are in poor rural environments. Normally, only a small, single room facility is available wherein five classes are held each day. The Indian Education Commission (1966) noted the high incidence of dropouts, failures, and low-level passes in the

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[24] Area Handbook for India 1975 (U.S. Government Printing Office, Washington D.C., 1975), p. 239.

[25] Ibid.

school leaving examinations. The Commission commented that the picture was particularly dismal in the rural areas and especially in the primary schools.[26]

Low salaries and reluctance of educated people to reside in the rural areas have hampered the recruitment and diffusion of teachers needed to reach the goal of universal compulsory education through the primary level by 1981.[27] The size of the country and lack of adequate communications networks have made the situation worse.

Major problems facing Indian educators continue to be raising the qualifications, status, and salaries of teachers, developing textbooks suited to Indian needs, and changing traditional methods of teaching from rote learning to a system that would stress deductive reasoning.

> There are difficulties on the grounds of institutional discrepancies among states; there are differences in the quality of education among states which induce a different view of the problems; there are obstacles on the road to basic reforms since the individual states cannot find together in a common policy.[28]

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[26]Wilbur Schramm, "Communication Satellites for Education and National Development; The case of India," Vol 2, (Washington D.C. - prepared for U.S. Agency for International Development, 1968), p. 49.

[27]Encyclopedia Americana, International Edition, Vol 14, Grolier Incorporated, Danbury, Connecticut, 1982.

[28]Alexander Melzer, <u>The Social Use of India's Television Satellite: A Technology Assessment of the INSAT Proposal</u> (Center for Economic Research, Swiss Federal Institute of Technology, Zurich, 1974), Volume II, p. 67.

Mass Communication

The use of mass communication media for education has gained considerable acceptance in India over the last four decades. During the 1950s and 1960s, educational planners became aware of the potential of the mass media for educational and national development. As generally interpreted, the mass media are the press, films, radio, television, computers, books, posters, etc. In this study, discussion will be confined to the four primary modern mass media in India, namely, the press, films, radio, and television systems.

With India's high rate of illiteracy, her teeming population spread over 600,000 villages, it has become necessary to utilize these media to reach mass rural audiences.[29] Meeting many of the national goals in education and development depends directly on the ability to communicate on a mass basis. This is especially true for the remote villages, which form the backbone of the Indian society.

> In any developing country, one of the prime ingredients of development is the dissemination of information: information about fertilizers, seeds, insecticides, cropping patterns, new goods and services, new living patterns etc. The process of education is basically related to an information dissemination/transfer process. For the rapid and sustained growth of developing countries, the

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[29] Mabel Aranha, "Broadcasting in India: Performance and Promise," Paper presented at the Annual Meeting of AECT, May 5, 1982, Dallas, Texas, p. 2.

> urgent need to disseminate information to the masses is obvious. Mass media are clearly the main component in this system of information transfer...[30]

The communications system is in a transitional stage in India. Information is disseminated in part by government channels and in part by private enterprise. Although information media have expanded since independence (1947), they reach only a minority of the people. Linguistic and regional barriers and urban-rural differences continue to be handicaps in the expansion of the mass media.

Press

Newspapers and news magazines are published in English and in all major Indian languages. Some publications are bilingual and some are multilingual. British influence is apparent in the style, character and format of these publications.

Out of the 17,168 newspapers published in 1979, there were 1,087 dailies, 86 tri/bi-weeklies, 5,023 weeklies and 10,972 other periodicals. Vernacular languages play a more important role in the periodical press than in the daily press. The largest number of newspapers were published in Hindi (4,610), followed by English (3,288) and the rest were

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[30] Alexander Melzer, The Social Use of India's Television Satellite: A Technology Assessment of the INSAT Proposal (Center for Economic Research, Swiss Federal Institute of Technology, Zurich, 1974), Volume II, pp. 19-20.

in other languages.[31] Newspapers in Hindi had the highest circulation (10 million) in 1979. Although there has been an annual increase in circulations, language differences, poverty and illiteracy have hampered the development of the press. Newsprint shortages and financial constraints are other handicaps.

There are only 1.6 copies per 100 persons, as against the minimum of 10 per 100 recommended by UNESCO.[32] In a country with a high rate of illiteracy, the use of printed word is limited. The press is primarily oriented towards the literate urban audience and has failed to touch the illiterate rural. Nearly 93 percent of the total sales of dailies is confined to about 10 percent of the population. The document on the Fourth Five Year Plan of India (1969) acknowledged the problem of a serious information of imbalance within the country.

> In the spread of information facilities, the imbalance in favor of urban concentration and prosperous area continues. There is a need for a deliberate attempt to inform the people in the rural areas and in particular those in backward regions, about the specific schemes in agriculture, forestry, road construction... so that the benefits of this program are more widely spread.[33]

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[31] Ministry of Information and Broadcasting, India: A Reference Manual 1981 (New Delhi, December 1981), p. 139.

[32] Area Handbook for India 1975 (U.S. Government Printing Office, Washington D.C., 1975), p. 288.

[33] G.N.S. Raghavan, "Do Mass Media Reach the Masses? - The Indian Experience," Prospects, Vol X, No. 1, 1980,

Films

India is one of the largest film producers in the world. The film industry produces an average of 400 feature length films every year. The production of feature films is mainly in the hands of private enterprise. Entertainment is the main aspect of the majority of these films. The Films Division of the Ministry of Information and Broadcasting is responsible for producing and distributing newsreels, documentaries, and other films required for public information, education, and instruction. It was recognized that short films were an ideal medium for the masses who could not read or write. This division produces nearly 150 films every year.

Licensing provisions require theater-owners to show upto 2000 feet of government films with each commercial feature.[34] The government has a strict censorship code administered by the Central Board of Film Censors. The movie theaters are concentrated mainly in larger towns and cities. Touring cinemas go around smaller towns and villages. These are very few and a very small percentage of the population is reached by them. Most of the films have an urban bias.

Films for the children are produced mainly by the Children's Film Society. The expenditure of the society is

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p. 91.

[34]Area Handbook for India 1975 (U.S. Government Printing Office, Washington D.C., 1975), p. 303.

met by grants-in-aids from the central government.

Radio

The first radio station in India started its broadcasting service in 1924. All India Radio (AIR) was set up in the late 1930s. With independence in 1947, AIR became the responsibility of the Ministry of Information and Broadcasting of the central government. AIR is a government owned and controlled organization used primarily for informational and educational purposes. The organization is controlled by a director-general, assisted by several deputy directors-general and chief engineer.

The AIR network is one of the largest news organizations in the world. It comprises a countrywide network of 85 stations and 157 transmitters covering 77.5 percent of the geographical areas and 89.3 percent of the population.[35] Programs are produced from the headquarters in New Delhi and from regional centers throughout the country. AIR broadcasts 17 national news bulletins in 19 languages each day. 116 bulletins in 23 languages and 33 tribal dialects are broadcast from regional stations. There are 'external service' transmissions which broadcast 56 hours of programs in 17 foreign languages and 8 Indian languages every day, to listeners abroad.[36] Nearly half of

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[35] Ministry of Information and Broadcasting, India: A Reference Annual 1981 (New Delhi, December 1981), p. 130.

[36] Ibid., p. 360.

AIR's broadcast time is devoted to music, one-fourth to news, and the remaining one-fourth to special broadcasts, dramas, talks, and features. The central program advisory committee is the overall advisory body on programming.[37]

As for the transmission capabilities, shortwave signals are not powerful enough to reach the remote regions of the country. Also, the medium wave transmission does not cover the whole territory of India. The range of most AIR stations is about 50 miles. Because of a total lack of comprehensive long-term communications policy, little has been done to extend the scope of AIR.

Radio Broadcasts for Schools. Programs for schools are broadcast two or three times a week, in 30 minute segments. The programs are based on the school curriculum. Out of the nearly 700,000 schools, only 20,000 own radio sets.[38] The responsibility of the broadcasts rests with AIR and not with any educational organization. The radio support to university correspondence degree courses is provided by several stations. Because of the limited range of these stations, it is difficult to reach students in remote areas with educational broadcasts.

Radio Broadcasts for Rural Areas. AIR broadcasts programs for rural listeners for about 30 to 75 minutes every day.

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[37] Area Handbook for India 1975 (U.S. Government Printing Office, Washington D.C., 1975), p. 300.

[38] Keval J. Kumar, Mass Communication in India, (Jaico Publishing House, Bombay, India, 1981), p. 66.

They issue weather bulletins and keep farmers informed on the use of fertilizers, pests, seeds and new farming techniques. About 70,000 community receivers have been installed in a number of villages throughout the country. A countrywide scheme of Radio Rural Forums providing listening-cum-discussion group programs was started in 1959.

Television System

The television system is an independent media unit in the Ministry of Information and Broadcasting. It was separated from the AIR and made an independent organization called 'Doordarshan' in 1976. Doordarshan is India's National Television Authority.

At the 1956 General Conference of UNESCO held in New Delhi, it was proposed that a pilot project should be undertaken to study the use of television as a means of education, rural uplift, and community development. An agreement was signed between India and UNESCO in 1959.[39] The first television center was set up on an experimental basis at New Delhi in September, 1959.

The programs were meant for schools and rural areas. Community viewing centers known as 'Tele-clubs' were established for viewers. The range of the transmitters was about 25 miles. Tele-clubs were formed to facilitate understanding through discussions. The program continued

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[39] M.V. Desai, Communication Policies in India, UNESCO, 1977, pp. 65-66.

until May 1961. Regular television service was started in 1965. In 1967, a pilot rural television project (Krishi Darshan) was designed around the only television transmitter of AIR, Delhi. The project was initiated by the Department of Atomic Energy, AIR, Indian Agricultural Research Institute and the Delhi Administration. Agricultural programs were telecast on two days for 20 minutes each day. This has been extended since then to a 30-minute program for three days a week. This project was a forerunner for the national system of instructional television.

At present, there are seven television centers and four relay centers in the country (1981 figures). The television network covers 6.1 percent of the geographic area and 15.2 percent of the population.[40]

Television was recognized as an important medium to accelerate the growth of national development in India.[41] The majority of the Indian population lives in rural areas where facilities are inadequate for the implementation of new technologies. Under such conditions, provision of a ground-based television service would be too slow and expensive. A television system based upon satellite-links

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[40]Ministry of Information and Broadcasting, India: A Reference Manual 1981 (New Delhi, December 1981), p. 48.

[41]United States House of Representatives, Satellite Broadcasting: Implications for Foreign Policy, Hearings before the Sub-Committee on National Security Policy and Scientific Development of the Committee on Foreign Affairs, U.S. House of Representatives, 91st Congress, First Session, May 13-15 and 22, 1969, U.S. Government Printing Office, Washington D.C., p. 215.

might ultimately prove cheaper than conventional methods of distribution. The particular contribution of satellite technology for distributing educational television is seen as a key for solving a number of problems of human resources development.

> Not only can it overcome terrain and distance, it may also be able to reform and modernize educational systems more rapidly than would otherwise be possible, giving more people access to education and training, place the best teachers within reach of large audiences, help to integrate large sections of the populations into the social, economic and cultural life of the nation or region, and contribute to international understanding.[42]

The next chapter discusses the development of broadcast satellite technology and how this technology could be used by developing countries.

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[42]UNESCO, "A Guide to Satellite Communications," Reports and Papers on Mass Communications, 66 (1972), p. 24.

CHAPTER III

BROADCAST SATELLITE TECHNOLOGY

Introduction

> The communication satellite knows no geographic boundary, is dependent on no cable, owes allegiance to no single language or political philosophy. Man now has it within his power to speak directly to his fellow men in all nations.[1]

The development of satellite communications draws upon centuries of scientific and technological advances. However, specific development relating to satellite technology goes back less than two decades. Satellites represent a relatively new technology which progressed from ideas to reality after the launching of Sputnik by the Union of Soviet Socialist Republic (U.S.S.R) in 1957.[2] Since then, technological development in satellites has passed through several generations. The first generation emerged with the launching of Telstar and Relay by the U.S.A. in 1962 and 1963. These satellites were able to operate over relatively

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[1]Evert Clark, "COMSATS - Mastering the Technology," Astronautics and Aeronautics, Vol 6, No 4, (April 1968), p. 9.

[2]R.P. Morgan et al., "A Guide to the Literature on Application of Communication Satellites to Educational Development" (Washington University, 1972), p. 1.

long periods of time and could transmit all forms of telecommunications traffic, including telephone, telex, facsimile, television, etc.[3]

The orbiting of Syncom and Early Bird by the U.S.A. in 1965 realized, for the first time, high quality transatlantic television transmission for long periods. The launching of a series of six MOLNIYA (meaning 'Lightning') communication satellites by the Union of Soviet Socialist Republic (U.S.S.R.) in the same year increased the capacities for television transmission.[4] A second generation of satellite technology evolved from the successful launching of these communication satellites. The real revolution in communication occurred with the commencement of the third generation of satellite technology - the Direct Broadcast Satellites.* Potential capability of these artificial satellites to augment long distance communications was realized.

> Periodically, technology introduces a new capability that makes possible vast improvements in man's ability to live and work in his

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*A Direct Broadcast Satellite transmits signals from a satellite directly to a community receiver or to an individual radio or television receiver.

[3]Nicolai I. Tchiastiakov, "Hurdles in Space Broadcasting," UNESCO COURIER, Vol 19, (November 1966), p. 30.

[4]Nicolai I. Tchistiakov, "Evolution of Satellites and Orbits," Space Science and Technology: Benefits to Developing Countries, The United Nations Conference on the Exploration and Peaceful uses of Outer Space, Vienna, 14-27, August 1968, United Nations, pp. 138-139.

> environment. On rare occasions, this same technology gives the man the opportunity to perform functions not previously within his capability. In some cases, the magnitude of the social and economic impact of these advances affects millions of persons in scores of nations and changes their concepts of established practices. Communication satellites have been a result of such technological progress.[5]

Satellite Technology for Communications

The successful experiments with communication satellites by the U.S.A. and the U.S.S.R. demonstrated that they have an important role to play in the development of modern broadcasting. Following the successful launching of these communication satellites, the General Assembly of the United Nations at its 17th session in December 1962, adopted a resolution stating the view that:

> Communication by satellite offers greater benefits to mankind as it will permit the expansion of radio, telephone and television transmissions, thus facilitating contact among the peoples of the world.[6]

Communication satellites serve as a powerful instrument for long-distance communication. High speed transmission in greater volume can be achieved by these satellites. Satellite application projects proved to be an important first step in gaining confidence in domestic hardware

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[5]A.V. Balakrishnan, Editor. <u>Space Communications</u>, (New York: McGraw Hill, New York, 1963), pp. 1-10.

[6]UNESCO, "Space Communications and the Mass Media: A UNESCO Report," 41, (Space Communication Conference, 1963), p. 8.

operation and maintenance. It was realized that satellite communication is quick, efficient, cost beneficial and capable of reaching isolated, mobile, and dispersed populations.

> ...unobstructed by mountains and rivers and 'impassable' terrain, it offers easy access to regions that would be extremely difficult or very expensive to reach by ground systems. Truly, satellites are man-made resource having a potential to reach and affect everyone.[7]

The spectacular growth of space technology has focused attention on the possibilities of using satellites for long range transmission. This facilitates television services to communities which are outside the range of existing conventional transmitters. The use of new techniques of communication for educational purposes was examined by a Committee of Experts (UNESCO, 1962). They noted that:

> ... resources which modern technology makes available to education may be employed both to improve the teaching process and to bring instruction within the reach of a continually increasing number of children and adults...among these resources the potentialities of sound and visual broadcasting, far from being fully explored are proving greater day by day, as seems to be indicated by plans for relaying radio and television through the use of satellites.[8]

A series of studies and experiments have been

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[7]Lawrence P. Grayson, "Education Beyond the Horizon," Science, Vol 170 (December 1970), p. 1376.

[8]UNESCO, "Space Communication and the Mass Media; A UNESCO Report," 41 (Space Communication Conference, 1963), p. 8.

undertaken by developed as well as developing countries to broadcast educational programs through television, using satellite communications. Experimental satellites have been launched by U.S.A., Canada, France, Germany, Japan, Italy, and the European Space Agency (ESA). Some of these experiments have been cited in Table VII.[9] UNESCO has also reported studies in various stages on potential use of satellites for education and national development in the Arab States, Brazil, India, Latin America, and Pakistan.

Satellite Technology for Developing Countries

A considerable discussion has been and is taking place on the use of satellite technology in developing countries for education and national development. The use of television and other media in education is becoming increasingly popular in some of these countries. The application of direct broadcasting satellite technology has opened up many possibilities to enhance this powerful approach.

Nearly 70 percent of the world's population lives in over 100 countries in Africa, Asia, and Latin America. These people have less than minimum access to press, radio, and film technologies. Only a few of these countries have been

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[9] Anna Casey-Stahmer, "The Era of Experimental Satellites: Where to Go from here," Journal of Communication, Vol 29, No. 4, Fall 1979, p. 139.

TABLE VII

EXPERIMENTAL SATELLITES AND APPLICATION EXPERIMENTS (1966-1978)

Satellite	Country	Date	Service Provided
ATS-1 ATS-3	U.S.A.	1966 1967	Experiments demonstrating new applications (Interactive voice only) and providing experience in the applied use of satellites. Examples: (1) University of the South Pacific - University extension courses; (2) Alaska - Telehealth care to remote villages; (3) PEACESAT - International conferencing.
ATS-6	U.S.A.	1974	Test feasibility of public service delivery and improving mass instructional broadcasting in developing and developed regions of the world (video and voice). Examples: SITE-project, continuing and in-school education, telemedicine.
Symphonie I	Germany/ France	1974	Make available transponder capacity for interested countries for educational television experiments, and develop familiarity in the use of satellites for economic and social developments. Terminals deployed in over 15 countries.
II	Germany/ France	1975	
Hermes/CTS	Canada/ U.S.A.	1976	Test feasibility of public service applications and improvement of educational services, community development, administrative conferencing.
SIRIO	Italy	1977	Test television transmission and interactive video conferencing.
CS	Japan	1977	Test satellite technology for emergency and disaster communication.
BS	Japan	1977	Facilitate nationwide broadcasts of educational programs, i.e. University of the Air and public service broadcasting.
OTS-2	European Space Agency	1978	Test applications of direct television distribution, document transfer, communication with oil platforms, and newspaper transfer.
Anik-B	Canada	1978	Test viability of public service applications on a pre-operational but continuing basis.

able to initiate 'television services'.[10] Telecommunication services are very poor or totally non-existent in most of these countries. Transportation system is underdeveloped. Facilities for formal education is extremely inadequate. Qualified teachers and educational materials are scarce. Under these circumstances, it is very difficult to reach all of these people with conventional instructional techniques.

> The need for new approaches to... education for its extension, diversification and intensification is experienced by all countries whatever the degree of their economic development. Nowhere are the existing traditional channels and structures of... education able to fulfill the needs. The existing establishment, even if it is efficient educationally, which it often is not, is too small in scale, too short in reach, and too limited in scope.[11]

Broadcast satellite technology is a powerful medium to overcome such severe handicaps. Educational opportunities can be provided effectively to combat illiteracy. Instructions in matters such as adult education, public health, agricultural techniques, and population control can be provided to a significant percentage of this population using satellites. Satellites can link various regions of these countries and can provide widespread communication

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[10] UNESCO, "Space Communication and the Mass Media: A UNESCO Report," 41 (Space Communication Conference, 1963), pp. 7-8.

[11] Ulvi A. Dogan, "The Feasibility of utilizing A Direct Broadcast Satellite for Education and National Development in Turkey," (Unpub. Doctoral Dissertation, Syracuse University, 1974), p. 154.

services. These satellites do not require extensive ground communications systems which utilize coaxial cables. This eliminates the prohibitive cost involved in building such communications systems in these countries. Hence, a nationwide television coverage is realizable within a short period of time.[12]

The direct broadcast satellite technology has attracted its critics as well as its proponents. Satellites are tools with immense potential for education, but there are constraints that need to be overcome before deciding to utilize them for education. There has been concern over what benefits investment in space might bring. It has been said that satellite technology would be unsuited to developing countries because it is expensive, technologically sophisticated, and presents new problems. But it should be realized that the same sophistication has also brought down the costs of these satellite systems within the reach of many developing countries. If the developing countries continue to rely upon traditional techniques without taking the plunge into the latest technology, this will only widen the gap between them and the advanced nations.[13] These developing countries are

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[12]Indu B. Singh, "A Study of Canada-United States Cooperation in Space Communication Programs with Special Reference to the Communications Technology Satellite Project," (Unpub. Ph.D Dissertation, Ohio University, 1977), p. 34.

[13]UNESCO, "A Guide to Satellite Communications," Reports and Papers on Mass Communications, 66 (1972), p. 23.

facing the inevitable tasks of having to promote education, tackle unemployment, increase agricultural productivity, control the growth of population, etc. This desperate situation has propelled them to utilize the swiftest means available to solve their problems. Many traditional technologies may become much more cost-effective, if only they are restructured with hints from some of the latest developments. Effective implementation of satellites to promote such an education will greatly augment the outcomes.

In his book, Learning for Tomorrow: The Role of the Future in Education, Alvin Toffler indicates the need of developing countries for advanced technology.

> The less-developed countries will require in fact, to have the very highest technology, not lower-level technology, as is often assumed at present (although there will undoubtedly be an important place for the much wanted "intermediate technology" as a stopgap). They will have the advantage of being able to introduce it without the grim consequences that marked our history, but it will need scientific imagination of the boldest kind, combined with the very highest level of sociological and humanistic insight.[14]

There is a problem of regional or international coordination associated with satellite broadcasting. If a nation with a small geographical area were to use a satellite for education, the retransmitted signals from the satellite would spill over many neighbouring regions or countries. This would require extensive diplomacy, patience

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[14]Alvin Toffler, Learning for Tomorrow: The Role of the Future in Education (New York: Vintage Books, 1974), p. 169.

and cooperation. Without these, the outcome would be totally controversial because what is one culture's 'education', may be termed as 'propaganda' in another culture.[15] These difficulties should not be underestimated.

Satellite technology holds the promise of opening new dimensions for education. But will social institutions accept it and adapt to it?[16] It must be remembered that education is not an isolated system but is closely related to many other systems in a society like religion, political behavior, etc. The selection of educational mass media is not solely in the hands of educators and developers; it is influenced by cultural, political and economic matters. Successful introduction of satellite technology calls for patient study of the needs of a given system. Also, there is a strong need to analyze the actual and probable impact of the innovation on the norms, beliefs, and values of the system. The introduction of educational media as a strong channel should be carefully achieved.

> It is demonstrated that the really basic decisions on communication strategy are not open to communicators at all; they are economic and political and grounded deeply in the nature of the society. Even the decision on what to communicate depends on prior decisions regarding the strategy

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[15]Wilbur Schramm, "Satellites for Education: Lessons from a Decade of Experience with Educational Television," U.N. Conference on the Exploration and Peaceful Uses of Outer Space, Vol 1 (August 1968), p. 123.

[16]William G. Harley, "Applying Satellite Technology to International Education," Educational Broadcasting Review, Vol 3 (December 1969), p. 7.

> of change. Thus communication is deeply integrated into society.[17]

However, an examination of the pertinent literature on the direct broadcast satellite indicates that an agreement prevails between critics and supporters even in the dark shadow of existing disagreements. Both the groups seem to agree on the fact that the best application of direct broadcast satellites can be made at the regional and national levels. This, of course, requires a great deal of regional cooperation.

Before introducing space technology into their existing educational systems, the developing nations must analyze the following factors with due regard for certain basic national needs.

-- national goals, needs, and characteristics

-- resources and skills available

-- local cultural and technological environment (social feasibility)

-- technical and social problems in deploying satellite communication systems

-- alternatives to satellite broadcasting

-- an objective assessment of the limitations and capabilities of the new communication system.[18]

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[17]Wilbur Schramm, "Communication and Change," Communication and Change in the Developing Countries, ed. Daniel Lerner and Wilbur Schramm (Honolulu: East-West Center Press, 1967), p. 5.

[18]J. Hanessian, Jr. and J.B. Margolin, "Broadcast

Candidacy of India for Satellite Television Experiment

The Scientific and Technical Sub-committee of the United Nations Committee on the Peaceful Uses of Outer Space made the following observations at its fourth session in April 1966:

> The Sub-Committee recognizes the problem of growing population and the problem of providing food for large populations in many parts of the world. Also the Sub-Committee is informed that member nations and specialized agencies are studying the applications of space technology in the fields of meteorology and for the improvement of mass television communications which may ultimately help to alleviate these problems. The Indian Ocean region has been mentioned as one example of an area, among others, in which the problem is especially severe and the opportunity correspondingly great.
>
> The Sub-Committee hopes that interested countries and specialized agencies will continue to study, with a sense of urgency, both the scientific and technical feasibility of such applications and the ways in which such applications could best be utilized, if available, to meet the needs of the developing countries of the world.[19]

The Government of India responded by presenting a document entitled 'Satellite Communications: An Indian

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Satellites: Their Potential Use for Educational Purposes and Their Relationship to International Understanding and Cooperation," Occasional Paper No. 3, Program of Policy Studies in Science and Technology (The George Washington University, Washington D.C., July 1969), p. 4.

[19] United Nations General Assembly, Satellite Communications: An Indian Study, A Note by the Secretariat, A/AC.105/36, June 20, 1967, p. 2.

Study', to the United Nations. This study emphasized the potentialities of synchronous satellites for television and meteorological uses in India. The document was reflective of the Indian Government's interest in a UNESCO pilot project using a satellite.

In 1969, the United States National Aeronautics and Space Administration (NASA) consented to collaborate with India for a pilot project using an educational satellite. NASA agreed to loan an experimental distribution satellite for a period of one year. India was particularly well suited for an experiment of this type.

> The Indian sub-continent is of a convenient size for the satellite's antenna pattern. There is no existing television distribution networks in India. The population is distributed fairly and evenly throughout the country, rather than being concentrated in a few large cities which could be reached easily by terrestrial television distribution methods. Also, there is a large illiterate population in need of an early and imaginative educational attention and there is a strong high-level Indian Government support.[20]

India offered a challenge to the use of broadcasting satellites because it presented a classic example in heterogeneity. Linguistically, culturally, and educationally it is more diverse than many countries.[21]

The next chapter focuses on the Satellite Instructional

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[20] Ibid., pp. 3-4.

[21] Alex Horn, "India: Another Frontier for Educational Television," Educational/Instructional Broadcasting (December 1969), pp. 15-17.

Television Experiment (SITE) conducted by India and provides a description of the experiment, problems encountered and the planned outcomes of the project.

CHAPTER IV

SATELLITE INSTRUCTIONAL TELEVISION EXPERIMENT

Background

India's interest in the practical uses of space communications dates back to the early 1960's. Dr. Vikram A. Sarabhai, the founder of the Indian Space Program foresaw the potential of satellite communications as an area of practical significance. He suggested the possibility of utilizing satellite communications as a medium for mass communications and education.[1] In 1963, a decision was made to set up an Experimental Satellite Communication Earth Station at Ahmedabad, India.

The Experimental Satellite Communication Earth Station was set up by the Indian Committee for Space Research with assistance from the United Nations Development Program in 1967. A number of software pilot studies were conducted to provide insights into the ways in which television could be used as a direct instrument for promoting developmental tasks by the Indian Government.

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[1]UNESCO, "Planning for Satellite Broadcasting: The Indian Instructional Television Experiment," Reports and Papers on Mass Communications, 78 (1976), p. 9.

> Community television receiving sets were placed in 80 villages in the general vicinity of Delhi, and half hour rural oriented programs are being broadcast three times a week; to date, experience indicates that it may be possible to make relevant changes in the development of isolated communities.[2]

These pilot programs provided valuable experiences in the design of rural broadcasts. The Indian official report presented a summary of the main findings, interpretations, and conclusions of these pilot studies in the following manner.

> The main purpose of the inquiry was to assess the usefulness of television for family planning and social education. This was to be gauged by measuring the shifts in information, attitudes and behavior brought about in the 1418 members of the 80 tele-clubs in the sample, as a result of viewing 20 special telecasts on health, citizenship, and participating in post viewing discussions... The data showed that there were in fact statistically significant shifts.[3]

The first inter-agency study teams were set up in 1967 by the Indian National Committee for Space Research and the Department of Atomic Energy (DAE). A study team sponsored by DAE visited the United States of America for an on-the-spot study and discussions with the National Aeronautics and Space Administration (NASA) on the technical feasibilty of

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[2]Kenneth A. Polcyn, "Educational Broadcast Satellite Experiment," Educational Technology, Vol XII, (June 1972), p. 14.

[3]Ulvi A. Dogan, "The Feasibility of utilizing A Direct Broadcast Satellite for Education and National Development in Turkey," (Unpub. Doctoral Dissertation, Syracuse University, 1974), p. 171.

launching a pilot project of satellite instructional television in India. The Indian Space Research Organization (ISRO) and NASA jointly studied the possibility of conducting an experiment using Applications Technology Satellite - 6 (ATS-6). A National Satellite Communications Committee (NASCOM) was established in India in 1968, and recommended the Satellite Instructional Television Experiment (SITE), to the Indian Cabinet in February 1969. The Memorandum of Understanding between ISRO and NASA was signed in September 1969, and work on SITE was started. After a series of health and education experiments by the United States, the ATS-6 satellite was loaned to India for the Satellite Instructional Television Experiment, from August 1, 1975 to July 31, 1976.

Description of the Project

The United States National Aeronautics and Space Administration (NASA) and the Indian Department of Atomic Energy (DAE) signed a Memorandum of Understanding on the 18th of September, 1969.[4] The objective was to conduct jointly, an instructional television experiment using the Applications Technology Satellite - 6 (ATS-6). The full

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[4]United States House of Representatives, Satellite Broadcasting: Implications for Foreign Policy, Hearings before the Sub-Committee on National Security Policy and Scientific Development of the Committee on Foreign Affairs, U.S. House of Representatives, 91st Congress, First Session, May 13-15 and 22, 1969, U.S. Government Printing Office, Washington D.C., pp. 238-242.

text of this agreement has been provided in Appendix A. The experiment was called the Satellite Instructional Television Experiment (SITE).

SITE used NASA's ATS-6 (see Figure 5), to broadcast instructional programs for a period of one year from August 1, 1975 to July 31, 1976. NASA's responsibility for this experiment included provision of operating time (four hours a day), on ATS-6's communications system as well as positioning, maintenance and pointing of the spacecraft from the ground station in Madrid, Spain. The Government of India assumed control over all remaining aspects of the experiment including the design and deployment of all ground transmission and reception systems as well as software materials.

The instructional programs were videotaped in four languages, for the six participating regions of the country. These programs were transmitted to NASA's ATS-6 from two earth stations in India, located at Ahmedabad (ISRO's headquarters), and Delhi. The satellite amplified the television signals and returned them to earth. The signals were received by small antennae linked to each of the special inexpensive community television receivers. Such receivers were located in about 2400 rural villages, in the six participating Indian States: Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Orissa and Rajasthan. The languages used in this experiment were - Hindi for the states of Bihar, Madhya Pradesh and Rajasthan; Telugu for

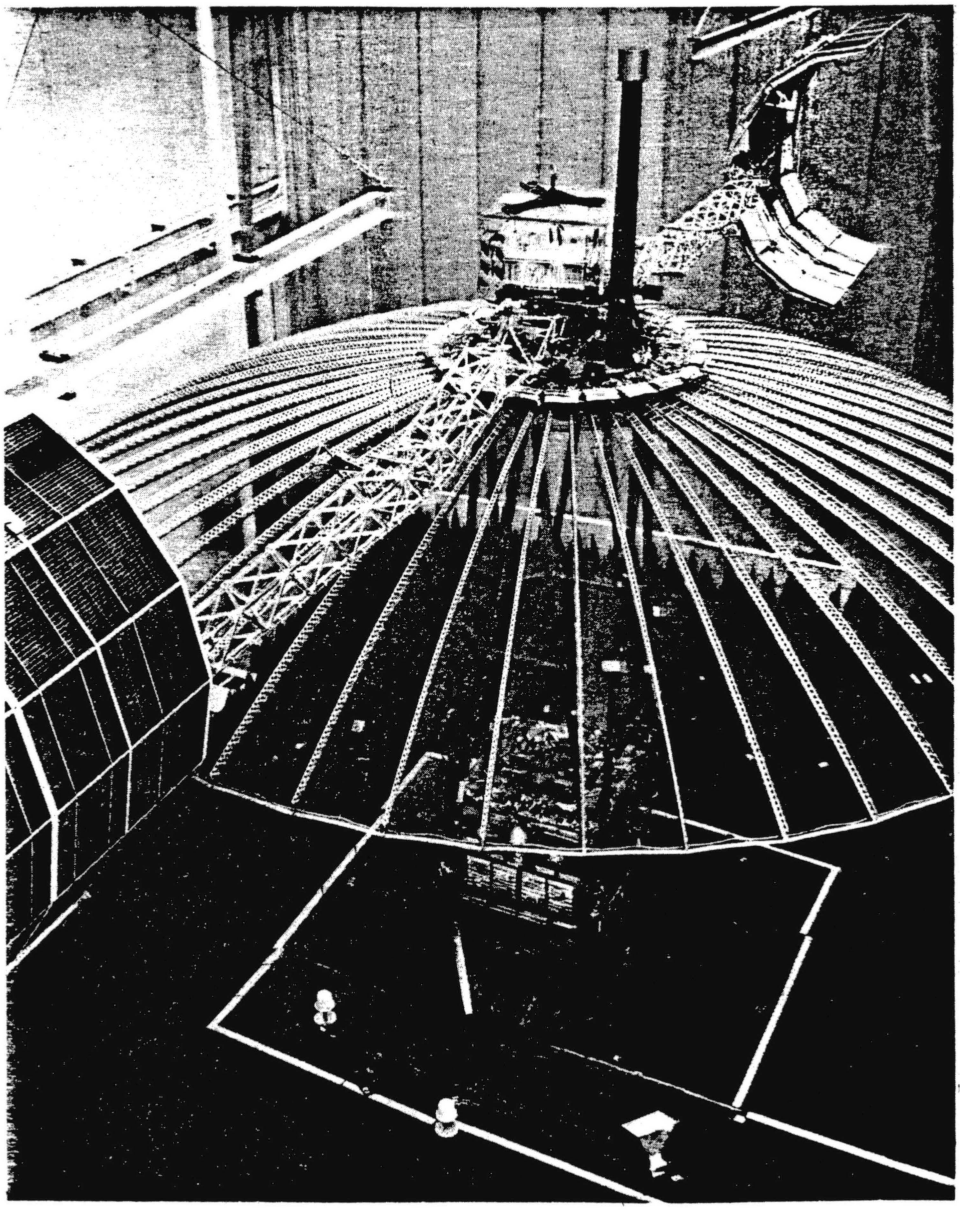

Figure 5. Applications Technology Satellite - 6

Andhra Pradesh; Kannada for Karnataka, and Oriya for Orissa.

Objectives

India's objectives for the SITE were stated in the Memorandum of Understanding.

General Objectives

* To gain experience in the development, testing and management of a satellite based instructional televison system, particularly in rural areas and to determine optimal system parameters.
* To demonstrate the potential value of satellite technology in the rapid development of effective mass communications in developing countries.
* To demonstrate the potential value of satellite broadcast television in the practical instruction of village inhabitants.
* To stimulate national development in India, with important managerial, economic, technological and social implications.

Instructional Objectives

* Contribute to family planning efforts
* Improve agricultural practices
* Contribute to national integration
* Contribute to teacher training
* Contribute to general school and adult education
* Improve other occupational skills
* Improve health and hygiene

Technical Objectives

* Provide a system test of broadcast satellite television

for national development

* Enhance capability in the design, manufacture, deployment, installation, operation, movement and maintenance of village television receivers

* Gain experience in the design, manufacture, installation, operation and maintenance of broadcast and/or distribution facilities to the extent that these are used in the experiment

* Gain an opportunity to determine optimum receiver density distribution and scheduling, techniques of audience attraction and organization, and to solve problems involved in developing, preparing, presenting and transmitting television program material.

This study will restrict itself to the instructional objectives.

Participants

The key participants in the SITE were:

1. Indian Space Research Organization (formerly part of the Department of Atomic Energy)
2. Doordarshan, India's National Television Authority (formerly part of All India Radio)
3. Indian National Council of Educational Research and Training (NCERT), and
4. United States National Aeronautics and Space Administration.

Cluster Selection

Six Indian States (Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Orissa, and Rajasthan) within the range of the satellite beam were chosen for direct reception of the educational programs. The departments of Government of India

(Agriculture, Posts and Telegraphs, Health, Family Planning, and Education) along with the state governments helped in the selection process. Each of these states were referred to as a cluster area (see Figure 6). These clusters were located in different linguistic, cultural, climatic, and agricultural regions of the country. Each state had about 400 direct reception television receivers.

Cluster Selection Criteria

The criteria adopted in selecting the cluster areas were:

- -- backwardness (low rate of progress in agriculture, poverty, low standard of living, under-utilization of resources, etc.)
- -- continuity of television service using ground transmitters after the completion of SITE
- -- common agro-economic conditions
- -- educational, agricultural, health and family planning infrastructure and supporting facilities.[5]

Areas regarded as comparatively developed, as well as areas thought of as developing were selected, to present a cross-section of different stages of development.

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[5] Romesh Chander, "Programming for the Satellite Instructional Television Experiment in India," Educational Broadcasting International, (June 1974), p. 82.

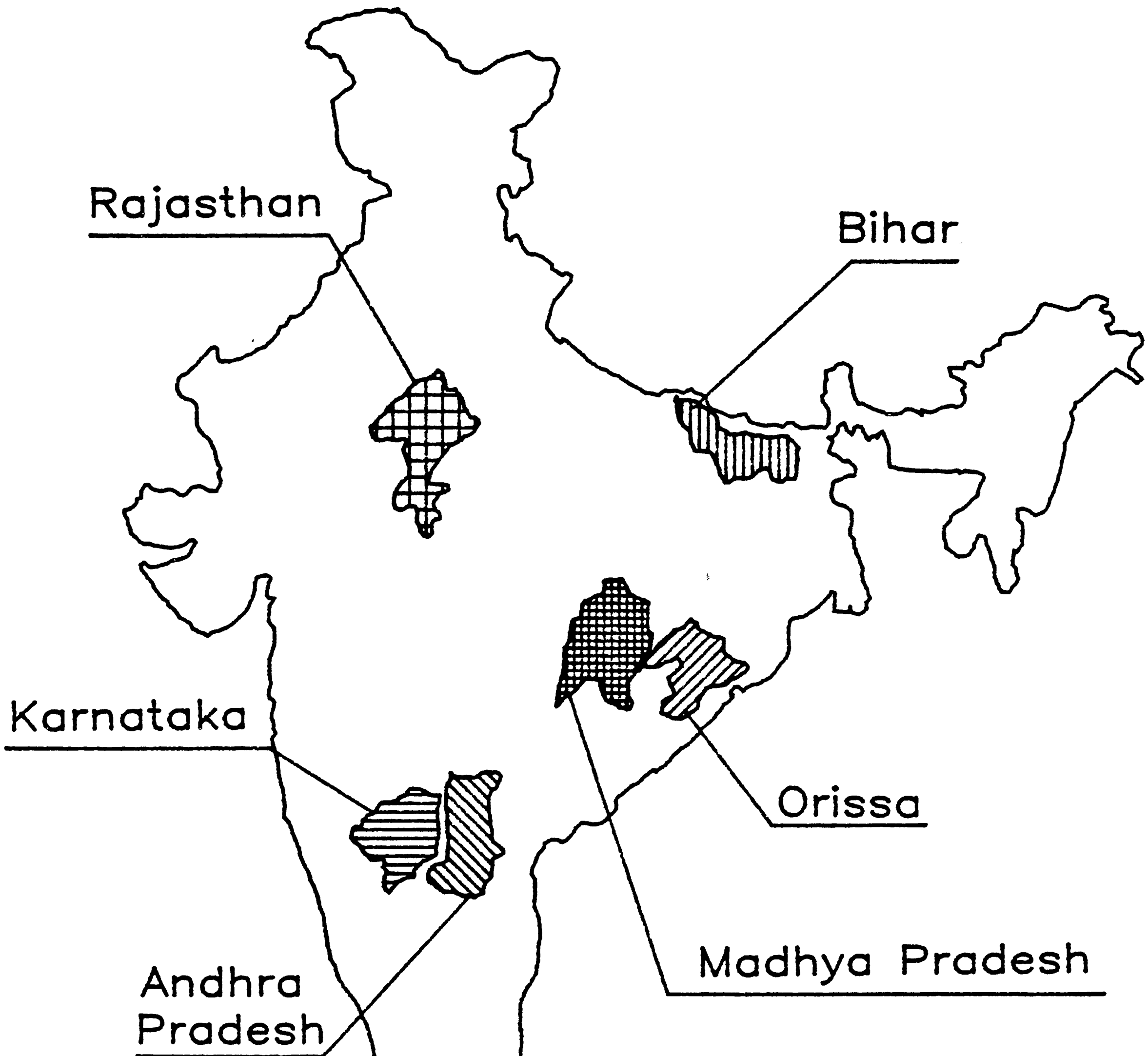

Figure 6. SITE Cluster Areas

Village Selection

In each state, three to four districts (similar to counties in the United States) were selected. Within the districts, villages were chosen to install direct reception systems. The stratified random sampling method was adopted in selecting the villages. About 400 villages were selected per cluster.

Village Selection Criteria

The criteria for the selection of these villages were:

* availability of power supply within about 600 feet of the public building
* suitable location (a public building accessible to everyone, e.g. school or community hall), for installation of a television receiver
* villages with reasonable all-weather access roads
* population of the village to be between 300 and 3000
* villages should not be farther than 40 kilometers (25 miles), from the nearest maintenance center.[6]

Owing to the non-availability of suitable villages, a number of modifications were made in the selection criteria to suit the local conditions of each state. For example, villages on roadsides up to 60 kilometers (about 35 miles) were included in the selection. Each cluster of 400

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[6] SITE Technical Report, Part II, Vol 2, Indian Space Research Organization, Bangalore, September 1977, p. 7.

villages was served by a main maintenance center fully equipped to deal with equipment breakdowns. Each maintenance sub-center was responsible for approximately 100 receivers. 153 battery-operated sets were also installed in the state of Orissa, to experiment with different means of reception.[7] Facilities for charging and replacing these batteries were taken into consideration.

Installation

In each village, a television set (24 inch screen), was installed as part of the Direct Reception System (DRS). Each of the Direct Reception Systems consisted of an antenna (10 feet in diameter), a front-end converter to amplify the signals (pre-amplifier), and a television receiver set. ATS-6's capability for two channel audio permitted the audience of the television programs to select the narration in a choice of languages.[8]

Indian Earth Stations

The main earth station for transmitting programs to the satellite was located at the SITE headquarters, in Ahmedabad. This station transmitted all but one-half hour of the four hours of the daily broadcasts. A second earth

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[7] SITE Technical Report, Part I, Vol 1, Indian Space Research Organization, Bangalore, September 1977, p. 2.

[8] G.N.S. Raghavan, "New Approaches to Development Communication," Indian and Foreign Review, Vol 18, No. 20, (1-14 August, 1981), p. 12.

station was located in Delhi. It was used to transmit a half hour daily national news segment, and to broadcast special programs for such events as Republic Day, Independence Day, and addresses from the Prime Minister and the President. It also served as a back-up in case of hardware failure at Ahmedabad. A third station at Nagpur, in the central part of India was built to keep the satellite precisely oriented, if its internal pointing (orienting) system failed. These earth stations were all designed and built in India.[9]

Software Production

Doordarshan, India's national television authority was primarily responsible for the SITE programming. These programs were planned in consultation with experts from the concerned ministries of agriculture, health, education, etc. of the state and central governments. The responsibility for producing programs was decentralized into several locations.

Doordarshan had base production centers at three cities, Delhi, Hyderabad (state of Andhra Pradesh), and Cuttack (state of Orissa), (see Figure 7). Each of these centers was responsible for programming for specific areas and language groups. An Indian Space Research Organization studio at Bombay produced a series of science education

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[9]UNESCO, "Planning for Satellite Broadcasting: The Indian Instructional Television Experiment," Reports and Papers on Mass Communications, 78 (1976), p. 11.

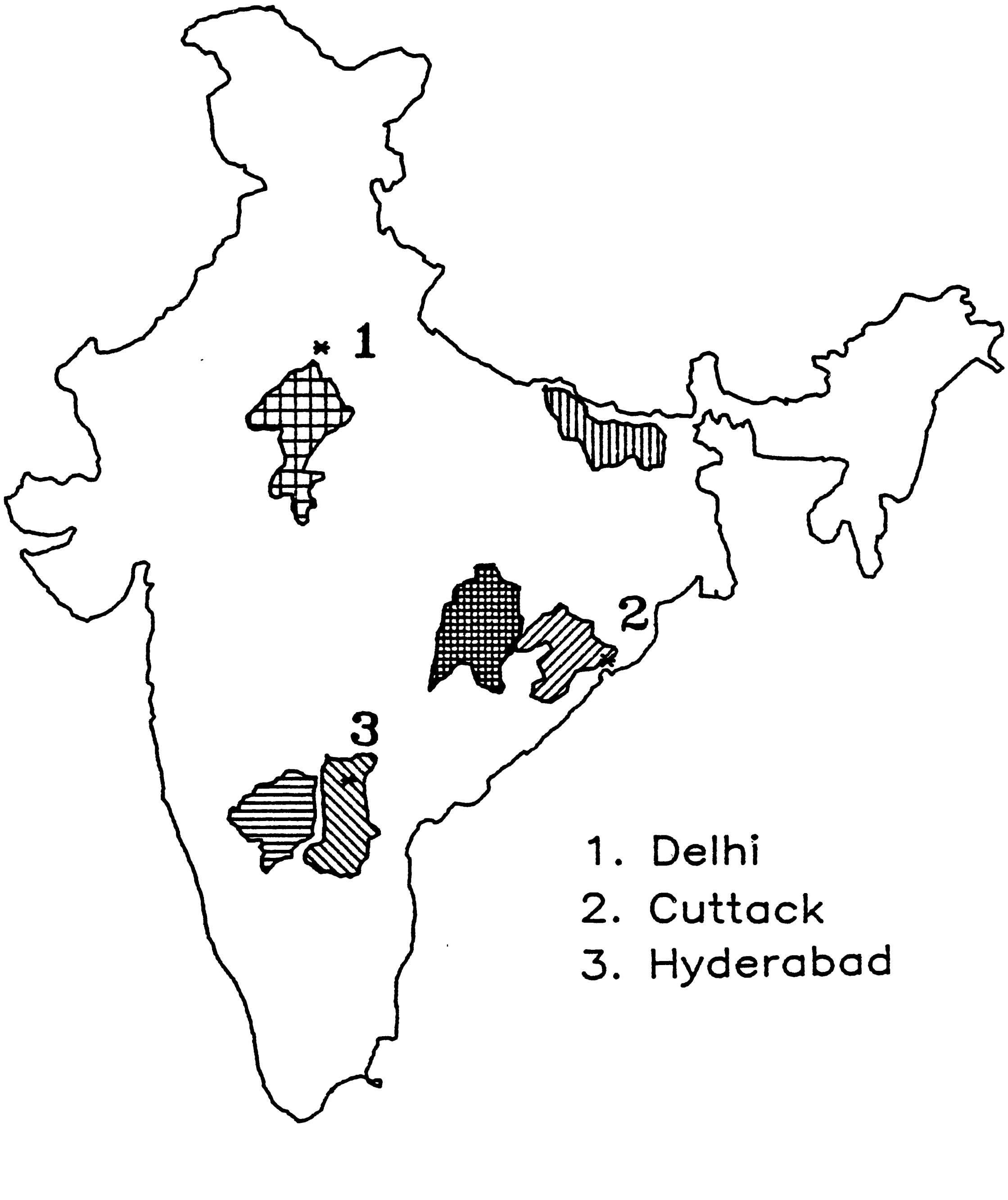

Figure 7. SITE Base Production Centers

programs for in-school broadcasts to children. Programs were produced on one inch and half inch videotapes. The videotapes were sent to the main link-up station in Ahmedabad, to be beamed up to the satellite. Approximately 1500 hours of programs were produced by the production units.[10]

Programs

SITE broadcasting reached about 2330 villages (originally intended for 2400). About 2.8 million people had daily access to SITE programs. The television receivers were located in schools, community halls, or local government offices and were usually placed out-of-doors. The audiences included men, women, and children from a variety of socio-economic backgrounds.[11]

Four hours of programs were transmitted daily. There was a morning transmission of one and half hours for school children with programs of twenty-two and a half minutes each in the four languages. The evening transmission of two and a half hours was intended for the rural adult public (See Appendix B for evening program schedule).[12]

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[10] SITE Technical Report, Part I, Vol 1, Indian Space Research Organization, Bangalore, September 1977, p. 2.

[11] Emile G. McAnany and John K. Mayo, Communication Media in Education for Low Income Countries: Implications for Planning, # 29, UNESCO, (Paris 1980), p. 46.

[12] UNESCO, "Planning for Satellite Broadcasting: The Indian Instructional Television Experiment," Reports and Papers on Mass Communications, 78 (1976), Annex C, pp. 56-57.

School Telecasts

Primary Education was given the first priority. For one and a half hours per day, the programming was directed to an in-school audience of pre-primary and primary school students between the ages of 5 and 12 (classes I to V). The programs were not directly related to the school curriculum of the various states. The programs were planned to help children to:

* learn community skills
* acquire basic skills in numeracy and literacy
* learn about hygiene and healthy living
* acquire aesthetic sensitivity
* make them aware of the process of modernization of life and society around them.[13]

The programs covered science education, biographies of great Indians, health education, current affairs, and entertainment. Approximately half of the programs were on science education. Teachers were supplied with a detailed guidebook which summarized the program of the day and the lines along which follow-up discussion should be conducted. The teacher was expected to introduce the topic and follow the program with discussions and other activities.[14] Appendix C provides a sample of school programs.

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[13] P.V. Krishnamurthy, "Learning Through Satellite Broadcasting," Literacy Discussion, Vol 6, No. 3, (Fall 1975), p. 113.

[14] UNESCO, "Planning for Satellite Broadcasting: The Indian Instructional Television Experiment," Reports and

Adult Education

The evening transmission of two and a half hours was intended for the rural adult population. It carried news, entertainment programs, instructional programs, programs on animal husbandry, health, hygiene, nutrition, and family planning. In programs on agriculture, the objective was to provide information to the farmers on various topics such as better methods of cultivation, fertilizers, pesticides, water management, credit facilities, market trends, and to issue weather forecasts. The pace of the program was kept slow, and the language simple. Family welfare through planned parenthood was emphasized. The problems, aspirations, and needs of the entire family were projected. Programs were designed in the areas of health, hygiene, and nutrition. Specific attention was given to preventive as well as curative measures for various diseases, infant care, and pregnancy.

A news bulletin formed part of a half-hour 'national segment' in Hindi, which was telecast in all the six clusters. It was intended to generate a sense of unity among the citizens. There was a live coverage of important national events like Independence Day, Republic Day etc. A variety of program formats including direct instruction,

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Papers on Mass Communications, 78 (1976), Annex D, pp. 62-64.

interviews, drama, panel discussions, song and dance, puppets, response to viewer mail, etc. were used.

Table VIII shows the percentage of broadcast time allocated to different areas for the evening programs.[15]

Teacher Training Program

The teacher training program of the SITE was developed by the National Council of Educational Research and Training (NCERT). A 12-day multi-media science package was designed for the training of primary school teachers in the cluster areas. The package consisted of television programs, radio broadcasts, self-instructional and other printed enrichment materials for self-study, and classroom experiments (see Figure 8).[16] The Center for Educational Technology (an institute of NCERT) was responsible for the design and coordination of the project.

The multi-media training package had two main objectives.

1. To familiarize the teachers with the methodology associated with the teaching of science.
2. To up-grade teacher's knowledge and understanding of the content of the primary school new science syllabus (see

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[15]SITE Technical Report, Part I, Vol 1, Indian Space Research Organization, Bangalore, September 1977, Appendix A.2, p. 4.

[16]UNESCO, "Planning for Satellite Broadcasting: The Indian Instructional Television Experiment," Reports and Papers on Mass Communications, 78 (1976), p. 42.

TABLE VIII

ESTIMATED PERCENTAGE DISTRIBUTION OF SITE EVENING PROGRAMS THROUGHOUT THE YEAR BY BY BROAD AREA CONTENT FOR ALL CLUSTERS

Broad Area	A.P. & Karnataka	Bihar M.P. & Rajasthan	M.P. & Orissa	Orissa	Average
Agriculture	7.3	11.9	10.4	14.5	10.7
Animal Husbandry	3.5	3.1	0.3	1.0	2.8
Family Planning	5.5	4.7	1.2	1.6	4.2
Health, Hygiene & Nutrition	11.8	11.4	12.5	9.5	11.3
National Integration	3.1	1.7	4.8	2.4	2.4
Informative & Instructional other than SITE objectives	18.5	13.1	20.2	29.2	22.2
Entertainment	50.3	54.1	50.6	41.7	46.4
Total Percentage	100.0	100.0	100.0	100.0	100.0
Total Number	(1232)	(1709)	(336)	(578)	(3855)

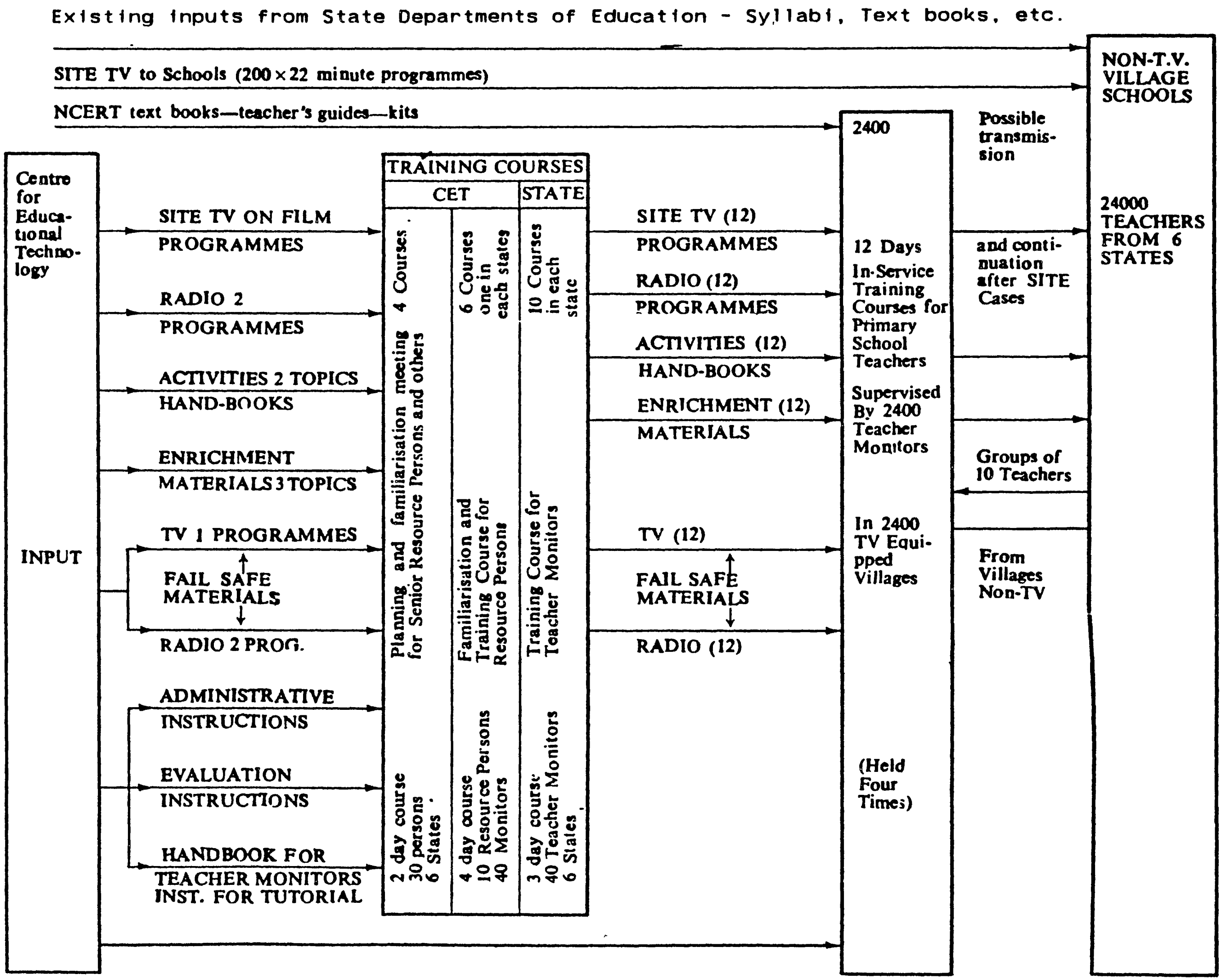

Figure 8. Multi-Media Package for In-service Teacher Training Program

Figure 8).[17]

Twelve common topics from the primary school syllabi of the six participating states were selected. Seven topics were in the area of physical sciences, and five in biological sciences. The 12-day schedule for in-service teacher training program is provided in Appendix-D.[18]

The in-service training sessions for teachers were held during school vacations. The telecast was preceded by an introductory talk by a specially trained resource person. It was followed by a general discussion on the content of the program. The resouce persons were trained in different stages. The NCERT organized training sessions for 10 resource persons from each state for four days. These trained resource persons in turn conducted 10 training camps each for 40 teachers, to produce 400 teacher-monitors for each state.

Each teacher-monitor then recruited 10 teachers to attend the training program at each of the 400 SITE villages in each state, for a total of 4000 teachers per state. In this manner, 24,000 teachers were trained in each training cycle.[19] The training program was run twice.

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[17] Ibid., p. 41.

[18] Ibid., pp. 60-61.

[19] Ibid., p. 43.

The Kheda Laboratory

In addition to the six clusters served via satellite, a low-power terrestrial television transmitter was located in the village of Pij in Kheda District of Gujarat (see Figure 9). A separate production and broadcast system was established by ISRO at the Space Applications Center in Ahmedabad to serve the Kheda District. About 500 conventional television sets were installed in 355 villages of Kheda district, with more than one set in several villages.

Kheda Objectives

The first objective was to gain experience in the use of a limited rebroadcast system that used both terrestrial broadcast and satellite reception. The second objective was to experiment in innovative ways of program designing and production techniques.[20]

Kheda daily telecasts consisted of one-half hour of national programming transmitted from the Delhi earth station via satellite to all the receivers. This was then relayed by cable and microwave to the transmitter at Pij for rebroadcast. Another one-half hour of local programs was produced mainly for Kheda District. The local programming contained a variety of formats:

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[20] Emile G. McAnany and John K. Mayo, Communication Media in Education for Low Income Countries: Implications for Planning, # 29, UNESCO, (Paris 1980), p. 49.

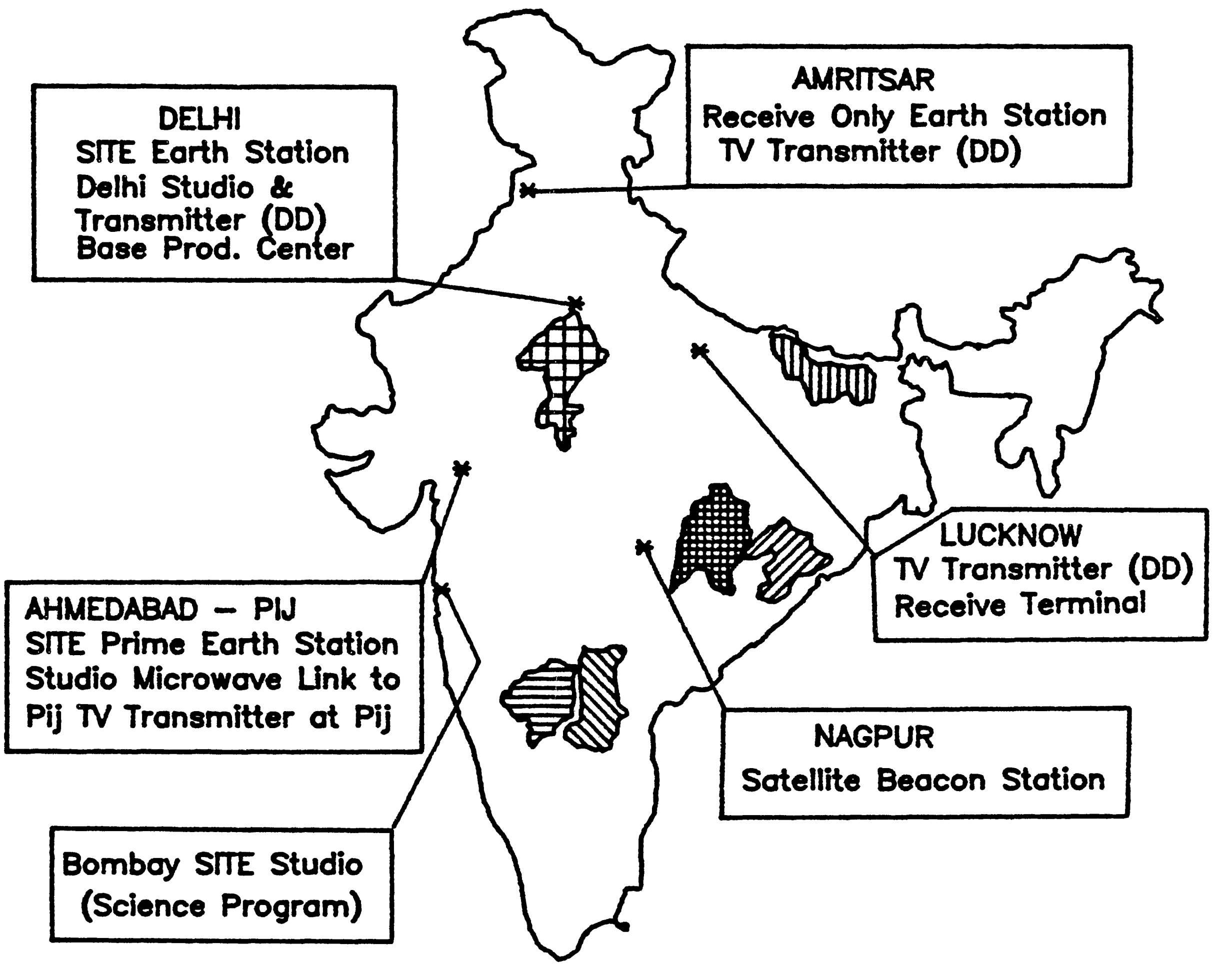

Figure 9. SITE Centers of Activity

--- Instruction in areas like agriculture, health, etc.

--- Children's programming

--- Drama, songs, and dance

--- News, news bulletins.[21]

Evaluation of the Satellite Instructional
Television Experiment

Social research for and evaluation of SITE was done primarily by the Indian Space Research Organization. A Research and Evaluation Cell (REC) was set up in Ahmedabad. It consisted of more than hundred social scientists and researchers from various disciplines. There were four research assistants assigned to each of the clusters and a few at Ahmedabad. Additional research assistants were employed, whenever needed. Anthropologists, sociologists, psychologists, and communication researchers were involved in the collection and analysis of data. Hence, the SITE evaluation was multi-disciplinary in nature.[22]

REC's activities included both formative evaluation (to facilitate decisions that had to be taken during the life of the project), and summative evaluation (to assess the effects of the experiment and to suggest follow-up

[21] G.N.S. Raghavan, "Do mass media reach the masses? The Indian Experience," Prospects, Vol X, No. 1, (1980), p. 94.

[22] SITE Technical Report, Part II, Vol 2, Indian Space Research Organization, Bangalore, September 1977, p. 8.

activities).[23] The evaluation design of SITE was based on Context-Input-Process-Product (CIPP) model. This model, originated by Daniel Stufflebeam and Egon Guba, is based on the view that the most important purpose of evaluation is 'not to prove but to improve'.[24]

> The use of CIPP model is intended to promote growth and to help the responsible leadership and staff of an institution systematically to obtain and use feedback so as to excel in meeting important needs, or, at least, do the best they can with the available resources.[25]

CIPP is oriented more to the needs of those who are in charge of planning and administering the projects. The basic framework of this model consists of context evaluation to inform planning decisions; input evaluation to serve structuring decisions; process evaluation to guide implementing decisions, and product evaluation to serve recycling decisions. These four types of evaluation may be used to guide decision making (formative role), as well as to supply information for accountability (summative role).[26]

SITE's formative research program was divided into

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[23]Blaine R. Worthen and James R. Sanders, Educational Evaluation: Theory and Practice (Wadsworth Publishing Company, Inc., Belmont, California, 1973), pp. 104-105.

[24]George F. Madaus, et al., Evaluation Models: Viewpoints on Educational and Human Services Evaluation (Kluwer Academic Publishers, Hingham, Massachussetts, 1983), p. 118.

[25]Ibid.

[26]Ibid., p. 124.

three categories:

1. Context Evaluation

   This comprised of audience profiles and needs assessment studies.

2. Input Evaluation

   This consisted mainly of pre-testing of prototype programs.

3. Process Evaluation

   This involved an extensive feedback study on specific programs.[27]

SITE's product evaluation (summative evaluation) was performed by conducting a series of different studies.

* Impact studies on adults and children
* Participant-observation (anthropological or 'holistic') studies
* Content analysis
* In-depth studies.

Formative Evaluation

Context Evaluation

Audience Profile. Audience profile studies relevant to program production were undertaken in each of the cluster areas. Researchers collected data on the demographic composition of the audience, their socio-economic

[27] UNESCO, "Planning for Satellite Broadcasting: The Indian Instructional Television Experiment," Reports and Papers on Mass Communications, 78 (1976), pp. 44-46.

backgrounds, interests, educational levels, linguistic characteristics, religion, clothing, leisure time activities, festivals, occupational distribution, social customs and superstitions, and the problems they faced in agriculture, nutrition, health, family planning, and communication.[28] The profiles for the Andhra Pradesh and Karnataka clusters were prepared by the Central Institute of Indian Languages at Mysore, and the Institute of Development Studies of the University of Mysore. The studies in the other clusters were conducted by the Research and Evaluation Cell (REC).[29]

Needs Assessment Studies. Needs assessment studies were undertaken in all the clusters to determine the actual needs, problems, and priorities of the villagers. In order to ascertain the needs, interviews were conducted with the rural audience and also with the government officials connected with developmental activities like agriculture, primary education, health, family planning, etc. This background helped the producers to design programs that were relevant to local needs.

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[28] Peter.Dannheisser,"The Satellite Instructional Television Experiment: The trial run," Educational Broadcasting International, (December 1975), p. 157.

[29] Romesh Chander, "Programming for the Satellite Instructional Television Experiment in India," Educational Broadcasting International, (June 1974), p. 84.

Input Evaluation

Pre-testing of Programs. Pre-testing was done on pilot programs early in the production cycle and was done on audiences with minimal or no exposure to television. Programs were pre-tested to assess the usefulness, entertainment value, and to determine their appeal and effectiveness. Pre-recorded programs (on one inch and half inch videotapes) were shown in selected villages, to audiences under simulated SITE conditions. Audiences were observed closely. An interview guide was given to each researcher. The researcher interviewed ten primary school children and illiterate adults from each village after exposure to the programs. The objective was to record the interest, comprehension, credibility, novelty, and utility of the programs. This helped to compare the merits of various formats of presenting the programs (e.g.: straight talk, documentary, dramatization, songs, animation etc.). Script-testing (dramatized reading of the script to children and observing their reactions) was also done on a small scale.[30] This proved cost-effective. Science education program were pre-tested in all the clusters.

Process Evaluation

Process evaluation for the SITE consited of an

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[30]UNESCO, "Planning for Satellite Broadcasting: The Indian Instructional Television Experiment," Reports and Papers on Mass Communications, 78 (1976), p. 45.

extensive feed-back study. Data were collected from the audience after each evening's broadcast. This involved interviews by 27 researchers assigned to SITE villages. Each researcher covered four villages. They observed and interviewed 270 adults and same number of children every day. The data collected included reaction to the transmission as a whole, difficulty in seeing or hearing, best liked and most useful program of that day, content comprehension, language difficulty, program duration, etc.[31] The collected data was sent to Ahmedabad, where it was coded and processed on a computer. The results (in the form of computer print-outs) were supplied to program producers and discussions were held with them periodically. The feedback provided valuable general data with regard to program preferences, audience size, television set availability, and maintenance, etc.[32] Based on the feedback, guidelines were made available to the producers about audience reaction to different programs and different program formats. This guided the subsequent production of programs.

Product or Summative Evaluation

Impact Studies. The studies examined the impact of SITE broadcasts directed at adults and children. These were designed to observe the changes in viewers' knowledge,

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[31] Ibid.

[32] SITE Technical Report, Part II, Vol 2, Indian Space Research Organization, Bangalore, September 1977, p. 8.

attitudes, and behavior after exposure to television programs. Interviews were conducted in three phases - before, during, and after SITE, to measure the extent of these changes.

A special Survey Research Group was set up to study the impact of SITE programs on adults. The survey was designed as a field experiment having pre and post observations in experimental and control groups. 12 experimental and 6 control villages were selected in each cluster, thus providing a total of 108 SITE villages. 72 respondents (15 years and above) were randomly selected from each of these villages. The sample consisted of approximately the same number of males and females. About 8,000 such interviews were conducted during each phase of the survey. Data were collected by using pre-tested, common schedules in the local languages.[33] The collected data were coded and processed on computers at Ahmedabad.[34]

A study was carried out to evaluate the impact of SITE broadcasts on primary school children. This study was a joint effort by NCERT and ISRO. It was expected that the children who were exposed to the SITE programs would show improvement in school attendance, show gains in language development, develop more interest in acquiring knowledge,

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[33]SITE Technical Report, Part I, Vol 1, Indian Space Research Organization, Bangalore, September 1977, p. 153.

[34]UNESCO, "Planning for Satellite Broadcasting: The Indian Instructional Television Experiment," Reports and Papers on Mass Communications, 78 (1976), p. 46.

and demonstrate higher achievement in school subjects. It was also expected that the teachers would develop positive attitudes toward utilization of media technology in education and would encourage more children to learn.[35]

One district from each of the six clusters, and six villages from these districts were randomly selected. Control villages were so selected that television was not within their reach (5 miles away from television village). A list of experimental schools was prepared. A sample size of 100 participating children (in grades III to V) and their teachers were compared with a similar sample from communities without television. Observation schedules and questionnaires were the same for all the states and were translated into appropriate local languages. Achievement tests (in particular curriculum of the state) and tests to measure language development were administered to both the groups, approximately six months before and towards the end of the SITE broadcasts.[36] The study was limited to assess the impact on the age group of 9 to 11 years. The attitudes of the teachers were studied by comparing the experimental with the control group and by comparing pre-SITE responses with the post-SITE responses.

Anthropological Studies. Anthropological Studies were

[35] Bella Mody, "Programming for SITE," Journal of Communication, Vol 29, No. 4, (Fall 1979), p. 97.

[36] Snehlata Shukla, "The Impact of SITE on Primary School Children," Journal of Communication, Vol. 29, No. 4, (Fall 1979), p. 102.

conducted in 6 villages (in every cluster), served by the satellite, and in addition one village which was served by the Pij terrestrial transmitter. Villages having a multi-caste population between 1000 and 1500, located at a distance of 12 to 18 miles from urban centers, were selected. These villages broadly represented seven cultural and linguistic regions.[37]

Anthropologists who knew the local languages lived for 18 months in the respective villages before, during, and after SITE, for data collection. They observed continuously, at close range, the nature and extent of television viewing in these villages. The field-work was done in three phases - pre-SITE, during SITE, and post-SITE observations. No hypothesis was proposed in this study. Field methods like case-studies, participant observation etc. were the main instruments for data collection. Questions were asked about television and the process of change brought about by its introduction in the rural structure and communication patterns.[38] The study was aimed at providing an in-depth qualitative understanding of the process of socio-cultural changes brought about by the introduction of television.[39]

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[37]Binod C. Agrawal, "SITE: TV comes to village, An Evaluation of SITE," Technical Report, Indian Space Research Organization, Bangalore, (October 1978), p. 3.

[38]Ibid.

[39]UNESCO, "Planning for Satellite Broadcasting: The Indian Instructional Television Experiment," Reports and Papers on Mass Communications, 78 (1976), p. 46.

Content Analysis. Content analysis of selected programs (25% of the programs in Hindi language) was done in order to assess the nature of the messages that were transmitted. The selected programs were in Hindi and Gujarati languages. These programs were analyzed to measure cultural authenticity, dominant themes, character types, and the utilization of formative research guidelines in the production of the programs.

In-depth Studies. A number of in-depth studies relating to program specifics, were also carried out in local areas. These studies aimed at exploring and gaining insights into the process and impact of communication. An example of such an in-depth study was, a study done in two villages of Bihar. The aim of the study was to examine the impact of SITE broadcasts on different socio-economic classes.

Results

The SITE project demonstrated that the instructional messages could be communicated on a national scale. NASA's ATS-6 satellite worked without a fault. The reliability of the earth stations was higher than 99.8%. The video and audio signals received from the satellite were of high quality, even in remote areas.

The audience for SITE broadcast was composed of about 50% men, 20% women, and 30% children. The average attendance for the first month was 300. The following months had an average attendance of 80 to 100, after the initial curiosity wore off.

> Many of the viewers of SITE program were first generation mass media participants in the sense that they were never exposed to radio, newspapers, or cinema. Most of the first generation mass media participants were illiterate and came from the poorer sections of rural society.[40]

The public location of the television set induced a good percentage of landless laborers and poor farmers, to view the telecast. The audience preferred instructional programs, as compared to entertainment programs.

Agriculture

SITE had an ambitious goal in promoting new agricultural practices, like dry land farming, use of fertilizers, pest control, market trends, etc. According to the Social Evaluation Report on SITE by ISRO (1977),

> There was some gain in the agricultural awareness, though it was not statistically significant. It points out that some case histories of these innovations indicate that the farmers adopted only those practices which did not demand additional expense or infrastructure. They were also secretive about their intentions till the time they achieved success.[41]

Family Planning

Family welfare through planned parenthood was

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[40] SITE Technical Report, Part I, Vol 1, Indian Space Research Organization, Bangalore, September 1977, p. 4.

[41] Keval J. Kumar, Mass Communication in India, (Jaico Publishing House, Bombay, India, 1981), p. 84.

emphasized by focusing on social, educational, occupational, and cultural problems. The proportion of respondents (male as well as female) who desired a small family, increased from the pre-SITE survey to the post-SITE survey. Among frequent television viewers, the percentage of males increased from 55.6 to 62.2, while the percentage of females increased from 51.4 to 58.7.[42] The statistical significance tests showed that changes were significant for occasional and frequent television viewers compared to that of the control group (see Table IX).[43] The scores further indicated that the magnitude of gain was higher for females than males. This was attributed to the fact that they did not have access to such information prior to SITE. The survey concluded that a year's time was too short to realize a significant change in such social attitudes.

> The illiterate television viewers who had no prior mass media exposure and who did not go out of the village, gained most in family planning... But desire for small family was shown by literates more than illiterate viewers.[44]

<u>Health and Nutrition</u>

There was an increase in awareness and knowledge about health and nutrition as a result of the SITE programs. The

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[42]Binod C.Agrawal, et al., "SITE Social Evaluation: Impact on Adults, Part - I," (Space Applications Center, Ahmedabad, India, September 1977), p. 83.

[43]Ibid., p. 96.

[44]Ibid.

TABLE IX

TOTAL GAIN SCORES IN FAMILY PLANNING

MALES				FEMALES			
C	E1	E2	E3	C	E1	E2	E3
0.754	0.424	0.756	0.890	0.725	0.243	1.230	1.445

* Level of significance = 0.05
C -- Control Group
E1 -- Rare television viewers
E2 -- Occasional television viewers
E3 -- Frequent television viewers

results showed that the gains were significantly different for the experimental and control groups for both males and females (see Table X).[45] Frequent television viewers gained more than the other groups. Females gained more in health and nutrition practices, compared to males. Females who did not have access to such information earlier, now received it directly through television.

> In general, the young, the unmarried, and the married respondents with two or less children gained more knowledge about health innovations than others. The magnitude of gain was more in illiterates than literates... The community television played an important role in narrowing the knowledge gap among various sections of rural

[45]Ibid., p. 77.

TABLE X

TOTAL MEASURE OF CHANGE IN HEALTH INNOVATIONS

MALES				FEMALES			
C	E1	E2	E3	C	E1	E2	E3
1.423	1.466	1.799	1.938	1.047	1.287	2.020	2.431

* Level of significance = 0.05
C -- Control Group
E1 -- Rare television viewers
E2 -- Occasional television viewers
E3 -- Frequent television viewers

population that did not have access to sources of information on modern health practices.[46]

School Telecasts

Students exposed to television programs in the classroom showed an improvement in the area of language development, as compared to non-participating students. The increase was statistically significant (see Table XI).[47] The presence of television in the classroom had no impact on school attendance or the drop-out rate.

[46] Ibid.

[47] Snehlata Shukla, "The Impact of SITE on Primary School Children," Journal of Communication, Vol. 29, No. 4, (Fall 1979), pp. 102-103.

TABLE XI

DIFFERENCES BETWEEN SCORES IN LANGUAGE DEVELOPMENT TESTS BEFORE AND AFTER SITE BROADCASTS

	LISTENING COMPREHENSION		VERBAL ANALOGY		WORD MEANING		VERBAL FLUENCY	
	Control group	SITE group	Control group	SITE group	Control group	SITE group	Control group	SITE group
CLASS III								
Andhra Pradesh	0.58	1.82**	1.19	2.09*	0.36	2.39**	-0.23	4.32*
Karnataka	0 51	1.56**	0.94	3.49	1.10	3.04**	6.74	7.19**
Orissa	-1.22	1.60**	-3.55	5.32**	-1.53	7.93**	-0.66	5.49**
Bihar	1.71	3.84*	0.50	2.75*	1.04	2.48	-13.66	4.21**
Madhya Pradesh	2.38	3.82*	1 31	3.65*	1.53	2.56	6.02	15.13**
Rajasthan	1.37	2.73	2.40	3.82*	1.31	0.70	2.86	11.14**
CLASS V								
Andhra Pradesh	1 30	3.22**	0.55	2.39*	1.30	2.15**	2.47	9.46*
Karnataka	1.81	5.08**	3.29	3.76	2.79	5 11**	5.85	13.18**
Orissa	-0.62	4.73**	-0.32	5.37**	-0 14	2.40	-0 35	2.31**
Bihar	1.73	2.44	1.03	1.13	0.26	1.79	-4.87	3.67*
Madhya Pradesh	-0.19	1 97	4.57	5.63	2.41	2.30	-0.36	2.95
Rajasthan	-2.31	0 61**	0.39	2 81	-1.19	2.14**	-9.16	-9.66

* Difference between gains and scores significant at $p < 0.05$.
** Difference between gains and scores significant at $p < 0.01$.
Note: Sample size for each group is equal to or slightly smaller than 100.

> In countries such as India, these problems have roots in the economics of living conditions and the need for little children to be tending the infants or to be working in the fields themselves.[48]

Scholastic achievements were not affected by watching SITE programs since the programs were not syllabus oriented. However, children interacted more with the teachers. Teachers developed more positive attitudes toward using media in education and also to involve children more in learning processes.[49]

Teacher Training

The majority of the teachers showed a positive attitude towards the training program. The multi-media science package for in-service teacher training was successful in increasing the knowledge of content, teaching methods, etc. among primary school teachers. Teachers were of the opinion that the television visuals helped them in understanding the topics in science. 50,000 rural teachers were exposed to the multi-media package.[50] Classroom observation of some of the teachers showed improvement in the use of teaching aids,

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[48]Bella Mody, "Lessons from the Indian Satellite Experiment," Educational Broadcasting International, Vol 11, No. 3, (September 1978), p. 120.

[49]Snehlata Shukla, "The Impact of SITE on Primary School Children," Journal of Communication, Vol. 29, No. 4, (Fall 1979), p. 102.

[50]SITE Technical Report, Part I, Vol 1, Indian Space Research Organization, Bangalore, September 1977, p. 5.

performance of experiments, and in encouraging children to participate in the class. The teacher training program was a success because of the clarity of the objectives aimed at a homogeneous audience of professionals.

Political Socialization

Programs were telecast on a variety of life-styles in different states. News, interviews, documentaries, and songs dealt with citizen's responsibilities. These programs were meant to promote national awareness and to minimize regional prejudices. An effort was made to measure the gain in political information, national integration, and views regarding administrative efficiency. There was no appreciable change in the respondent's perception of problems facing the country or the citizen's responsibility in the context of these issues. However, statistically significant gains in political information were reported for the frequent television viewers (see Table XII).[51]

> In general, the magnitude of the gain was greater... for illiterates, for females, for low income groups, and for those who reported regular TV viewing. These were the groups who had less exposure to other sources of information and thus gravitated towards free community-TV.[52]

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[51] Binod.C.Agrawal, et al., "SITE Social Evaluation: Impact on Adults, Part - I," (Space Applications Center, Ahmedabad, India, September 1977), p. 128.

[52] Bella Mody, "Lessons from the Indian Satellite Experiment," Educational Broadcasting International, Vol 11, No. 3, (September 1978), pp. 120-121.

TABLE XII

TOTAL MEASURE OF CHANGE IN POLITICAL SOCIALIZATION

MALES				FEMALES			
C	E1	E2	E3	C	E1	E2	E3
1.387	0.527	1.566	2.397	1.747	0.901	1.587	2.565

* Level of significance = 0.05
C -- Control Group
E1 -- Rare television viewers
E2 -- Occasional television viewers
E3 -- Frequent television viewers

Problems Encountered During the Project

Programming presented the most difficult and demanding problems. SITE's production facilities were small, under-equipped, and understaffed. The program production had to be done in a hurry, since there were delays in setting up studios, recruiting production staff, providing audience profiles and needs assessment to the producers. No significant efforts were undertaken towards software production. The primary challenge was to meet the production target. These conditions, together with the pressure of having to produce so many new program segments each day, led to an over-dependence on entertainment programs. This trend continued, even though audience feedback indicated a preference for instructional programs.[53]

According to Bella Mody, SITE's Chief Evaluator,

> Since production was in no position to physically even glance at such (feedback) research in a healthy frame of mind, there was little time for concern about adequacy for the villagers of what was produced. The concern was to keep the TV monsters fed.[54]

An average of 90 minutes of finished programming was expected of each SITE producer, per month.

> The pressure to produce and can videotapes was so high that producers had little time to discriminate between what was relevant and what was not. The overriding concern was to have something passable to transmit everyday.[55]

The pressure of meeting deadlines gave little scope for pretesting and revision of the programs. However, the audience reactions to the earlier telecasts guided subsequent programming.[56]

The software operations presented more problems than the installation and maintenance of hardware. The main reason was that there were only three base production

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[53]Emile G. McAnany and John K. Mayo, Communication Media in Education for Low Income Countries: Implications for Planning, # 29, UNESCO, (Paris 1980), p. 48.

[54]Ibid., p. 49.

[55]Bella Mody, "Programming for SITE," Journal of Communication, Vol 29, No. 4, (Fall 1979), p. 94.

[56]Ibid., p. 96.

centers to produce programs for villages with varied agro-economic and cultural backgrounds. Area-specific programs were minimal.

> "...it is a truth apparent to common sense that decentralized and area-specific programs, employing the local dialect and depicting local agro-economic and human landscape, are necessary in any attempt to persuade people to change their attitudes and practices in agriculture or hygiene, or even more so, in family planning."[57]

Local production facilities were lacking. The bulk of the project's budget was allocated to the installation and maintenance of the hardware. Program planning and utilization played a secondary role.

> 82% of SITE costs were incurred on hardware - earth stations, studios, television sets and so on. Only 9% of total costs were spent on actual software production, and 3% on social research and evaluation. Hardware planning started in 1970 while software planning started only in 1974.[58]

The one-video, two-audio situation put the producers in a difficult position. The satellite had only one video channel and two audio channels. It could transmit one picture at a time with synchronized sound in two different languages. So, it was possible to beam programs to only two linguistic regions at a time. This rigid broadcasting

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[57] G.N.S. Raghavan, "Do mass media reach the masses? The Indian Experience," Prospects, Vol X, No. 1, (1980), p. 95.

[58] Bella Mody, "Lessons from the Indian Satellite Experiment," Educational Broadcasting International, Vol 11, No. 3, (September 1978), p. 120.

schedule of local programming conflicted with local dinner hours, cold weather in the evenings, etc. Attendance suffered in areas where there was a time lag between national programs from Delhi and the regional language broadcasts.[59] The lack of lip-synchronization between the dubbed sound tracks and the video reduced the effectiveness of the programs to a certain extent.

A continuous feedback is necessary for the assessment of the progress of the project. But during SITE, feedback procedures encountered a number of problems. Time lag between collecting the data and processing the results took more than a month. However, the problem was that the producers had neither the time nor the inclination to interpret the enormous amount of quantitative results.[60]

Secondly, the feedback was too general in nature to provide practical guidance for the producers.

> It was composed of summary assessments of individual programs (e.g: On a '5' point scale, viewers rated the program '2' in usefulness), but little interpretation of what aspects of the program viewers found useful or confusing was provided.[61]

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[59] Clifford Block, Dennis R. Foote, and John K. Mayo, "SITE Unseen: Implications for programming and policy," Journal of Communication, Vol 29, No. 4, (Fall 1979), p. 120.

[60] Kiran Karnik, "Developmental Television in India," Educational Broadcasting International, Vol 14, No. 3, (September 1981), p. 133.

[61] Clifford Block, Dennis R. Foote, and John K. Mayo, "SITE Unseen: Implications for programming and policy," Journal of Communication, Vol 29, No. 4, (Fall 1979), p. 123.

The program quality suffered because of a lack of right type of equipment in sufficient numbers, inadequate television libraries at the broadcast production centers, and late arrival of feedback reports from research centers.[62]

A more fundamental problem on the software side was the lack of a strategy for the content and format of the programming, particularly for the evening programs. It tried to explore a wide variety of goals. The general objectives covered a broad range of development themes - agriculture, family planning, health, nutrition, etc. But there was no precise definition of what was to be accomplished.[63] Lack of defined goals for evaluation was a basic handicap.

The national program telecast was a convenient means for the government to expose the villagers to the government's policies and programs. The nightly news segment from Delhi in Hindi language, was common to all the six clusters. In such instances, the villagers either had to sit through programs they could not understand, or leave and return later. Very often, the villagers could not understand the commentaries in the documentaries because of speech. The employment of local speech was found to be

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[62]K.E.Eapen, "The Cultural Component of SITE," Journal of Communication, Vol 29, No. 4, (Fall 1979), p. 123.

[63]Clifford Block, Dennis R. Foote, and John K. Mayo, "SITE Unseen: Implications for programming and policy," Journal of Communication, Vol 29, No. 4, (Fall 1979), pp. 120- 121.

necessary. According to the findings of a research study undertaken by ISRO:

> ... the use of English-sounding technical names (in programs on agriculture and animal husbandry) compounded the problem... if the programs were entertaining enough in terms of songs and dances, language did not become a barrier. Due to this reason, recreational programs of other clusters were viewed with enthusiasm in all the villages... The Hindi common news was almost ineffective in all the villages...[64]

The villagers were not well-informed about program scheduling. The program sequences prepared at the base production centers were not readily available in the villages. Thus, the average village viewer did not know what he or she would be viewing on a particular evening. Lack of information about the broadcast schedule discouraged the villagers from developing interests for particular programs. This was partially responsible for a decline in the attendance. The television viewing was further affected by power failures. Villagers simply watched the SITE programs. Little attempt was made to coordinate the television broadcasts with the other follow-up activities like organization of listening and discussion groups, radio broadcasts, etc. due to lack of adequate funding.

Impediment to Research

Just 34 days before SITE broadcasts were scheduled to

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[64]G.N.S. Raghavan, "Do mass media reach the masses? The Indian Experience," Prospects, Vol X, No. 1, (1980), p. 95.

begin (August 1975), a national emergency was declared by the then Prime Minister of India, Mrs. Indira Gandhi. Because of the prevailing atmosphere of the fear of the government, viewers were hesitant to openly criticize the government sponsored programs and activities.

Bella Mody, the SITE's chief evaluator, stated:

> The unusual and special publicity in all media for development schemes generated under the emergency declared by the then Prime Minister Indira Gandhi, simultaneously with SITE, made it difficult to assess the impact of SITE programs.[65]

Thus, the scope of the research was hampered.

The Appalachian Education Satellite Project

The Appalachian Education Satellite Project (AESP) was planned and carried out by the Appalachian Regional Commission (ARC) in the United States of America, during the years 1974-75. The project was funded by the National Institute of Education (NIE), and was jointly sponsored by ARC, NIE, and the National Aeronautics and Space Administration (NASA).[66] It was an experiment designed to determine the feasibility of delivering, via satellite, in-

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[65] Bella Mody, "Lessons from the Indian Satellite Experiment," Educational Broadcasting International, Vol 11, No. 3, (September 1978), p. 119.

[66] William J. Bramble, Catherine E. Hensley, and Dennis Goldstein, "A Follow-up Report on the Appalachian Education Satellite Project," Journal of Education Technology Systems, Vol. 5 (2), 1976-77, p. 83.

service education courses and supporting information services (in career education and elementary reading) to teachers in the Appalachian region (see Figure 10). The educational objective of AESP was to improve the effectiveness of the classroom teacher, thereby upgrading the quality of reading and career education instruction available to Appalachian students. The Appalachian region encompasses 397 counties and includes all or part of 13 states of the U.S.A.: Alabama, Georgia, Kentucky, Maryland, Mississippi, Ohio, New York, North Carolina, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia.[67] AESP offered four graduate-credit continuing education courses -- two each in reading instruction and career education. The courses were broadcast to over 1,200 Appalachian area teachers and educators.

The Appalachian Regional Commission was established in 1965. The purpose of the commission was to promote the overall development of the Appalachian Region. A 1970 survey conducted by the ARC revealed that Appalachian teachers, particularly those in the rural areas, received very little in-service training.They expressed a strong desire to receive in-service training in reading and career education. The availability of the Applications Technology Satellite-6 (ATS-6) for transmission of educational programs offered a

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[67] AESP Technical Report, edited by William J. Bramble and Catherine E. Hensley, No. 13, June 1976, p. 1.

Figure 10. The Appalachian Region

unique opportunity.[68] The year-long AESP utilized ATS-6 to deliver the training courses to a large number of teachers and educators in Appalachia. AESP also utilized the Applications Technology Satellite-3 (ATS-3) for live audio interaction.

There were 15 satellite receive-stations (clusters), scattered from New York to Alabama. These clusters were located within the footprint of the satellite. They were geographically arranged in groups of threes, forming five separate triangular networks (see figure 11). Each cluster fell under the jurisdiction of one Regional Education Service Agency* (RESA). In each triangle, there was one "main" site, capable of transmitting as well as receiving signals via satellite. The other two were "ancillary" sites, which could only receive. These ancillary sites interacted directly with the instructor on television through the main site, to which they were connected by telephone.[69] ATS-3 was used for the reception and transmission of radio messages (audio interaction), from the main sites to the broadcast studio located at the University of Kentucky at Lexington,

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[68]William J. Bramble, Claudine Ausness, and Dennis F. Goldstein, "On the Beam: The Appalachian Education Satellite Project," Appalachia, Vol 9, No. 5, April-May 1976, p. 11.

* Regional Education Service Agencies are confederations of school districts that share audio-visual centers and/or specialists.

[69]Nick Engler, "An A for AESP," Appalachia, Journal of the Appalachian Regional Commission, Vol 11, No. 5, April-May 1978, p. 27.

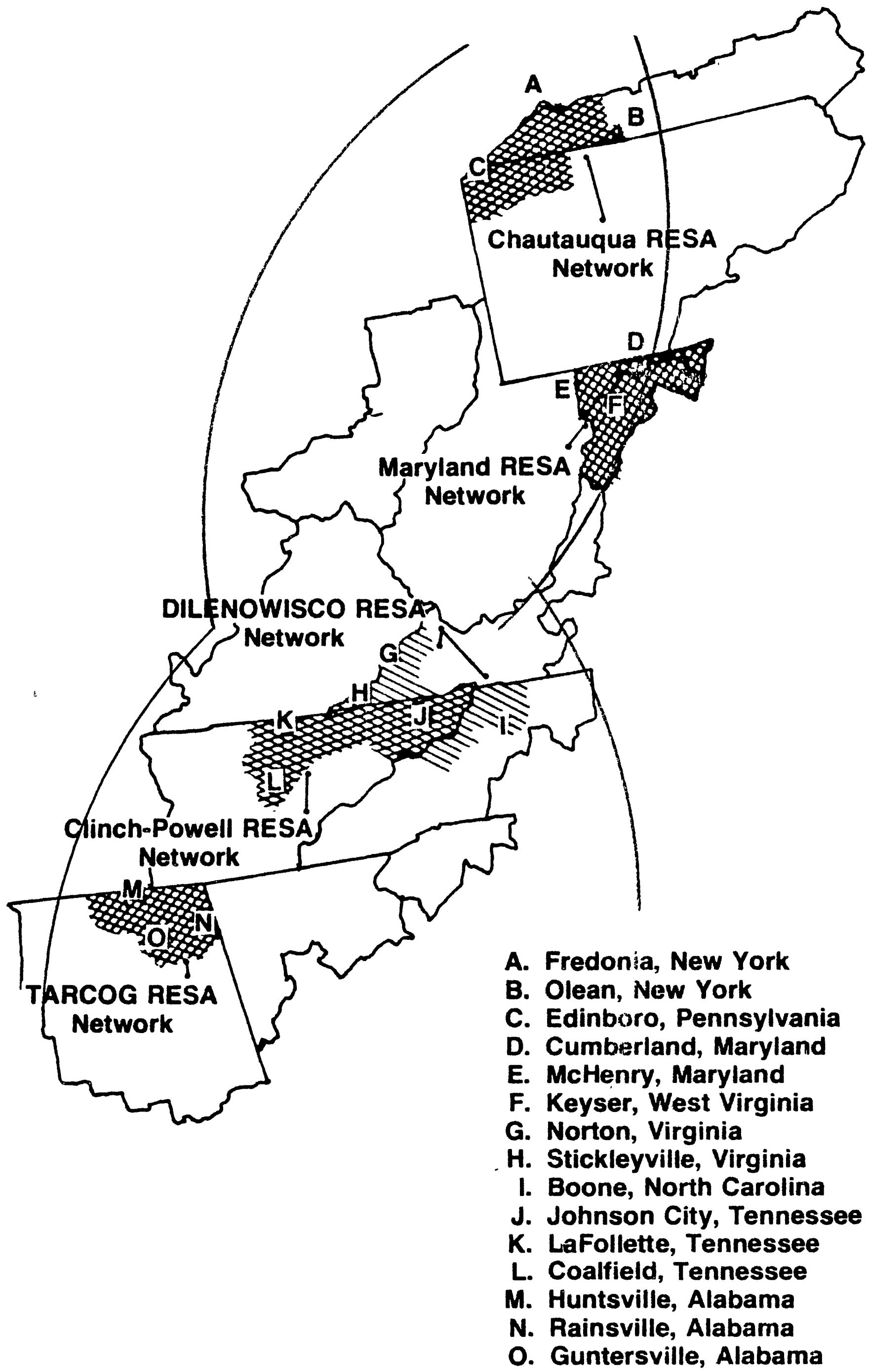

Figure 11. The Appalachian Region with the Five Triangular Networks and Approximate Satellite Footprints

Kentucky. The University of Kentucky was the Resource Coordinating Center (RCC) for the project. RCC was responsible for developing, producing, and evaluating all software programming for the four courses. The University of Kentucky also offered graduate credit for the participants in each of the courses.[70] The pre-taped programs were sent over a land-hookup to a NASA Control Center in Rosman, North Carolina, and were beamed up to ATS-6. The satellite transmitted these programs back to the 15 classroom sites.

The first two courses, Career Education for the Elementary School (K-6), and Diagnostic and Prescriptive Reading Instruction (K-3) were delivered in the summer of 1974. Career Education for Secondary Teachers was conducted during the following fall session. The final reading course for the K-3, K-6, and 4-6 level teachers was offered during the spring of 1975. Each course was delivered to an audience of about 300 teachers.[71]

The format for the two AESP Reading courses and the Elementary Career Education course consisted of the following:

1. 30-minute color video-taped programs augmented by pre-taped, programmed four channel audio instruction -- Both the activities were designed to convey practical application as well as theory.The television programs

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[70] AESP Technical Report, edited by William J. Bramble and Cathy Whitton, No. 11, September 1975, p. 2.

[71] William J. Bramble, Catherine E. Hensley, and Dennis Goldstein, "A Follow-up Report on the Appalachian Education Satellite Project," Journal of Education Technology Systems, Vol. 5 (2), 1976-77, p. 84.

were heavily illustrated with filmed interviews of content experts and with demonstration segments of Appalachian teachers applying instructional techniques in their classrooms.

2. 15 minute audio reviews of the pre-taped television programs using the four-channel audio capability of ATS-6 -- Each review consisted of a question describing a hypothetical teaching situation and four alternative approaches to the problem. The student selected the response he felt the most appropriate by pressing a button on his response pad. He then heard an explanation of the merits of his response.

3. Live Seminars, forum in format, made it possible for students to interact with the content experts during a live broadcast. Seminar questions were relayed from the 10 ancillary sites by landline teletype transmission to the broadcast studio, via ATS-3.

4. The students had resource libraries at each of the sites. These resource libraries included materials which were pre-selected to complement each course. They also had access to searches for instructional materials using computerized and manual information retrieval systems.[72]

The satellite-delivered activities were followed by laboratory sessions during which participants completed suggested group and individual follow-up activities.

The Career Education Course consisted of 16, one-hour, live, interactive seminars. These broadcasts were moderated by a leading expert in career education who hosted a wide variety of content experts and practitioners. Students interacted with these content experts. The seminars were followed by laboratory sessions at each site.[73]

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[72] William J. Bramble, Claudine Ausness, and Rodger Marion, "Education on the Beam: A Progress Report on the Appalachian Education Satellite Project," (Paper presented by Dr. Bramble, at the 1975 Annual Meeting of the American Educational Research Association, Washington D.C., April 1, 1975), pp. 4-8.

[73] William J. Bramble, Catherine E. Hensley, and Dennis Goldstein, "A Follow-up Report on the Appalachian Education

A site coordinator handled all the technical and administrative details. A faculty consultant advised students and assisted in evaluating their progress.

Comparison of the Evaluation Techniques of SITE and AESP

The Indian Satellite Instructional Television Experiment (SITE) and the Appalachian Education Satellite Project (AESP) were conducted to demonstrate the feasibility of a broadcast satellite to deliver educational programs to a large, diverse, and isolated rural audience. Both experiments hoped to gain experience in the development, testing, and management of a satellite-based instructional television system.

Evaluation and research were integral components of programs and operations of SITE and AESP. The evaluation design of SITE was based on the Context-Input-Process-Product (CIPP) model. AESP utilized Formative-Summative evaluation design with more emphasis on the summative evaluation. AESP appointed a staff of trained evaluators headed by a director, an assistant to the director, and two or more evaluation coordinators. An evaluation office was established as a component of the AESP Resource Coordinating Center (RCC).[74] SITE's research and evaluation staff

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Satellite Project," Journal of Education Technology Systems, Vol. 5 (2), 1976-77, p. 88.

[74] Final Report of the Appalachian Community Service Network to the National Institute of Education: The

consisted of more than 100 people and the evaluation staff was multi-disciplinary in nature. Extensive evaluation procedures were designed into the project.

The difference in intended programming in the two countries ("education" in the U.S. and "agriculture, family planning, health, etc." in India), and the differing cultural contexts, made it impossible for SITE's evaluation design to have a close collaboration in research procedures with those of the AESP. The magnitude of the project in India was much larger than AESP. Due to its innovative nature, the scope of AESP was limited and the number of participants was small. SITE differed from AESP in its diversity of the audience, the geographic area covered by satellite footprint (more than 2300 satellite reception locations for SITE as compared to AESP's 15 satellite reception sites), the type of feedback necessary for agricultural and other developmental activities. Due to these factors, a much wider variety of program evaluations were conducted by SITE than were carried out by AESP.

In the case of AESP, the major objectives of the experiment and major goals of evaluation were well defined. The evaluation goals emphasized empirical data and proving the feasibility of programming, reliability of the equipment, the achievement of the participants, and the

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Reshaping of an Innovation 1970-1982, Appalachian Community Service Network, Washington D.C., pp. 53-54.

effect upon their attitudes.[75] Teachers' acceptance of the materials and the delivery system were stressed. Twelve major technical reports were published during 1973-76 by the RCC evaluation component of the University of Kentucky, Lexington, Kentucky.

The technological and social objectives of SITE were clearly defined. But the objectives of social evaluation were not clearly outlined by the experimenters or those who were responsible for future policy decisions. Therefore, the first task of the researchers was to define evaluation goals.

> ...Since the program content was not fully known, evaluation goals were set up keeping in view the broad instructional areas of SITE.[76]

Program objectives and content varied between the localities. Initial lack of defined goals for evaluation was a basic handicap in SITE. Defining the audience and targeting the message would have reduced the frustration. Pre-determined measurable objectives are necessary to conduct evaluation in a systematic manner. However, SITE was extensively evaluated in terms of its process, acceptability, and impact. In-depth research was attempted to evaluate and judge the significance of the delivery of

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[75]Ibid., p. 58.

[76]SITE Technical Report, Part 1, Vol 1, Indian Space Research Organization, Bangalore, India, September 1977, p. 5.

the satellite based television programs to the villages.

Formative Evaluation

The formative evaluation of a program is designed to help the administrator and the planner to make effective decisions throughout the project duration. This type of evaluation provides continuous information that can be used to modify the program to improve its effectiveness and efficiency.

The formative evaluation component of Appalachian Education Satellite Project provided data about teaching and administrative conditions in the target regions. AESP made use of the needs assessment survey conducted by the Appalachian Regional Commission in 1970. A strong feature of the AESP was the emphasis that was placed on identifying local needs as a basis for program selection. While planning for the course content, local input was sought continually (throughout the experiment) from the universities, public school consultants, and classroom teachers in the region. The involvement of the educators and the audience reaction studies helped to alter, refine, and revise formats of the course materials to meet the expressed needs of the participants. However, due to limited funding and time, AESP found it difficult to conduct an extensive formative evaluation for 1974 summer courses.

SITE's formative evaluation system was elaborate and involved a great deal of personnel and equipment. A feedback system for evaluating television programs as well as management needs in the field was established. The concerned ministries (on health, education, etc.) gave guidance on topics in the initial stages. But there was no continuous significant input or feedback from the audience to the producers for the overall planning of the television programs. Program planning and utilization played a secondary role compared to the emphasis placed on technological objectives. An earlier review of the project's evaluation in its initial stages would have given an insight of what was happening. Limited funding (0.03% of the total SITE budget) and time, made an extensive formative evaluation impossible. Revision of program contents after pre-testing was found to be extremely difficult, because of the tight schedule. Though needs assessment studies were carried out in all the clusters, not all clusters could be covered in a detailed manner. Careful coordination between the assessment of needs, planning of program objectives, and the related activities of the ministries was found to be essential.

Summative Evaluation

Summative evaluation is done at the end of a program and is used to determine the program's overall effectiveness. The results of such an evaluation can be used to modify the program, if the program is to be continued.

In AESP, the summative evaluation procedures were carried out to answer the following questions:

> How reliable was the technology?
>
> How well did participants like the satellite delivered activities?
>
> How much did participants learn?
>
> How cost-effective were the courses as compared with the cost of the campus-based courses?

Data were collected by means of questionnaires, pre and post measures of cognitive and affective achievement, participants' ratings of various learning activities, and methods of presentations and of the technical aspects of the course.[77] The summative evaluation of AESP proved that it was technically feasible and cost-effective to deliver college credit courses to remote areas. It further showed that there was a large potential audience for satellite based television learning.

The external evaluation of the AESP was conducted by the Educational Policy Research Center (EPRC) of the Syracuse University Research Corporation. EPRC did not conduct any formal data collection or analysis of the project. It mainly discussed the organizational context of AESP. Information was gathered by visits to 6 classrooms during class meetings and from conversations with 67 persons

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[77]William J. Bramble, Claudine Ausness, and Rodger Marion, "Education on the Beam: A Progress Report on the Appalachian Education Satellite Project," (Paper presented by Dr. Bramble, at the 1975 Annual Meeting of the American Educational Research Association, Washington D.C., April 1, 1975), pp. 9-10.

who had participated directly or indirectly with AESP.[78] The interviews were unstructured and no attempt was made to analyze the content of the conversations. EPRC did not question the basic findings of the internal evaluation or the successful overall performance of the AESP. However, it was concerned with the roles of the Appalachian Regional Commission (ARC) and the coordinators of the Regional Education Service Agencies, which were considered as critical. It felt that ARC was being used by federal agencies to distribute funds to independent agencies (RESA, collges, and universities) instead of serving as a coordinator of the associated states in seeking federal support for regional projects. It also expressed concern about the limited scope of live interaction seminars in the experiment. EPRC commented that screening questions off-camera made spontaneity difficult. It also concluded that the computer-based information retrieval system (which were used as part of the resource libraries) did not contribute to the outcomes of the project.[79]

The summative or product evaluation may dampen the enthusiasm when the results are poor. However, when there is evidence of achievement it can aid in securing additional

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[78]Robert T. Filep and Patricia A. Johansen, "Synthesis of the Final Reports and Evaluations of the ATS-6 Satellite Experiments in Health, Education, and Telecommunications," Agency for the International Development, Washington D.C., February 1977, p. 62.

[79]Ibid.

financial support from the funding agencies. Decisions related to continuing or terminating a project and increasing or decreasing the funding level depends on the project outcomes. Evaluators often have to negotiate with the various parties at interest - the evaluation sponsors, the federal,state, and local program managers and others in exchange for resources and cooperation. This is largely a matter of political judgement. The importance of gaining knowledge about the programs becomes secondary. The funding units exercise great influence over the nature of the evaluation studies.

SITE's summative evaluation included a series of impact studies which measured the impact of the programs on children and adults. Anthropological studies, small, sample in-depth studies, a program inventory, and content analysis of the programming were also undertaken as a part of summative evaluation. Unlike AESP, the aspect of cost effectiveness was not included as a topic of investigation. This was left to the hands of the management. Table XIII summarizes the the evaluation techniques utilizied by SITE and AESP.

The single most important external factor that affected the social impact of SITE was the declaration of emergency on June 25, 1975 and its continuance throughout the SITE period.

> It was difficult to assess the all-pervasive socio-political changes that took place after the declaration of emergency... Pre-SITE survey data

TABLE XIII

EVALUATION TECHNIQUES OF SITE AND AESP

SITE	AESP
FORMATIVE EVALUATION was classified into a. Context Evaluation: – Audience profiles – Needs Assessment Studies b. Input Evaluation: Pretesting of pilot programs to guide program format and design c. Process Evaluation: An extensive feedback system on specific programs SUMMATIVE EVALUATION included: – Impact studies on adults and children – A series of holistic anthropological studies – Content Analysis – In-depth studies on variety of topics	FORMATIVE EVALUATION: AESP made use of the needs assessment survey conducted by Appalachian Regional Commission in 1970. – Identifying local needs for program selection – Field review of scripts by teachers and content experts – Performing experiments to determine the most effective sequences and formats for the learning activities – Audience Reaction Studies SUMMATIVE EVALUATION included: – Unit tests, pre & post achievement and attitude tests, pre & post teaching practices inventories – User ratings of the quality of the learning activities – Follow-up studies – Equipment checklists – Cost studies comparing alternative formats EXTERNAL EVALUATION was conducted by the Educational Policy Research Center of the Syracuse University Research Corporation. – Discussed the organizational context of AESP – Discussed the role of the coordinators of the Regional Education Service Agencies in AESP – Expressed concern about the limited scope of live interaction seminars in the experiment

> were collected from 108 villages, a few days before the proclamation of emergency... these villages were also surveyed after the proclamation of emergency... The pre-SITE survey was a pre-emergency survey whereas, during and post-SITE surveys were emergency surveys.[80]

Normally, the evaluation of federally funded projects is controlled by three different agencies - the sponsor of the evaluation, the program agency in the field, and the evaluators. Each of the agencies may have some influence over the design and conduct of research. But every decision in the project has to be negotiated and agreed to, by a number of parties. Political forces and events which impinge on decisions about programs are often more powerful than empirically derived evidence.

It is difficult to compare the results of SITE evaluation with those of AESP because of the differences in their evaluation designs. These evaluation designs differ in their philosophies, perspectives, and experiences. SITE's CIPP design caters to the managers or the decision makers, whereas AESP's formative-summative design is consumer oriented. The major elements in understanding the evaluation designs are their ethics, epistemology, and their political ramifications. However, these models strive to arrive at a single judgement - the overall social utility. No matter what the evaluation design may be, the prime

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[80] SITE Technical Report, Part 1, Vol 1, Indian Space Research Organization, Bangalore, India, September 1977, p. 5.

consideration will be the decisions that will be made as a consequence of the data. A record of the results obtained regarding the program approach and costs involved can assist planners and developers. A careful analysis of these reports can shed light on future projects.

Although the two experiments, SITE and AESP, differed in magnitude, cost, intended programming, etc. they have provided some answers to the communication experts, educators, engineers, and others. The experiments focused their attention on the operational feasibility of using a broadcast satellite to deliver instructional programs to the rural audience. These experiments have proved that it is technically feasible to deliver instructional messages to remote areas. In the process, they have also encountered and overcome many problems related to software production, logistics, personnel training, evaluation techniques, etc.

The final chapter presents a summary of the study along with a discussion related to lessons learned, implications, and recommendations regarding future satellite based television projects.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

Summary

The primary objective of this study has been to make a thorough analysis of the Satellite Instructional Television Experiment (SITE), that was conducted in India during the year 1975-76. The study begins with a discussion on satellite systems for communication purposes. The main features and the existing patterns of the present educational system and mass media in India are discussed in the second chapter. The third chapter examines the development and application of broadcast satellites for education. The controversies and effectiveness of broadcast satellites have also been reviewed. Chapter IV focuses on the Indian Experiment with Satellite Instructional Television. It provides a description of the experiment, problems encountered, and the planned outcomes of the project. Also, the evaluation techniques of the Indian experiment have been compared with those of the Appalachian Educational Satellite Project (AESP), that was conducted in the United States during 1974-75.

The final chapter discusses the lessons learned from the Indian Experiment and the implications of using broadcast satellite technology. The chapter concludes with recommendations for future satellite-based television systems in developing countries.

Findings

The most impressive outcome of the SITE project is the demonstration that the technical and operational aspects of a large-scale use of sophisticated technology can be undertaken in the context of a developing country. SITE has shown that even a developing country with limited resources can take up great challenges in experimenting with the latest technology and "deliver the goods". It also demonstrated that developing countries like India have the necessary technical and managerial capability to design, operate, and maintain an advanced communications technology.

The experiment demonstrated that the community broadcast satellite can be a reliable technological system for reaching large numbers of widely dispersed, rural, and heterogeneous population. It further proved that it is possible to disseminate modern educational techniques and programs to areas where facilities are limited or non-existent.

SITE was particularly successful in its development of low-cost video technology and inexpensive ground receivers. The use of this inexpensive equipment for decentralized program production will greatly benefit other developing countries who may undertake such schemes in the future. SITE provided the experience for the technical staff, program producers, and the social scientists, who will help to guide future programs. SITE illuminated a host of issues on programming for the rural audience like scheduling, audience size and diversity, integration of programs with local activities, etc. These experiences in the development of technology, software, and management will be of help to future planners.

An encouraging trend that emerged out of SITE results was that the magnitude of the gain was greater for women, low-income groups, and illiterates. It expanded the educational opportunities for rural adults. It catered to the needs of the underprivileged groups of the society by providing a direct access to information. The experiment neither grossly transformed the Indian villages into hot beds of development, nor caused the disintegration of the rural society, as some had feared.

Both SITE and AESP identified the significant roles of software planning and feedback procedures. Importance of formative evaluation was realized by both the experiments. These experiments emphasized the need for reliable communication and involvement of all the related agencies and ministries.

SITE was successful in its technical implementation. However, it lacked an efficient planning of software development and continuous feedback on program performance. This is partially due to the fact that the concept and the vision that created and guided SITE came from the scientific community and not from the educational community. The social impact of SITE was not as far-reaching as anticipated, because of problems in software production, personnel training, logistics, and sluggishness of the feedback system. The significance of these factors can be observed from the success of Appalachian Education Satellite Project (AESP), wherein software planning and local feedback were key features. The involvement of educators, teachers, and content experts made all the difference. It should, however, be noted that AESP had access to a well developed and superior telecommunication and broadcasting network, which helped to provide a live-interaction between the audience and the educators. Further, AESP was aimed at a defined group, while SITE addressed a very diverse, rural audience.

Rural broadcasting has to be closely linked to the life of the rural population. To become part of the village community, television must reflect that community. The content of programming should not be decided based on the opinions of a relatively small group of people. The local people should be actively involved in determining the themes for the telecast. While catering to a diverse audience, the choice of language for television broadcasting or broadcasting in general, always poses a political problem. During SITE, many viewers were not prepared to watch a program in which the commentary was not in their local language (for example, the mandatory one-half hour news segment in Hindi). In order to benefit from any offering of the media the broadcasts should be related to the language practices of the audience. It is only natural that people gravitate toward programs in their own language. Also, the language used should be scaled down to match the intellectual level of the viewer. Education through mass media will be more effective if it is addressed to homogeneous audiences and their specific needs.

The lessons learned from projects such as SITE and AESP should contribute significantly to future projects in developed as well as developing countries. These projects have provided the necessary insights for improving the decision-making process concerning the development of an educational broadcasting satellite system. By synthesizing the information gained from these projects and other previous studies, educational ventures which are currently in the planning stage can greatly improve the scope of their outcomes. Therefore, analytical studies similar to this work have a significant role in the planning and execution of future educational satellite experiments.

Recommendations

A set of guidelines can be proposed for future satellite-based educational experiments.

1. The planner must consider the appropriateness of communication in terms of educational objectives to be pursued. Educational objectives should originate

primarily from a thorough and realistic determination of rural needs, and only secondarily from the assessment of the media's potential role. A thorough understanding of the educational problems and the experiences of other projects that have employed the media would be of great help. Planning must proceed from an analysis of the problems existing under local conditions and a careful assessment of the educational, social, and cultural requirements of the situation.

2. Careful consideration should be given to all available technical options. The choice between conventional and advanced technology should be considered. A variety of media and combinations of technology and human organization can be adopted to serve different purposes in a variety of national contexts. Planners need to understand both the potentials and limitations of communication media.
3. Economic feasibility of satellite educational broadcasting in developing countries must be assessed. Careful economic analysis is needed by the educational and financial authorities in the developing countries before they commit themselves to a satellite-based educational system. The data derived from the experiences of the previous experiments should be closely looked at.
4. Extensive care and planning must go into the preparation of the broadcast curricula. A rapid and widespread

expansion of software facilities is required. Program content must be relevant to the needs of the intended learner. When the software aspects are ignored, the investment in the hardware is placed in great jeopardy. Software must be adapted to accommodate local differences. Differences exist in the specific knowledge requirements of different geographic and socio-economic sub-groups in the population of any developing country. Scripting and production must involve people from the relevant disciplines. It may be preferrable to produce a major percentage of the work locally. The planners must allocate a substantial portion of funds to produce high quality and highly relevant software. Language differences may call for specific local language be used in the production. Enormous linguistic fragments are bound to present a formidable obstacle. There may be a need to rebroadcast in three or four languages. Prompt and reliable feedback is a must for evaluating the effectiveness of a project. Continuous flow of feedback information from the receiving points to the production centers must be maintained. Supplementary learning activities must also be planned locally. Hence, there is a strong need for trained manpower. Competent personnel are required to provide the inputs for the production and also to train the staff.

5. The cooperation and involvement of all the related ministries and agencies must be ensured. Interaction

between the technical systems and human or organizational systems should be effectively maintained. Planning for effective development requires the support and participation of the community which is being served by the project. Therefore, harmonious and reliable communication are crucial between the planners and the community. Otherwise, the entire system may be disrupted. Total involvement of all related agencies for the success of any international, multi-disciplinary project in a developing country is necessary.

6. Since evaluation is recognized as an important element of planning, there is a strong need to acquaint the planners with a variety of program evaluations. The problem of determining what must be evaluated and the scope of evaluation must be carefully considered. Timely formative research and pretesting of prototypes are needed.
7. Planners and educators must go beyond the considerations of efficiency and economy to evaluate a culture's ability to cope with the new technology. Political and socio-cultural influences affect the outcome of ideas that cross cultural frontiers. The introduction of highly sophisticated technology into developing countries is very likely to have socio-political and cultural repercussions. Resistance to change occurs at many levels. The cultural conditions of a developing country may dictate the rejection of the medium if it is introduced in a careless or insensitive manner. The

impact on the culture must be carefully considered.

Recommendations for Further Studies

Certain specific recommendations have been made for further studies:

* Instead of exploring a wide variety of objectives, there is a need to minimize the number of objectives so that a strategy for attacking the problem can be efficiently formulated
* Objectives have to be explicit and appropriate with a clear vision of what is to be accomplished
* Need for greater involvement and participation by the educational community (with support from scientists) in decision making process and program production
* Geographical decentralization of program production.

It is dangerous to commit a society to technology before the problems that accompany such technology are analyzed, projected, and studied.

> What is needed is an educational rationale and plan designed to meet the needs of the society, that is a plan which takes stock of a society's social and cultural background and is capable of containing rather than be contained by technology... Theory must come before practice in the race to change people's habits and attitudes.... In the final analysis, it is humanity, not technology, that will bear the responsibility for human relations.[1]

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[1]Njoku E. Awa, Jack A. Barwind, and Arnold R. Gibbons, "Educational Technology in the Third World: A General Systems Perspective #9," Papers in Communication, Department of Communication Arts, Cornell University, Ithaca, New York, 1974, pp. 7-8.

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APPENDIXES

APPENDIX A

MEMORANDUM OF UNDERSTANDING BETWEEN THE INDIAN DEPARTMENT OF ATOMIC ENERGY AND THE UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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MEMORANDUM OF UNDERSTANDING BETWEEN THE INDIAN DEPARTMENT OF ATOMIC ENERGY AND THE UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BACKGROUND

1.0 The Indian Department of Atomic Energy (DAE) and the United States National Aeronautics and Space Administration (NASA) have jointly considered the fact that NASA plans, subject to funding and authorization, to launch two experimental Application Technology Satellites (ATS-F and G) in the early 1970's. These satellites will be placed in a synchronous equatorial orbit principally to explore the technical feasibility of erecting a large (30 foot) antenna structure in space and the ability to point it accurately (±0.1 degree). A candidate for inclusion on the ATS satellite is an UHF FM transmitter which could be used to transmit one video and two audio channels to augmented conventional TV receivers. Other experiments will likely include meterological, navigation and communications applications and scientific experiments in the space environment.

1.1 The Government of India has organized a Pilot Project in Delhi to test the effectiveness of TV for improving agricultural productivity, and is also deeply interested in the use of TV as a medium of mass communication for implementing programs for development. In addition, the DAE has established at Ahmedabad an Experimental Satellite Communication Earth Station. As a result of these activities and interests, the DAE has considered with NASA the feasibility and desirability of conducting an instructional TV experiment utilizing the experimental ATS-F satellite, which has been independently planned and programmed by NASA for other purposes which would proceed without regard to the specific Indian application discussed here.

1.2 The final report of the DAE/NASA Joint Study Group dated June 8, 1968 recommended that the DAE and NASA proceed to agree to such an experiment.

TITLE

2.0 The experiment with which this Memorandum of Understanding is concerned shall be known, and referred to, as the India/US ITV Satellite Experiment Project.

BASIC PURPOSE

3.0 The DAE and NASA agree to use their best efforts to conduct an experiment in the use of ATS-F for direct broadcast to rural community receivers and limited rediffusion through VHF transmitters of Indian-developed instructional TV program material.

GENERAL OBJECTIVES

3.1 The general objectives of the experiment will be to: Gain experience in the development, testing and management of a satellite-based instructional television system particularly in rural areas and to determine optimal system parameters. Demonstrate the potential value of satellite technology in the rapid development of effective mass communications in developing countries. Demonstrate the potential value of satellite broadcast TV in the practical instruction of village inhabitants. Stimulate national development in India, with important managerial, economic, technological and social implications.

SPECIFIC OBJECTIVES

3.2 Indian Instructional Objectives

3.2.1 Primary. - Contribute to family planning objectives, improve agricultural practices, contribute to national integration.

3.2.2 Secondary. - Contribute to general school and adult education, contribute to teacher training, improve other occupational skills, improve health and hygiene.

3.3 Indian Technical Objectives

Provide a system test of broadcast satellite TV for national development. Enhance capability in the design, manufacture, deployment, installation, operation, movement and maintenance of village TV receivers.

Gain experience in the design, manufacture, installation, operation and maintenance of broadcast, and/or distribution facilities to the extent that these are used in the experiment.

Gain an opportunity to determine optimum receiver density, distribution, and scheduling, techniques for audience attraction and organization, and to solve problems involved in developing, preparing, presenting and transmitting TV program materials.

UNITED STATES TECHNICAL OBJECTIVES

3.4 Test the design and functioning of an efficient, medium-power, wideband space-borne FM transmitter, operating in the 800-900 MHz band and gain experience on the utility of this space application.

GENERAL EXPERIMENTAL PLAN AND RESPONSIBILITIES

4.0 Following initial NASA experimentation with ATS-F, NASA would use its best efforts to position the satellite within view of India as early as possible to permit its use for the duration of this experiment. NASA will maintain control of the satellite while the use of the Satellite for the ITV experiment will be under the exclusive control of India. The appropriate authorities of the Government of India shall be solely responsible for the coordination of radio frequencies, earth to satellite and satellite to earth, insofar as this experiment, India and the surrounding region are concerned, in the framework of frequency coordination established in the International Telecommunications Union.

4.1 It is understood by DAE and NASA that the space segment responsibilities of NASA under this agreement do not go beyond the provision of experiment time on the satellite for approximately one year; no continuing responsibility is implied.

4.2 The DAE will arrange for the transmission of instructional TV programs from its earth station at Ahmedabad to the satellite for broadcast to appropriate receivers provided and sited by Indian agencies in villages in India. The number of receivers contemplated is a minimum of 5000, to be widely distributed. Responsibility for the TV programming is entirely with India and the use of the satellite would be in conformity with the specific objectives spelt out in the paragraph 3.2. The Government of India shall be solely responsible with respect to any legal proceedings which may be brought regarding such TV programs, and shall hold the Government of United States harmless therefrom.

4.3 The DAE and NASA recognize the possibility of utilizing the Ahmedabad earth station for monitoring the performance of the experimental satellite and for its station-keeping, and the DAE agree to make this facility available to NASA for this purpose and futher agrees to make available to NASA any data received from the satellites. While the DAE would not charge NASA for such use of the Ahmedabad earth station, costs incurred in making data available, such as the costs of purchase and transportation of tapes, would be met by NASA. The DAE and NASA also recognize the possibility of utilizing the Ahmedabad earth station for the purpose of conducting NASA-programmed scientific and technological experiments. These would be conducted on a time available basis and as mutually agreed.

RESPECTIVE SCIENTIFIC RESPONSIBILITIES

4.4 The DAE will use its best efforts to:

(1) Develop, provide and maintain in service the ground segment of the TV satellite experiment system that will carry out the technical objectives of the experiment.

(2) Develop and utilize ITV program materials that will carry out the instructional objectives of the experiment.

(3) Develop and implement a mutually acceptable experiment evaluation plan.

(4) Prepare and publish interim progress reports at six-month intervals and a final report within 18 months of the end of Phase III (see explanation of phase below).

(5) Make available trainees for such training as may be agreed to between Program Managers.

(6) Receive, record, reduce and analyze such ancillary engineering data as may be agreed between Program Managers.

4.5 NASA will use its best efforts to:

(1) Place into geostationary orbit an experimental Applications Technology Satellite (ATS-F), position it within view of India after a period of time, to be determined by NASA, but not greater than one year, and maintain it on station for approximately one year. The time required of the ITV experiment, which is expected to be about 6 hours a day, will be made available for the experiment during this period as NASA continues its own experimental effort using the satellite.

(2) Provide to the DAE such training and consultative services as may be agreed to between Program Managers.

PHASING OF THE EXPERIMENT

5.0 Phase I: 1968-69. - India will undertake necessary improvements to the earth station at Ahmedabad. Research and development will continue on the design, prototyping, manufacture and testing of ground segment components. The Indian technicians involved will become familiar, to the extent necessary, with space segment characteristics. NASA will supply technical assistance and advice during this phase as agreed to between Program Managers.

5.1 Phase II: 1969-70. - Phase I activities (which include the Delhi experiment) will continue and intensify. This would provide new centers of expertise, uncover and solve operational problems, permit experiments with different approaches, and develop a cadre of personnel for the next phase in receiver deployment maintenance and in programming.

5.2 Phase III: 1971-72. - The parties will conduct an instructional TV experiment using the ATS-F satellite.

EVALUATION PLAN AND REPORT OF EXPERIMENTAL RESULTS

6.0 An essential element of the experiment is in its prompt and objective evaluation - wherever possible in quantitative terms - so as to provide maximum and timely information, available to all nations, that might be relevant to any future experiments or services in this area.

6.1 The DAE will develop a plan for evaluating this experiment quantitatively to the mutual satisfaction of the Program Managers. The results of this experiment will be made freely available.

EXPECTED SYSTEM CHARACTERISTICS

7.0 The expected ITV satellite experiment characteristics are as follows, subject to minor modification as may be agreed to between Program Managers.

SPACE SEGMENT

7.1 The ATS-F satellite would be positioned approximately 80 E longitude in synchronous equatorial orbit, with the 30-foot parabolic antenna pointed generally toward the center of India. An FM transmitter operating in the 800-900

MHz, frequency range, with an RF bandwidth of approximately 30 MHz, will provide adequate power (45±5 watts) for transmitting TV program material and two audio channels to augmented conventional TV receivers.

GROUND SEGMENT

7.2 In this experiment it is assumed that the up-link transmission to the ATS-F satellite would be in the 6 to 8 GHz band. The experimental satellite communications earth station will be used for transmitting ITV program material to the satellite and for monitoring these transmissions and the performance of the satellite during the duration of the experiment. Augmented conventional TV receivers would be capable of receiving monochrome TV transmission from the satellite and one of two audio channels transmitted. For this purpose, the conventional receivers would be augmented by a front end, viz. a small parabolic receiving antenna (7-10 foot) and a preamplifier FM to AM converter of sufficient quality to receive transmissions from the satellite. In high village density areas, transmission from the satellite could be received for rediffusion from VHF TV transmitters to conventional TV receivers located in villages. An additional receive-only facility, using a 20 to 30 foot parabolic antenna is required near the VHF TV transmitter.

ENGINEERING AND EXPERIMENT DATA

8.0 All data relative to this experiment should be made available to both the DAE and NASA and should be processed as soon as possible.

OPERATIONAL COORDINATION

9.0 DAE and NASA agree to designate a Program Manager who shall be individually responsible for the respective responsibilities of their agencies and jointly responsible for coordination and mutual agreement where required.

9.1 DAE and NASA agree to designate a Project Manager to coordinate agreed functions and carry out detailed day-to-day project requirements. Project Managers will constitute a Joint Project Working Group of suitable size and composition to assist in supervising the project.

INDIVIDUAL FUNDING

10.0 DAE and NASA will each meet all costs associated with its own participation and there will be no exchange of funds.

APPLICATION OF SUPPLEMENT OF MARCH 10, 1966

10.1 Both parties agree that the provisions of the Supplement to the Memorandum of Understanding of July 1, 1965, dated March 10, 1966, pertaining to the procedures for payment of travel and subsistence costs will be applicable to this project.

PUBLIC INFORMATION

11.0 In general, public news release will be coordinated between DAE and NASA prior to release. If the information pertains solely to the participation of one of the parties, it may be released after informing the other party. However, if the interests of the other party are involved, such news releases will be coordinated with the other party. Basic "replies to queries" and press releases will be mutually developed as soon as possible and from time to time during the life of the project, so as to provide continuous up-to-date mutually-agreed public information materials.

PARTICIPATION

12.0 The experiment is to be conducted on the basis of this Memorandum of Understanding. The involvement of agencies or personnel from other nations or international bodies shall be subject to the prior agreement of DAE and NASA, and the provisions of the Memorandum of Understanding shall apply .us mutatis mutandis in such participations.

TERMINATION DATE

13.0 If the project provided for in this agreement is not substantially under way by January 31, 1975, it shall terminate on that date, unless both agencies mutually agree to an extension.

GOVERNMENTAL CONFIRMATION OF MEMORANDUM OF UNDERSTANDING

14.0 This Memorandum of Understanding shall be subject to confirmation by the Government of the United States of America and the Government of India by an exchange of diplomatic notes.

APPENDIX B

SITE EVENING PROGRAM SCHEDULE

APPENDIX B

SITE EVENING PROGRAM SCHEDULE

FIXED POINT CHART (EVENING TRANSMISSION)
WINTER SCHEDULE (NOVEMBER 1 - MARCH 31)

TIME (P.M.)		6:00	7:00		7:30		7.50 - 8:30
DAY	MINS	BIHAR/MADHYA PRADESH/ RAJASTHAN	COMMON PROG.		ORISSA		ANDHRA/KARNATAKA
MONDAY	10	Agriculture (MP)		10	Agriculture	10	Agriculture (Andhra)
	20	Cultural (MP/Bihar/Rajasthan)				10	Cultural Entertainment (Urdu)
	10	Health	N			10	Cultural Entertainment (Karnataka)
			E				
	15	General Education/Information Film	W	10	Cultural	10	General Education Community Matters (Karnataka)
			S				
	5	Short Film					
TUESDAY	10	Agriculture (Bihar)				10	Health, Nutrition, Hygiene, Family Planning (Andhra)
	30	Play	A	10	Agriculture		
	10	Youth	N	10	Cultural	10	Cultural Entertainment (Karnataka)
			D				
	5	Cultural					
	5	General Information				20	SKIT Play (Andhra)
WEDNESDAY	10	Agriculture (Rajasthan)		10	Women's Program (Health, Nutrition, Family Planning)	10	Agriculture (Karnataka)
			C				
	20	Cultural (Bihar/MP/Rajasthan)	O			10	Cultural Entertainment (Andhra)
			M				
	10	Health, Family Planning, Nutrition (Repeat Program)	M	10	Cultural	10	Cultural Entertainment (Urdu)
			O				
			N			10	Indian News Review
	10	Cultural Program from other centres					
	10	Indian News Review					

APPENDIX B (continued)

THURSDAY	10	Health, Nutrition		10	Agriculture	10	Health, Nutrition, Hygiene, Family Planning (Andhra/Karnataka)
	30	Women's Program				20	Women's Program (Andhra/Karnataka)
	15	Development and General Education (Films)	P			10	Programs from other Centres
	5	Cultural	R O				
FRIDAY	10	Agriculture (Common)-Repeat	G			10	Agriculture (Andhra/Karnataka)
	20	Cultural (Bihar/MP/Rajasthan)	R	20	Play	10	Cultural Entertainment(Andhra)
	20	Development and General Education (Films)	A M			10	Cultural Entertainment (Karnataka)
	10	Health and Family Planning	M E			10	Youth (Andhra/Karnataka)
	5	Cultural Program from other states					
	5	Short Film					
SATURDAY	10	General Education common matters				10	Health, Nutrition, Hygiene, Family Planning (Karnataka)
	20	Cultural (Bihar/MP/Rajasthan)		20	Children's Program alternating with fortnightly Indian newsreel		
	25	Development and General Education				10	Cultural Entertainment(Andhra)
	5	Topical hints on agriculture				20	SKIT Play (Karnataka)
SUNDAY	30	Children's Program		10	Health, Family Planning, Nutrition, Development and General Education	30	Children's Program (Andhra/Karnataka)
	25	Play				10	Documentary (Film)
	5	Topical hints on General Health		10	Cultural Program		

APPENDIX C

SAMPLES FROM SCHOOL PROGRAMS

APPENDIX C

SAMPLES FROM SCHOOL PROGRAMS

Date of Telecast: November 10, 1975 - ISRO production

Topic:

Shakti Roopantar - Part II -- (Energy Conversion - Electricity)

Objective

Electricity is a form of energy. Energy is of various kinds i.e., chemical, heat etc. One kind can be converted to another.

Pre-telecast Activity:

(a) Observe the different uses of electricity in your village.
(b) Trace the route of the electric wire from the pole, outside or in the field, into the house.

Program Content:

Studio based production; using live models of a mini-generator to explain the ideas of electricity being a form of energy.

Use of charts to reinforce the various energy conversions that take place in a thermal power plant, i.e. from chemical to heat, to mechanical, and to electrical energy and vice-versa.

Use of stills to show the purpose and use of the accumulator battery (wet-cell) in motor vehicles. Different types of cells and accumulators used for converting chemical energy into electrical energy. Demonstration of various uses.

Post-telecast Activity:

(a) Food can be converted into energy in men, animals - which they use for work (i.e. mechanical energy).

(b) Sun is the source of all energy. Ask children to observe in how many ways this energy is used around them. Give them an idea about solar energy.

(c) Ask them to conduct experiments with a dry cell, mini-bulb (1-5 watt bulb) and connecting wires.

Date of Telecast: November 11, 1975

Topic: Ram Lila, Parts I, II, and III

Objectives:

(1) To introduce the great classic Ramayana to children.

(2) To develop in children an appreciation of good values such as bravery, co-operation, social equality, and respect for elders.

(3) To explain the significance of 'Vijaya Dashmi' and 'Deepavali' festivals.

Pre-telecast Activity:

Help the children to recapitulate the scenes from Ramayana program that they have already seen in the evening transmission.

Program Content:

The children may have already seen parts of Ram Lila in the evening transmission (telecasts from October 5-14, 1975 on the occasion of Vijaya Dashmi). Many of them would be even familiar with stories from Ramayana. In this program, the following scenes from the Ramayana have been shown.

(1) Rama's birth
(2) Rama and his brothers under training and education with the great teacher, Vashishta.
(3) Rama's and Lakshmana's stay with Saint Vishwamitra.
(4) Sita's Swayamvara (wedding)
(5) Rama's exile and the events that follow
(6) Fight with Ravana.
(7) Rama's coronation.

Post-telecast Activitity:

Discuss with the children what they have seen in the program elucidating the following aspects:

(1) During the Ramayana period, children were given training

in all the arts including archery. This training was given by the Gurus (teachers) in the ashramas (traditional residential schools).

(2) Ultimate victory of good over evil.

(3) Love among brothers as in the case of Rama and his brothers, should transcend material considerations.

(4) Under no circumstances should ideals and principles be sacrificed.

APPENDIX D

TEACHER's TRAINING PROGRAM SCHEDULE

(OCTOBER 16-27, 1975)

APPENDIX D

TEACHER's TRAINING PROGRAM SCHEDULE
(OCTOBER 16-27, 1975)

	DATE	TELEVISION	RADIO	ACTIVITIES	ENRICHMENT MATERIAL
1.	Thursday Oct 16	Introductory Program "Let Children Learn Science by Doing"	Satellite Technology and In-service Teacher Training Schedule	Air Pressure	1. Learning Science 2. Air Pressure
2.	Friday Oct 17	Using Environment for Teaching Science, Topic for Illustration: "Air Pressure"	Shadows	Our Universe	Our Universe
3.	Saturday Oct 18	Use of Models. Topic for Illustration:" Earth is Very Big and Round"	Science is Doing	Field Trip	Symmetry in Nature
4.	Sunday Oct 19	Using the Steps of Teaching Science, forming and testing hypothesis. Topic for Illustration:"Water - Three States"	Water and Life	Living Things and Seed Germination	Adaptation to Environment and Evolution
5.	Monday Oct 20	Continuation of Program No. 4, but testing hypothesis leading to measurement. Topic for Illustration:"Why Things Float"	Edited Comments by Teachers on TV programs	Force	Force-leading to Power and Energy
6.	Tuesday Oct 21	Role of Classification in Teaching Science. Topic: "Living and Non-living"	Hand	Five Senses	Five Senses

APPENDIX D (continued)

7.	Wednesday Oct 22	Mental Models are Sometimes Necessary in Teaching Science. Topic for Illustration: "Transmission of Heat"	Edited Comments by Teachers on TV programs	Three States of Matter	Different Categories of Models
8.	Thursday Oct 23	Importance of Project Work and Questioning Techniques	Projects by Children	Food Contamination and Preservation	How Children Form Concepts? Questioning for Communication
9.	Friday Oct 24	Demonstration Lesson in Biological Science on "Plant Life"	Dr. Jagdish Chandra Bose	Use of Plants	Tree of Wealth - Cocoanut
10.	Saturday Oct 25	Demonstration Lesson in Physical Science on "Measurement of Length, and Need of Standard Unit"	Time	Measurement of Length and Area	Volume
11.	Sunday Oct 26	Improvization in Science Teaching	Story of the Wheel	Simple Machine	Some more improvization relating to a more difficult topic. e.g. heat
12.	Monday Oct 27	Introducing NCERT - New Syllabus in Nutrition and Health.	Edited Comments by teachers on TV programs	Purification of Water	Flies and Mosquitoes

VITA

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