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ABSTRACT

A second quarterly report describes activities of the Syracuse Educational Policy Research Center's two-year analysis of educational satellites and telecommunications. Visits to Rocky Mountain, Appalachian and Alaskan sites are described. Activities of other nations are reviewed and summarized. Preliminary staff work and analysis for the final report is discussed, along with activities of the special "local advisory panel." First-draft working papers on the progress of the three projects are appended. (SK)

SECOND QUARTERLY PROGRESS REPORT

Contract No. NIE C-74-0145

REPORT OF ACTIVITIES AND ACCOMPLISHMENTS

October 11, 1974 to January 10, 1975

STUDY OF EDUCATION SATELLITE COMMUNICATION DEMONSTRATION

Prepared for:

National Institute of Education
1200 Nineteenth Street, N.W.
Room 632
Washington, D.C. 20208

Prepared by:

Educational Policy Research Center
Syracuse University Research Corporation
Merrill Lane, SKYTOP
Syracuse, New York 13210

January 10, 1975

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INTRODUCTION

This document constitutes the second quarterly report of the Syracuse Educational Policy Research Center's two year policy analysis of educational satellites and telecommunications. Our over all task is to explore the possible uses and abuses of educational satellites and to compare the relative advantages and disadvantages of satellites with other modes of telecommunications. It is intended that this investigation be used to improve the information which is used in making decisions about educational telecommunications, especially, though not exclusively, at the federal level.

The Educational Policy Research Center is aware that various decisions about educational satellites and telecommunications must be made and will be made in the next several years. These decisions may well be crucial in determining the course of educational telecommunication in this country for the next five to ten years. It is for this reason that we have decided to adopt a fairly "open" policy with regard to the release of material which does not need such scholarly requirements as fully substantiated and documented references.

The major restriction on release of draft reports involves consideration of possible interference in the conduct of the Educational Satellite Communication Demonstration (ESCD). This demonstration constitutes the major source of practical experience with educational satellites and we wish to make sure that our activities do not interfere with their operations. This restriction will disappear when the demonstration terminates in June, 1975.

The periods efforts have included:

I. observing the progress of the ESCD by way of:
   1. visits to demonstration sites.
   2. visits to demonstration management, utilization, evaluation, and production offices which involved both discussions of ESCD issues with project personnel and examinations of project documentation of the ESCD.
   3. conversations with governmental and community organizations interested in and/or affected by the ESCD.

II. observing developments in satellite telecommunications generally by keeping track of relevant:
   1. worldwide satellite launch plans - movements,
   2. national legislation,
   3. international and domestic regulatory activity,
   4. satellite users organizations and related political activity and
   5. conferences;

III. formulating the basic conceptual format of our final report in a way that will prove useful for our audience;

IV. creating the special "local advisory panel" to directly relate the ESCD experiences to EPRC's demand and utilization analysis questions;

V. doing the preliminary staffing, data scanning, and categorizing needed to get the cost study into full operation during the next reporting period; and

VI. doing some of the preliminary analysis and issue development preparatory to EPRC's analytical history of the ESCD.

VII. reviewing the literature devoted to:

1. the technology, regulatory environment, cost factors and policy analysis of telecommunications, and
2. the various roles and methods open to the government to adopt for introducing technology into social service delivery systems.

SPECIAL ACTIVITIES AND SIGNIFICANT EVENTS

During the past quarter, the Educational Policy Research Center (EPRC) staff conducted visits to sites and project operations centers in the Rocky Mountain area, Appalachia and Alaska. Reflections about, and interpretations of, what was learned on these visits can be found in the "Working Papers" Section of this Report. The present Section is essentially descriptive. It begins with discussions of the EPRC staff activities in the ESCD projects, and is followed by similar discussions of project activities which did not directly relate to the ESCD.

Rocky Mountain States

Fred Baldwin and Steve Porter visited the Federation of Rocky Mountain States - STD offices in Denver, Colorado, October 28-November 1, 1974. They discussed EPRC's role in the study of the demonstration with Gordon Law, STD Director; Ken Lokey, STD Deputy Director; Austin Connolly, STD Research Director, and other staff members.

Baldwin and Porter stressed that EPRC's study of the ESCD is oriented toward informing future governmental policymaking and not toward evaluating past project management.

Also discussed were various research topics such as whether EPRC should conduct a case study of a single site (subsequently rejected by EPRC) and whether a local advisory panel of teachers and school administrators should be created (subsequently adopted, Section IV of this report).

Cost-Effectiveness issues were also addressed.

Baldwin and Porter also met with administrators of the FRMS-STD Utilization, Broadcasting and Engineering, and Research components. EPRC goals in these meetings were to clarify our ESCD study objectives and to develop the relationsh' needed for facilitating data flow to Syracuse and EPRC research in the region. Arrangements for acquiring cost data were discussed with Dick Campbell and Ken Lokey. Baldwin was able to talk with several state coordinators at the close of the visit.

Fred Baldwin visited Federation offices, December 16-18, 1974, along with the EPRC consultant Marshall Jamison and new staff member John Hudder, Ph.D. candidate in the Syracuse University Department of Economics. Hudder is joining the EPRC team to collaborate in the cost study.

Jamison and Hudder explored cost study issues with FRMS staff. Baldwin continued conversations with FRMS Research and Utilization staffs with emphasis on EPRC "local advisory panel" research instrument. He also visited a classroom at Cuba, New Mexico (an intensive site--one which has two-way audio communications) in the company of Don Rea, FRMS' State Coordinator for New Mexico. Baldwin pursued further examinations of FRMS records and watched the tapes of several programs.

Appalachia

During the past quarter, four Appalachian ESCD locations have been visited by Gus Root:

September 30	Appalachian Regional Commission (ARC), Washington, D.C., for an orientation meeting with the project directors.
October 17-18	Resource Coordinating Center (RCC), Lexington, Kentucky, to talk with the Director, the managers of each of the project missions, and the Dean of the Graduate School.

October 22-23	Cumberland, Maryland, to meet the Regional Education Service Agency (RESA) personnel, observe a classroom during the broadcast, and talk with teachers, and administrators involved in the program.
November 25-26	Fredonia, New York, to meet the RESA personnel, observe a classroom during the broadcast, and to talk with teachers and administrators.
December 5	ARC, Washington, D.C., to attend the final day of a project-wide meeting of RCC and RESA personnel.

In all of these contacts, attention has focused on the following factors: an analysis of the Appalachian ESCD history; the decisions that individuals and agencies have made to become involved in the project; the functions performed by the media used in the project; and the outcomes of the project in terms of changes in persons and institutions. During this period, frequent discussions with other EPRC observer-evaluators has helped to clarify and sharpen perceptions of the critical factors to observe and analyze.

Alaska

Steve Porter visited Alaska in the latter part of November, 1974, for discussions with the staffs of Practical Concepts, Inc. (PCI) and Center for Northern Educational Research (CNER) staff. The purpose of the visit was to get better acquainted with their research objectives and strategy for attaining them and with their progress in implementing that strategy. Data-gathering instruments were discussed with a focus on their relevance to the policy analysis issues EPRC wants to address. Some of the points touched on in these discussions were

1. disaggregated cost data collection from project offices in Juneau and from Northwest Regional Educational Laboratories,
2. utilization data collection coordinated with, and implemented through, the project's utilization component,

3. gathering demand data from PCI-CNER representatives in selected sites and the extent to which such data should and can be defined in terms of EPRC policy analysis objectives,

4. the difficulties likely to be encountered by using something like EPRC's "local advisory panel" research instrument in Alaska,

5. funnelling information about prospective important events to EPRC as part of the Calendar effort Peter White is currently handling in Syracuse,

6. tracking those activities in Alaska which fall under the rubric "expressions of demand for telecommunications services." (These "expressions" emanate from either private or public sector organizations; of particular interest are Alaska's relations with both satellite user organizations (e.g., the Public Service Satellite Consortium)),

7. observing political relationships among Native, non-Native, private economic sector, and governmental organizations,

8. documenting the infrequent interactions among Alaska, FRIS and ARC STD components,

9. tracking the progress of the Alaska Public Communications Commission legislation and identifying its supporters and detractors,

10. tracking deliberations concerning private sector involvement in Alaska's evolving telecommunications system (e.g., the dispositions of RCA Alascom's and Fairchild's plans for that system), and

11. developing contact points with other Satellite Technology Demonstration (STD) evaluators, especially with the health component of the project, for the purpose of possibly inaugurating mutually beneficial communication among the several R&E programs.

Besides discussing the above points with Roger Popper of PCI and Jim Orvik, Kathy Hecht, and Frank Darnell of CNER, Porter also had an opportunity to see

Lee Salisbury (Alaska Educational Broadcasting Commission (AEBC) member, broad experience with KUAC and with some of the participants in the ESCD programming and production operations, Drama Department, University of Alaska, Fairbanks)

Sam Kito (chief officer of Doyon, Ltd., and prominent Native spokesman in Alaska)

Marilou Madden and Ernest Polley (Alaska Department of Education's principal contributors to the ESCD. Ernie's involvement was greatest during the 1972-3 project designing phase while Marilou has become relatively more involved during the NIE period)

Charles Buck (chief office of the Governor's Office of Telecommunications up through November, 1974).

Porter's scope of interviewing was narrow in order to avoid undesirable duplication with PCI-CNER interviewing plans. Attempts were made to get in touch with Charles Northrip and to visit a site in a Native village. However, personal schedule conflicts and transportation problems aborted the attempts. Porter viewed tapes of several programs concentrating on the "viewer-defined programming" Alaska Native Magazine which utilizes satellite interactive communication capability.

Other Activities

1. International

Generally, Marshall Jamison and Peter White are EPRC's principal observers of international developments in satellite telecommunications. They will contact researchers studying satellite-based education and social service programs and plans outside the United States.

Of current specific interest are (1) contacting Japanese technology developers and communications planners, (2) tracking discussions of the Free Flow of Information issues in the United Nations, and (3) following WARC activities and related plans by United States agencies for the next conference.

During a vacation (not funded by the project), Peter White visited London and UNESCO offices in Paris. In London, he had an informative conversation with Mr. Richmond Postgate, former comptroller of the BBC and educational and research coordinator of the Ford Foundation study on Open Learning Systems. While in Paris, White met with Mr. Herbert Marchl in the UNESCO Division of Methods, Materials, and Techniques, and with Messrs. Allan Hancock and John Willings in the UNESCO Division of Communication Research and Planning; the latter are interested in educational technology and are familiar with various satellite projects.

2. Satellite Users Organizations and Related Political Activity

December 16-19, 1974: Baldwin, Jamison and Peter White attended the Public Service Satellite Consortium (PSSC) meeting in Denver, Colorado. Devoted to the creation of a consortium of satellite users, this meeting was hosted by FRMS, sponsored by Stanford, and funded by an NIE grant. White will follow PSSC developments in the future. See Section II, 4.0.

3. Naomi White joined the EPRC staff as a technical advisor to assist in the implementation of the "local advisory panel" research instrument. Ms. White is a Ph.D. candidate at Syracuse University, with interests in the sociology of education.

4. Larry DeWitt (director of the EPRC ESCD Study), Jamison, Hudder and

Baldwin met in later November, 1974, to discuss the EPRC cost study. Jamison is gathering cost data for various projects worldwide. All four are in the process of devising the cost categories best suited to both ESCD cost data and comparisons with alternative modes of telecommunicated educational service delivery.

SECTION II.

SATELLITES, TELECOMMUNICATIONS AND EDUCATION
A CALENDAR OF FUTURE EVENTS

Introduction

Our study of the current Education Satellite Communication Demonstration and our subsequent policy analysis tasks must be acutely aware of the constraints on and opportunities for actual policy development. Because of the volatile nature of telecommunications activities and their regulation, our work always runs the risk of becoming redundant or irrelevant due to some unexpected major development. In order to guard against this, we are preparing a calendar of future events which might have an impact on the development of policies for telecommunications and the delivery of social services. This calendar will be updated and revised periodically.

Although the emphasis is on U.S. domestic activities we are including notes on the activities of foreign governments. This is done because of the rather complex relationships between domestic and foreign policy in areas involving the development and sale of communication satellite technology.

Obviously, personal opinion enters into the selection of an event as being potentially "significant." The same can be said when one tries to consider the possible implications of such events. We have no doubt that as our work continues, new events will be considered significant and initial interpretations of consequences will be revised. So what follows is essentially a personal listing and interpretation of events which our project will be monitoring.

As this calendar will be updated and distributed at regular intervals, suggestions, additions, and corrections will be welcomed. They should be addressed to:

Peter B. White
Research Associate
Educational Policy Research Center
Syracuse University Research Corporation
Merrill Lane, SKYTOP
Syracuse, New York 13210

Phone (315) 477-8483

1.0 Satellite Launch Plans-Movements

Note: (i) We have only included information on launch plans for communication satellites which specifically involve the provision of educational or social services. This means, for example, that Intelsat launches are not listed.

(ii) Currently, commercial operators do not plan any launches of satellites which could operate with low-cost group equipment. Although educational or social service agencies would invest in high-cost ground equipment services, because of cost, these would be restricted to services requiring a small number of receiving sites. We will however, monitor plans for commercial launches where the addition of a high powered transponder is feasible.

1.1 ATS-6

2.5 GHz (Focused/High Signal Flux)

Late Spring 1975	Moves from Western Hemisphere to Central Africa for Indian Satellite Television Experiment (SITE) and Apollo-Soyuz mission.
Summer 1976	Return to Western Hemisphere with expectancy of three additional years operating life (Source: Fletcher testimony S.3542).

Notes: (1) Slippage. There is some question as to whether the SITE experiments will be ready for ATS-6 when it is re-positioned. This has led to conjecture about delaying the move so that current HET experimenters can keep using the satellite. The role of ATS-6 in the Apollo-Soyuz mission would certainly be an issue here.

(2) Non-Return. The non-return of ATS-6 to the United States has been suggested as a possibility. (Source: Hearings on S.3542.)

1.2 C.T.S.

12 GHz (Wide and Narrow Beams, High and Low Signal Flux)

A cooperative effort between the United States and Canada.

Launch: December, 1975. Experiments scheduled to commence: April, 1976 for one year initially. (Source: NASA CTS Schedule - Revised November 1974.)

Notes: (1) This satellite has been suggested by NASA as a follow-on for NET experimenters. Because of technical differences, modification of ground equipment would be necessary at a cost of $1.1 million for current ESCD experimenters. (Mathews testimony S.3542.)

(2) No back-up satellite exists.

(3) The first year of operating time has been assigned. It is expected that second-year users will include some from the first year and some new experimenters. New users will probably be solicited soon after a successful launch. Solicitations will be made earlier if it is likely that equipment purchases will take longer than a year.

(4) Even though experimental time is provided free of charge, experimenters must obtain financial backing for their work and for equipment, and this is proving difficult for some potential experimenters.

1.3 Alaska

The recent elections and the continuing deliberations about R.C.A./Alascom's

role in Alaska's evolving telecommunications system will have a number of significant impacts during the coming year.

The Public Utilities Commission (PUC) is currently considering RCA/Alascom's plan for Alaska, a plan which does not incorporate the utilization of low-cost terrestrial terminals. The PUC will probably also review Fairchild's plan which includes reactivating the partially constructed ATS-G (follow-on to ATS-6), which utilizes low-cost terrestrial terminals, but has no definite back-up satellite. Other satellite vendors might make alternative proposals.

Of possibly equal importance is the current legislative debate over coordination of the development of an Alaskan telecommunications system. At issue are

1. what the trade-offs are between a cabinet level department of telecommunications and a Public Communications Commission with direct representation of various user groups.
2. how centralized planning and technical assistance functions should be coordinated administratively, and
3. whether state-wide systems planning should be housed in the same department/agency/commission as systems management and operations.

In a related development, Mr. Marvin R. Weatherly, the Executive Director of the Alaskan Educational Broadcasting Commission has been chosen to direct the Alaska Office of Telecommunications. Weatherly is also active on the steering committee of the Public Service Satellite Consortium. (see Section 4.0.)

1.4 Other Nation's Plans

1.4.1 Indonesia

Launch of (1) Hughes 333D satellite - August 1976 with a second in September 1978.

-Each probably with twelve 5 watt transponders. The system planned is a straightforward extrapolation of the communications experience gained with the Canadian ANIK series, U.S. Westars, and other systems. It involves low-powered transmitters which require relatively expensive high-powered receiving stations. Hughes, the Indonesian Government's contractors, see educational applications of high powered transmitters combined with low-cost transmitters as being possible in the next phase of the plan which would begin in seven years.

The Indonesian system is primarily a telephony, telex and data service which includes one TV channel. Current plans call for sharing of the one TV channel by commercial and educational users. It will reach individuals through the use of translators and re-broadcast facilities.

It should be noted that Indonesia has not ruled out the possibility of an educational system using low-cost ground receivers. It has merely left that option open for future consideration.

1.4.2 India

No decisions have been taken concerning a follow-on satellite at the conclusion of the ATS-6/SITE experiment. Some of the options include:

(1) Conversion of existing facilities for use in a terrestrial system.

(2) Retention of the ATS-6 (this will be vigorously opposed by current

ESCD experimenters because this satellite is the only satellite which is definitely available for their future use.)

(3) Purchase from Fairchild of the unused ATS-G (This is considered by some to be an expensive option.)

(4) Purchase or receive gift of another satellite. Newspaper reports suggest that Russia might be prepared to launch a satellite for India in return for access to certain port facilities. At present we assume that this satellite is intended for scientific research purposes and is not a communication satellite.

1.4.3 Iran

The Government of Iran is considering the launch of a Hughes 333D or 339 Satellite. The latter incorporates a 50 watt transponder which allows for the use of a low-cost ground station. There are conflicting reports as to whether the decision has or has not been made to go ahead. The system currently under discussion would include an integrated satellite/terrestrial system incorporating educational applications. Satellites would possibly be launched between 1977 and 1979.

1.4.4 Arab League

Newspaper reports suggest that West Germany's Messerschmidt-Boelkow-Blohm aerospace combined are involved in an Arab-financed communications satellite for the Arab League.

2.0 Legislation

2.1 Copyright Bill S.3161

The Copyright Bill S3161 passed the Senate; as yet no action has been taken by the House of Representatives. S3161 will be re-introduced in the 1975 Session. Passage of the bill is expected after brief hearings to be held by the House Judiciary Subcommittee early in the current Session.

2.2 Telecommunications Facilities and Demonstration Act-1974 HR17406

This legislation is a replacement of the current Broadcast Facilities Act which expires in June 1975. It was introduced in the last session and will be re-introduced in the next.

The original Act was limited to certain categories of non-commercial broadcasters. The proposed legislation proposes that alternatives to broadcasting be used in order to reach populations which could not be economically reached with Public Television using traditional broadcasting methods. Funds will be used for appropriate research and development.

Another intention is to co-ordinate the use of telecommunications by health, education and social service agencies so that the social service sector can be represented in the planning of privately financed communication systems. (See Section 4.0 - Public Service Satellite Consortium.)

3.0 Regulatory Action

3.1 International

3.1.1 International Telecommunication Union -WARC

1977 The WARC conference will meet to decide on how the 11.7-12.2 GHz

range is to be shared between satellite and terrestrial services. [This frequently is being used by CTS - See Section 1.2.]

1979 The General WARC conference meets. This has the power to reconsider all previous frequency allocations.

Note: It has been suggested by some that the United States should withdraw from the International Telecommunications Union. These suggestions have been made because of the difficulties associated with the "radicalization" of the United Nations and its associated organizations.

3.2 Domestic

3.2.1 Federal Communications Commission

The FCC has jurisdiction over the 2.5 GHz frequency currently used in the HET experiment. If the Public Service Satellite Consortium wishes to operate a permanent (non-experimental) service, the FCC administrative and rule-making procedures will need to be carried out. The process could take from six months to a year and would involve an examination of at least the following issues.

Varian Petition. There is a request before the Commission for the commercial allocation of a part of the 2500 MHz Band now reserved for non-commercial educational Instructional Television Fixed Services.

P.B.S. Eligibility. It will need to be decided whether P.B.S. can use the 2.5 GHz frequency or whether they would be legally restricted to frequencies specially allocated for Fixed Satellite Services.

4.0 Public Service Satellite Consortium (PSSC)

This group is endeavoring to gauge demand for a satellite-based telecommunication service in the public sector. Based on this estimated demand, certain technical, financial and organizational options are being explored. Several public meetings have been held, and an interim organization has been created. An interim committee, chaired by H. Rex Lee includes the representatives of current and potential users of satellite-based telecommunication services.

Two meetings are planned:

Steering Committee Meeting (closed)
Washington, D.C., January 20, 1975
Agenda: To consider forward planning and proposed bylaws.

General Meeting (open)
San Diego, California, February 19, 20, 21, 1975.

The General Meeting is designed for potential users and the Planning Committee will present a proposed charter, bylaws and articles of incorporation. The meeting will also be presented with the results of a survey designed to gauge the level and distribution of traffic on a PSSC system.

In the near term, this organization appears to represent the most significant actor in any debate over temporary or permanent provision of satellite-based communication services for the public sector.

5.0 National Activities

5.1 Corporation for Public Broadcasting (CPB)

April 9, 1975, the Advisory Council of national Organizations (ACNO) will report to the Board of the Corporation for Public Broadcasting. ACNO

has been studying the ways in which the CPB should be involved in instructional television. Four task-forces have completed reports on Early Childhood Education, Elementary, Secondary and Teacher Education, Formal post-secondary education and Adult and Continuing Education. The reports are scheduled for release some time after April 9, 1975.

5.2 National Science Foundation

Phase II of a design competition for the delivery of social services using CATV has just concluded. Of the seven project designs funded, as many as four will be funded as demonstration projects.

6.0 Conferences

6.1 University Applications of Satellite/Cable Technology Conference

University of Wisconsin, Madison, Wisconsin, June 3-5, 1975.

Sponsored by: University of Wisconsin -Extension
Department of Communication
Center for Health Services
Department of Engineering
University of Minnesota
Midwest Consortium for International Activities

Further details: Dr. Lorne A. Parker
Old Radio Hall
975 Observatory Drive
University of Wisconsin
Madison, Wisconsin 53706

Phone (607) 262-4342

6.2 Conference on Technology and Growth

The Government Conference Centre, Ottawa, Canada, February 4-5, 1975.

Sponsored by: The Ministry of State for Science & Technology
International Society for Technology Assessment

Organized by: The Business Planning Group - Bell Canada
Datacap Limited
Ottawa

Further details: Technology & Growth
Box 1420
Place Boneventure
Montreal, Quebec H A 1H3
Canada

Phone (514) 870-5733

6.3 Association for Educational Communications and Technology

Annual Convention, April 13-17, 1975, Dallas, Texas.

Further details: AECT
1201 16th Street, N.W.
Washington, D.C. 20036

6.4 American Educational Research Association

Annual meeting, March 20-April 3, 1975, Washington, D.C.

Further details: AERA
1126 Sixteenth Street, N.W.
Washington, D.C. 20036

AN OVERVIEW OF THE EPRC/SURC ANALYSIS PLAN

Introduction

The purpose of this paper is to provide an overview of EPRC/SURC plans for a study of communications satellites in education for the National Institute of Education (NIE). Since this summary will go to audiences with widely differing interests, we have chosen to emphasize what we are trying to do and why, rather than how. We hope it will give readers a sense of how issues fit together in our present thinking.

Background

In the summer and fall of 1974, educational television broadcasts via satellite began to be transmitted to selected audiences at sites equipped with special receivers dispersed throughout Appalachia, the Rocky Mountain States, and Alaska. The satellite was one of NASA's Applications Technology Satellite Series (ATS-6), and preparations for this demonstration had been underway since 1971.

The Education Satellite Communications Demonstration (ESCD) is funded for the remainder of Fiscal Year 1975 by NIE through three regional sponsors, the Appalachian Regional Commission, the Federation of Rocky Mountain States, and the Governor's Office of Telecommunications, Alaska. Programming differs from region to region. In Appalachia, the audience consists of public school teachers, who are receiving college credit for

courses in reading and career education. In the Rocky Mountain States, the audience is primarily junior high school career education students, but some programming is aimed at teachers and adults. In Alaska, the programming is concerned with both education and diagnostic health services. In each region, there is some amount of interactive (two-way) communications capability.

In June, 1974, the EPRC was awarded a two-year contract from NIE to prepare a cross-regional history of the demonstration, to evaluate its lessons for future programs, and to conduct an analysis of Federal policy options in educational telecommunications. The Washington-based firm of Practical Concepts, Inc., (PCI), was also awarded a contract for evaluative studies focusing on the Alaskan portion of the demonstration. Collaborating with PCI is the Alaska-based Center for Northern Educational Research located at the University of Alaska, Fairbanks, Alaska.

Summary of Objectives

A major purpose of our analysis is to evaluate a series of Federal policy alternatives pertaining to the support and regulation of educational telecommunications, especially those alternatives involving satellites.

In evaluating the apparent costs and benefits and institutional impacts of these alternatives, we shall take into account a number of systemic considerations, which create uncertainties, constraints and special opportunities for decision-makers. For the most part, these systemic considerations will be defined as factors which decision-makers must (or should) take into account, but over which they have little direct control. Examples are the strengths and weaknesses of organizations which must be depended on for carrying out policies, the presence or absence of

communication networks, and the distribution of financial resources, technical knowledge, and leadership throughout a system. Because our client is a Federal agency, and because useful advice to state and local governments requires special knowledge which is difficult to acquire, the main focus of our analysis will be Federal policy alternatives. However, wherever possible, we propose to extend our analysis to issues of importance to other institutional levels: regional, state, and local.

A secondary purpose of the EPRC analysis will be to explore issues which we believe may be interesting to policy-makers or educators, but which we have not yet stated in terms of alternative courses of Federal action. An example within this category is the importance teachers and other informed observers attach to interactive telecommunications in education. This is an interesting issue, but one where the implications for Federal policy are not yet clear. Another example is the impact that sophisticated telecommunications technology may have on the organization of schools and their teaching practices.

The Definition of Policy Options

In the following paragraphs, we have suggested several possible answers to a basic policy question, confining ourselves to those which seem plausible. The answers are referred to as options, which is intended to mean "a specifically defined alternative Federal course of action." As the analysis proceeds, the options will be subject to repeated redefinition to bring them as close as possible to choices actually facing Federal decision-makers.

Question: Should Federal assitance be extended as a matter of policy to the application of telecommunications to education? If so, what should be the nature and scope of this support?

Option 1: No policy commitment to provide support, except as it may be incidental to other goals.

This option assumes that no significant public interest is served by Federal promotion of a particular technology in education. It does not mean that Federal agencies would cease all assistance to projects involving telecommunications. For example, the Office of Education might continue to fund films for children's television. A sample policy statement might be as follows:

> Example: "This agency will give no preference to projects involving telecommunications, nor will it discriminate against them. Our goals do not include encouraging educational institutions to employ specific technologies or relying more heavily on technology in general. Projects which include use of telecommunications as part of their operating plan will be considered on their merits."

Option 2: A policy of positive assistance to educational telecommunications utilization.

This option assumes that a national policy to encourage the application of telecommunications technology to education is needed, either because the potential benefits of this application are expected to be significant, or because the absence of such a policy is expected to lead to confusion or duplication of effort.

> Example: "This agency will extend systematic support to projects promising to advance the utilization of telecommunications in education. Preference

> will be given to projects with potential for achieving cost savings through economies of scale, for reaching new or previously inadequately-served audiences, or for improving the average quality of instruction across a wide number of classes."

We assume that the second option, if adopted, would not be likely to be left open-ended. It would almost certainly be subject to some limitations, which might take any of several forms, or some combination of them. Some examples follow:

Option 2.1: Limitation by stage of project development.

> "Using four commonly accepted stages of project work--planning, organizing, controling or operating, and communicating--this agency will extend assistance to projects only through the planning and organizing stages. To be eligible for such assistance, projects must give evidence of ability to secure continuing support through the operational stages."

Option 2.2: Limitation by geography.

> "This agency will give preference to projects serving rural areas covering several states."

Option 2.3: Limitation by object category of expenditure.

> "Project support will be limited to the lease or purchase of specific pieces of capital goods, non-consumable equipment and supplies, or facilities with a life span estimated at ten years or more."

Option 2.4: Limitation by audience.

> "This agency will give preference to projects serving the following groups: (a) Native Americans or Indians, (b) the physically handicapped, (c) persons from households where English was not spoken as a first language."

Option 2.5: Limitation by research objective.

> "Project proposals whose objectives are cost savings must provide for comparison of alternate modes of service delivery. Where the objectives are educational gains, provision must be made for comparison control groups."

Note: Federal financial support is, of course, only one way in which the government may intervene in educational telecommunications. The government is actively involved in a variety of regulatory activities, in matters ranging from frequency allocation to copyright law. "To regulate or not to regulate" does not describe a realistic pair of options. As specific regulatory issues--e.g., the choice between two models of copyright protection to academic software developers--become identified, we shall attempt to evaluate them as carefully as the more obvious possibilities for extending or limiting financial support.

Tentative Reporting Format

Although the foregoing discussion of Federal policy options provides one way of organizing information related to educational telecommunications, and the role of satellites within that framework, a considerable amount of material is necessary background for anycne considering policy issues in this field. We expect to produce short papers at intervals throughout the duration of this study. In general, reaching our analytic goals will require completion of a series of tasks, which can be listed by fields of study, rather than options. The following outline of our work, which may be regarded as a tentative table of contents of a final report, may be helpful in understanding

the scope of this effort.

I. History of the ESCD Demonstration

A brief description and chronology of the demonstration, probably organized by regions. It will introduce readers to the organizational entities involved, the key actors, the programmatic content, technological setting, target populations, and major events and development.

II. Tracking of Current Events and Calendar of Future Events

This involves a charting of relevant launches, experiments, research efforts, major conferences, regulatory decisions, and pending Congressional or State actions.

This intention is to keep us and others aware of what is happening in the educational telecommunications domain, and to provide, eventually, a several-year map of forthcoming developments.

III. Cost and Technical Study

- Develop "program budgets" for ESCD.
- Develop descriptive "range of costs" for programming material.
- Develop estimates of current telecommunications hardware in schools--exclusive use of secondary sources, no original or primary research.
- Evaluate alternative cost/technical telecommunications options and systems, using computer assistance as required.

IV. Utilization and Revealed Demand Study

This study will survey the experiences of individuals and groups which have had experience with various educational telecommunications systems. Some of this information will be drawn from reports and evaluations of other

projects and programs, while other information will be collected first-hand from the ESCD.

It is expected that this study will serve two purposes. First, there is much that we can learn from experienced users of educational telecommunications about what works and what does not work and why. Second, we can discover much about the attitudes and stances which various experienced groups have developed about educational telecommunications. We would be interested, for instance, in noting the perceptions and attitudes of users, administrators, producers, and others with respect to the production and nature of programming, and the distribution, utilization, control, funding and research aspects of these systems.

Selected topics will be identified for special consideration. One major example is the nature and importance of real-time interaction.

V. Organizational Study

- Coordination of demonstrations from Washington; institutional response to policy issues.
- Regional management of the demonstration--the multi-state organization (what it did, what it seems to do well, and what it seems to do poorly).
- Regional organizations interface with the school systems, impact on local institutions.
- Role of the state educational agencies.
- Description of alternative fiscal/organizational arrangements (this will have to be developed in conjunction with the simulation part of the cost/technical study).

VI. Legal and Legislative Study

- Copyright problems

- Dedication of spectrum space
- International issues

VII. Analysis of Policy Options and Recommendations.

In Summary

To keep this discussion of tasks in perspective, the reader should bear in mind the following general observations, abstracted from our final proposal to NIE:

(1) We do not expect either the Education Satellite Communications Demonstration or our more general investigations to lay to rest the issues, questions, and disagreements over the educational potential of telecommunications. Conclusiveness and consensus are simply not common traits of studies of social change. Rather, it is our intention to devise careful and selective investigations which will serve the twin objectives of substantially improving and clarifying the on-going discussion and debate over the issues, while offering a better basis for making the allocative, legislative and other decisions which must be made one way or the other no matter what the state of knowledge.

(2) The entire investigation will be an extended and intensive policy analysis. There will be one central policy question which will serve as the cornerstone for all other decisions about what to examine and how to examine: what should the Federal government's stance be with regard to educational satellites and telecommunications?

(3) The Education Satellite Communications Demonstration should be assessed and examined from the perspective of generalizability. We are not, concerned per se with whether or not the demonstration projects are successful in meeting their objectives. What we are concerned with is discovering the ways in which the experience of these demonstrations, or wisdom gained from that experience, is generalizable to other, future circumstances. This to us, is why such demonstrations are funded. We should examine the actual uses of telecommunications in these three experiments so that light can be shed upon the potential use and abuse of such technology.

(4) We do not see the ESCD, or this particular ATS-F satellite configuration, as the only useful source of data for informing answers to the questions which are of concern. There have been other instances where satellites have been used for educational purposes. Furthermore, there have been non-satellite, mass and telecommunication experiments and programs which have some characteristics in common with satellites. Clearly, all legitimate experience and evidence should be brought to bear on the central policy questions.

(5) We shall not attempt to examine learning outcomes of the ESCD projects. It would be most difficult to tell how much of such gains should be attributed to the new programs which have been developed for this demonstration or to changes in teacher

performance and how much should be attributed to the new mode of delivery.

Furthermore, there have been a number of fairly comprehensive studies of alternative modes of delivering or presenting instruction. Such studies have not found substantial differences in learning outcomes which could be ascribed to the medium of communication. These studies have included televised instruction within their purview. And we have not been able to discover characteristics of the three demonstration projects which would suggest that they posses the essential ingredients for a major breakthrough in learning outcomes.

SECTION IV.

LOCAL ADVISORY PANEL

Summary

The Educational Policy Research Center plans to develop a local advisory panel (fewer than 75 persons with exact size depending partly on regional scope) of participants and informed local observers of the ESCD. Detailed planning and implementation will be done in close coordination with regional demonstration sponsors. Panelists would respond to mail questionnaires several times during the course of our study (probably twice during 1975). Questions would be directed primarily to the issues of utilization trends, perceived need for new or modified services, problems in regional-local interaction, and training needs. The composition of the panel would be limited to teachers and school administrators. Respondents would be paid some moderate amount (perhaps $5) for their cooperation. All responses would be mailed directly to EPRC and be confidential. We would consult with ESCD project personnel and others on form and content of questions, but we would retain final control over both. An expected side effect of the process is that pre-testing questionnaires and following up on interesting responses would provide a vehicle for structuring site visits by our staff.

Objectives

Our plans for studying the ESCD have put considerable emphasis on identifying probable trends in utilization of new technologies and on assessing their impact on existing institutions. In our analysis plan submitted May 20, 1974, we identified five policy goals associated with

satellite usage: (1) cost savings, (2) provision of new or expanded services, (3) increased opportunities for innovation and experimentation, (4) improved modes of participation in educational decision-making, and (5) preservation of educational options in regard to such things as frequency allocations. Direct contact with informed local observers is especially important for understanding the extent to which the third and fourth goals are likely to be achieved. Similarly, we identified five ways in which Federal influence might be exercised: (1) leadership, (2) research and development, (3) coordination, (4) programmatic revision, and (5) legislation. Understanding local reactions will be important to officials contemplating any of these modes of action and possibly critical to some decisions on the second, third and fourth modes.

Somewhat more concretely, here are some issues where feedback from local observers of the demonstration might complement ESCD project experience.

--A sponsor might decide how much to spend on films with high "local interest" materials while balancing educational and political factors against costs. How important do teachers think such materials are?

--A sponsor wants to estimate the best mix between broadcast of taped programs and some function entirely dependent on local demand, e.g., materials distribution. How can he get insight on this?

--A Federal analyst planning new R&D work requires criteria for evaluation. He wonders what local teachers use as indicators of success.

--The same planner worries about unintended side effects of introducing new technology. How will teachers adapt?

We know of no one strategy which is guaranteed to shed light on all of

these questions. The best one, of course, is intensive field work at many different locations by a sensitive and well-trained staff. Certainly no questionnaire or set of questionnaires is an adequate substitute for this. We intend to use our staff in the field as fully as possible, but our resources for this are limited. The fact is that our proposed field work is more realistically understood as sensitizing our staff to operational issues than as providing a basis for systematically studying them.

We have considered several alternatives for reducing our reliance on impressions gathered at a very few sites. We early rejected, and re-rejected upon reconsideration, the use of a large-scale survey aimed at sampling local observers in a statistically rigorous way. We have more reluctantly rejected using consultants for in-depth case studies at one or two sites, both because it would somewhat duplicate work underway by the Federation and because we are seeking research techniques with more heuristic value for our own staff.

With these considerations in mind, we are recommending the creation of a local advisory panel of informed local observers. By employing a series of short questionnaires and providing feedback to panelists on aggregate responses, we hope we can overcome the tendency to answer questions perfunctorily that marks most surveys. We tentatively plan to consult panelists three times during the period of our study: once during the present school year and twice during our analysis next year. This will give us an opportunity to follow up on promising leads, either from previous questionnaries or from other sources.

We anticipate another kind of benefit from the panel other than information acquired directly. As indicated, we do not intend the panel to be a substitute for visits to sites by our own staff and/or by consultants. We expect that the necessary pre-testing of questionnaires (probably done in a group interview format at a single site) will provide an organizing principle for visits.

It has been suggested that we might wish, near the end of our study period, to convene some subset of panelists in a conventional advisory committee setting. We will evaluate this idea after we have more experience with trends in panelist responses.

Panel Composition, Size and Selection

We presently think of the panel as consisting of teachers familiar with the demonstration (but not solely participating instructors), teacher-students in Appalachia, local school administrators, and school board members.

Our principal criteria for panel size are: (1) that the number be large enough to give us a reasonable amount of geographical spread in each of the three categories of panelists, and (2) that the number be small enough so that all completed questionnaires can be read and analyzed by one person. The questionnaires will be a mix of open-end and closed-end questions.

Our present thinking on selection is to widely distribute a screening questionnaire among potential panelists and to select randomly the actual panel members from the group of respondents. We are in the process of discussing details with regional ESCD sponsors.

The following tentative guidelines represent our present thinking on panel operations.

1. Participants will be asked on three or perhaps four occasions during the next 18 months to complete questionnaires on topics relating to the demonstration and educational television in general. All answers and comments will be kept confidential.

2. Participants will receive a small fee (probably $5.00) each time they complete a questionnaire, as partial compensation for their time and effort.

3. Identities of panelists will be held confidential during the course of the study, but we would like to be able to acknowledge panelists' cooperation in our final report. Each participant will be given an opportunity to say whether or not he or she wishes to have his or her name published at that time. If not, the individual will be identified only by occupation and state of residence, e.g., "a Colorado teacher."

4. The answers participants give will not be released to anyone except authorized researchers at the Educational Policy Research Center. This includes personnel connected with the demonstration, local school systems, and state or Federal officials. Questionnaires will be coded in such a way that EPRC researchers can compare answers over time and contact respondents if an answer is unclear. At the end of the study, identifying codes will be destroyed so that no one can reestablish the link between a panelists and his answer.

5. Participants will receive a tabulation or summary of the answers other panel members gave to all questions. This will normally arrive 4-6 weeks after responses are completed. The procedure will resemble the Delphi technique to some extent. Participants will also be given an opportunity to suggest questions they think are important, thereby making an important contribution to the conduct of the study.

6. No one will be obligated to answer any question to which he or she objects. Participants may drop out at any time, if responding becomes inconvenient. Naturally, however, we hope that all panelists will continue to participate during the entire course of the study.

7. Most questions can be answered by simply checking a box or filling in a number. A few, however, will involve narrative responses. We estimate that the typical questionnaire will contain only 6-10 questions and will

usually take about a half hour to complete. The exact time will depend on how much detail respondents go into in answering narrative questions. We hope that panelists will be willing to give their opinions in detail when they think a question is important.

NOTE

The working drafts included in this appendix section exemplify some of the preliminary policy analysis tasks in which we are currently engaged. Other work not included in this report is in an earlier phase of development and will be included in subsequent reports.

We assume that readers will appreciate the generally tentative character of these papers. We are well aware that some of the interpretations they suggest may be based on as yet inconclusive evidence. In some cases, we must wait for evidence to take a form that permits public documentation. For this and other reasons, the documentation of materials has been generally kept at a minimum though this will naturally change as the analysis proceeds.

These papers have been circulated to the Appalachian Regional Commission, the Federation of Rocky Mountain States, Practical Concepts, Inc., and the National Institute of Education prior to their inclusion in this document. However, those organizations are not responsible for any errors of fact contained in the papers, nor do they necessarily concur with the various interpretations.

APPENDIX A

WORKING PAPER ON THE SATELLITE TECHNOLOGY DEMONSTRATION

The largest component of the Education Satellite Communications Demonstration (ESCD), both in terms of television broadcast hours and number of ground stations, is managed by the Federation of Rocky Mountain States. The Federation's part in the national demonstration is called the Satellite Technology Demonstration (STD).* It broadcasts programs aimed at junior high school students, teachers, and adults to 56 rural schools and 12 public television station reception areas, containing approximately 150 additional participating schools.

This paper has three parts: (a) a summary of the present STD structure and programming, (b) a brief history of the STD to date, and (c) some provisional opinions on the most important issues for further study. The first two parts are based principally on generally available, if somewhat scattered, materials. Most of these materials have been provided through the cooperation of the Federation's STD management. Comments on an earlier draft of this paper were received from STD staff, but they are obviously not responsible for errors of fact, nor should their agreement on matters of opinion be assumed.

Structure of the STD

The Federation itself is a non-profit organization founded in 1966 to promote regional development within the Rocky Mountain States. Its

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*Until May, 1973, the Federation portion of the ESCD was referred to as the Educational Technology Demonstration. For convenience, the present term, STD, will be used throughout.

headquarters are in Denver, Colorado. Its membership includes the governors of six states (Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming). There are also about three hundred business and industry members, heavily weighted toward extractive industries and financial institutions. Its base budget comes from appropriations from the six state legislatures and membership dues from the private sector, based on the number of employees in each member business.

For purposes of the STD, the six states are joined by Arizona and Nevada. Although only a part of Federation activity, the STD is by far its largest project in terms of budget and staff. Current STD operating expenses are about $2 million a year. The STD staff, which totals approximately 80, is about three times that of the remainder of the Federation.

The STD staff is organized functionally into four division, plus general management. The four are Broadcast and Engineering, Program (which includes both content and media specialists), Utilization, and Research. Prior to a reorganization (and program cutback) in June, 1973, the organization included two subject-matter oriented units, Career Education and Early Childhood Development. The STD Director, Dr. Gordon Law, has been in his present position since that time. He was previously head of the Broadcast and Engineering component. The Research component was at first a part of Utilization.

The functions of most components are self-explanatory, but those of the Utilization staff warrant some explanation. Its missions are to promote the project to participating communities and others, to iron out operating problems not requiring engineering expertise, and to provide feedback to STD management from participating schools and state agencies. A small staff in Denver (4 professionals) oversees the activities of eight state coordinators, whose salaries and expenses are paid in part through STD

contracts with state education agencies (or, in one case, The Office of the Governor). The STD also has established a "site coordinator" at each receiving site, usually the STD career education teacher. This person is paid from $800 to $1600 a year from the STD for handling the support work (administration, public information, and research) connected with STD operation at the local level.

The Receiving Sites

The receiving sites in the Rocky Mountain region are scattered throughout two "footprints," so called because each satellite broadcast reception area consists of two slightly intersecting ovals, about 300 miles by 500 miles at their widest points. There are 56 "closed" sites. "Closed" means that only participating junior high schools equipped with special antennas can receive programs. Of these,24 are interactive or "intensive terminals," capable of two-way audio communication with the Denver studio, and through it, with other sites. The other 32 closed sites are designated "receive-only terminals"; students can listen to questions from the two-way sites, but cannot ask them. The closed sites are all rural communities. In addition to the closed sites, there are 12 "open" ones. These are public television stations which relay STD broadcasts to about 150 schools (and any other viewers who wish to watch). Many of the open sites are in urban areas.

An initial criterion for rural site selection was that each would be "satellite-dependent," in the sense that available television reception from ground stations or from CATV would be limited. At the present all but a few communities are served to some extent by some amount of commercial television service. They generally do not receive educational or other public television broadcasts, however.

Program Content and Audience

The STD broadcasts in four formats:

(1) "Time Out" is a sixteen-week series of daily programs for junior high school students on career developments.

(2) "Careers and the Classroom-A New Perspective for Teachers," is a biweekly, year-long inservice series on career development for public school teachers.

(3) "Footprints" is a series of ten topical evening programs for general community viewing.

(4) A materials distribution service transmits films on many subjects to teachers for videotaping and later classroom viewing.

All formats but the last involve some amount of live interaction between viewers at two-way sites and the Denver studio. All broadcasts are in color.

Since it appears daily, the format that absorbs most STD energy is "Time Out". It reaches about 1450 junior high school students at the 56 rural sites. Slightly over two-thirds of the students are Caucasian (Or "Anglo," in the Southwest), and the rest are approximately evenly divided between Chicanos and Indians. Black students comprise less than one-half of one percent of the audience. Several thousand students also receive the broadcasts relayed from the twelve participating public television stations. Demographic information on the latter audience will be available later.

The program tapes are produced by the Federation in a small studio in the basement floor of its main offices. The lessons are built around a time-travel theme: visitors from the future return to the 1970s to learn how career decisions were made. The main set resembles that of "Star Trek." In addition to several recurring characters and sets, the programs make

extensive use of purchased film segments about specific jobs or other related topics (e.g., labor history).

The taped portion of "Time Out" runs for 28 minutes and 50 seconds, Monday through Thursday and is followed each day by a six-minute, 10-second, interaction period ("Time In") during which pre-selected schools are polled verbally by the studio to see if they wish to ask questions. On Fridays, the entire 35-minute broadcast is transmitted live with attempts to maximize interaction. For reasons which will be discussed in more detail later, the STD has experienced considerable difficulty with its interactive sessions. It is still experimenting with possible formats for the Friday periods.

The "Careers and the Classroom" teacher-education series runs for 55 minutes every two weeks. About 800 teachers are participating, either for state recertification credit or college credit. The format tends toward a 25-minute lecture to a small group seated on the studio stage, followed by 30 minutes for discussion. Questions may be raised either by the studio listeners or teachers at the two-way sites. Lecturers are drawn from area universities or public schools.

The "Footprints" programs appear every third Thursday with 30 minutes of taped broadcast and 25 minutes for interaction. The fifth and most recent broadcast dropped the interactive period. The programs are produced by the STD. The programs shown to date have been on the STD itself, on human communication problems, on consumer education, on land use, and on regional geography and cultures. The January 9 program was a parents' introduction to the "Time Out" series. At the "closed" rural sites, viewers must go to the junior high schools to watch the programs.

The records of the Research and Utilization staffs suggest very favorable reactions from those attending. They also indicate considerable staff

dissatisfaction with audience size. The closed site audience for the November land use program was about 750. Three sites accounted for over one-third of the total, and at almost twenty sites no one appeared. It should be kept in mind, however, that "Footprints" can be received in homes in the areas served by the twelve public television stations, so the total audience is much larger than this.

The materials distribution service provides teachers at closed sites with the chance of ordering free films on any subject. The records of the Research staff and comments from Utilization staff suggest that it is extremely popular. By early December, the service had transmitted nearly two hundred films averaging about 17 minutes each.

Teachers wishing to order a film submit their requests to the STD offices. According to the staff member who manages the service, three or four requests are usually sufficient to insure that an item is actually transmitted. The time and content of transmissions are announced in advance. The STD staff says that a teacher learns in two or three weeks whether his request will be filled. The transmissions are recorded on videotape by interested schools (which usually means the majority of the 56 schools).

The films are leased to the STD from the Great Plains National Institutional Library, a distributor of film materials. At the end of the STD, the agreement requires the schools either to erase their tapes or to purchase them permanently at a price significantly below normal catalog price. Videotape recorders were purchased by participating schools out of local funds with technical advice and purchasing assistance from the STD. The schools also pay for blank tapes.

The materials distribution service was originally scheduled for two hours per week per footprint. It has been able to utilize some additional

transmission time available when other satellite users temporarily suspended their experiments. The service is not dependent on special broadcast hours, so long as broadcast time can be communicated to schools in advance.

Internal Evaluation Plans

The STD is collecting extensive information on audience acceptance and student learning gains. Most of the attention to date has been directed toward measuring audience acceptance of the programs. Students and teachers fill out short questionnaires each week (during the early weeks, each day) evaluating specific program elements (e.g., how well a character comes across). There are also more general acceptance measures. A five-page summary of early findings is attached to the December 27 "Executive Report," the STD's monthly newsletter. It indicates generally high levels of acceptance.

During the fall semester, findings from the surveys were incorporated into programs still in production and will be used to modify some already taped segments. Program taping was completed on schedule in early December, and some editing will be done before the second semester broadcasts begin on January 20, 1975.

Cognitive and attitudinal changes will be measured through the Career Maturity Inventory, a nationally normed test. Questions will be addressed to students' self-assessment, decision-making abilities, occupational awareness, and general job attitudes. Pre- and post-tests have been administered for the fall semester, and pre-tests are currently being administered for the spring semester. The STD Research staff has also recently completed a 62-item criterion-referenced test, based on specific "Time Out" objectives.

Because neither the satellite nor the taped programs were available for

full pre-testing during the summer, the STD indicates that it regards the fall semester as "a comprehensive formative field trial."

During the spring both acceptance and learning-oriented tests will be administered at schools within the twelve open sites served by public television. There will also be two comparison sites in each of the eight states. The comparison sites are mostly rural and outside the ATS-6 footprints. A few are urban for comparison with the open sites. Comparison sites do not receive any of the STD programs, though some have a history of using televised instruction. The Research staff plans extensive comparisons across sites to discover if any differences in acceptance or learning are associated with its programs, the on-site technology, or demographic factors.

Case studies oriented toward detecting institutional changes are underway at three sites, where data is collected during monthly field visits by Research component staff. Finally, a series of in-house historical papers are being prepared by a member of the Research staff. These papers are currently scheduled for release in June, 1975, when the present funding period of the STD nears its end.

The STD cost records are exceptionally complete and permit reporting at essentially any level of detail needed. The functional organization chart makes assigning costs to functions relatively easy. There are, of course, always special problems in projecting costs from a demonstration, but these are beyond the scope of this paper.

STD History

A history of the first two years of the Federation participation in the ESCD may be found in the final report of a study conducted by the Stanford University Department of Communication under contract with the

U.S. Office of Education (USOE).* Its authors were Nancy H. Markle, David G. Markle, Conrad G. Carlberg and Dennis R. Foote. The present account draws heavily from their work.

The Stanford contract extended eighteen months, ending in October, 1973. The researchers were cast in the dual roles of internal advisors and external evaluators; their relationship with the STD staff came to be characterized by mutual distrust. Nevertheless, the final report seems to be more critical of Federal policies, or their alleged absence, than of Federation management. At this writing, the Stanford report is not available from the Education Research Information Center (ERIC), nor has it been readily available from the Department of Health, Education and Welfare (DHEW).

The Federation submitted its first proposal to produce educational television broadcasts via satellite to USOE in 1969. First funding, did not come until May, 1971, when USOE awarded slightly under $36,000 for a planning grant. At that time, the Federation was acting in concert with the Education Commission of the States and the Western Interstate Commission for Higher Education.

In July, 1971, the Federation and its co-participants, to which the Rocky Mountain Corporation for Public Broadcasting had been added, submitted an ambitious proposal for what was called an experiment but clearly covered the developmental stage of a major telecommunications enterprise. The plan envisioned broadcasts through public television stations and cable networks, as well as direct reception through antennas in colleges, public schools,

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*Nancy H. Markle and David G. Markle, History and Recommendations Resulting From Evaluation Planning for the Federation of Rocky Mountain States' Educational Technology Demonstration, Final Report on Contract No. HEW-OS-72-155, May 10, 1974.

community meeting places, and private homes--a total of 500 antennas in all. The three-year budget request exceeded $26 million, of which approximately $17 million was to have gone for software production.

No such amounts of Federal funds were forthcoming. In January, 1972, the Federation received $500,000 from USOE for program development in career education and early childhood development. The latter project was sub-contracted to the Educational Commission of the States. The Federation retained responsibility for career education, broadcast and engineering, a utilization program, and research.

The following year saw substantial progress toward deciding the technical parameters of the STD demonstration. One important decision, not officially confirmed until February, 1973, was to develop at least minimum production facilities within the Federation. (The Federal preference was for the use of existing films or, if no suitable material existed, for sub-contracting film production.)

The organization as a whole, however, appears to have had more than its share of "technical and managerial teething troubles."* The Stanford study summarizes a series of shifts in organizational responsibility at both Federal and regional levels and reductions in the scope of proposed work. The final report of the Education Commission of the States,** written after its early childhood development component was dropped from the STD,

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*The phrase is borrowed from Albert Hirschman, Development Projects Observed. The Brookings Institution, Washington, D.C., 1967.

**Final Report: Early Childhood Development Component, Educational Technology Demonstration, Education Commission of the States, November, 1973.

reveals the frustration of one set of ex-participants. It states: "There were four federal staff changes, 19 Federal focus changes and 14 FRMS management changes, in addition to several minor changes. Future projects need to seek a way in which this problem can be overcome. The amount of energy expended in dealing with these changes certainly detracted from the demonstration's main thrust, if not in fact becoming quite counter-productive to achieving success." No Federation history of this period has been published, but the STD management and staff agree that it was a difficult time.

According to the Stanford history:

> By April 1973, the satellite communication design had been completed by the Broadcast and Engineering component. The Career Development component was structuring and outlining their script production; no scripts had yet been written. The Early Childhood component was completing scripts in a modular format. The Production component was releasing studio equipment bids and identifying available production talent for eventual staffing of the studio. The Utilization component was finalizing its prototyping plan.

Matters came to a head in early summer, 1973, following an evaluative site visit in April from Washington and subsequent renegotiation of the STD contracts. The evaluation team was headed by staff from the newly created National Institute of Education, to which responsibility for the ESCD had recently been assigned. (The project had originated within the Office of the Secretary, USOE, and had been transferred to the Office of Telecommunications Policy, USOE. The NIE was its third Federal sponsor in less than two years.) The site visit report was critical of the program's progress and internal management arrangements.

A number of changes took place. For the first time, a full-time project director was appointed (Dr. Law). In the course of negotiations over program scope and funding, the early childhood development component was discontinued.

The core of the agreement between the Federal and Federation negotiators is contained in a memorandum of understanding dated June 8, 1973. That memorandum set the total STD budget at $4.5 million. On November 15, that amount was increased to $4.616 million to accomodate the inclusion of the materials distribution service, added largely at NIE initiative.

These changes, and the attendent reorganization, left the STD in approximately its present form. The Utilization component had already negotiated agreements with State Education Agencies during the fall of 1972, and State coordinators had been hired since early 1973.

The number of receiving terminals were reduced to the present 68, and physical preparation for installing antennas began in the fall of 1973. The antennas themselves were installed during the spring of 1974 at a cost of approximately $4000 per receive-only site and $7000 for sites with two-way audio. The television antennas are 10-foot dishes mounted upon a fixed platform. A helical antenna was added for receiving audio signals, which come via a different satellite than the video transmissions. Participating schools paid for their own television receivers, purchased through the STD.

In August, 1973, the Federation submitted an unsuccessful proposal to NIE to install a digital interactive system at the 24 two-way sites. The proposed budget, covering two years, came to $345,000. If it had been funded, each student's desk would have been equipped with a twelve-button "digital response pad" resembling the body of a touch-tone telephone. The system would have permitted polls using questions answerable by "yes" or "no" or a number. The STD planned to query students at intervals during each telecast to solicit opinions and test grasp of program content. For test items, the desk pad would be equipped with a "right/wrong" indicator to provide prompt feedback on the accuracy of answers. On opinion poll items, a computer tabulation of response could also be fed back immediately.

In April, 1974, a second team from NIE made a two-day site visit evaluation, a year after the one which had had such an important effect on the demonstration structure and scope. Its conclusions were considerably more favorable than that of its predecessor. Two "General Observations" from the team's report were as follows:

1. The project has made significant strides since the last site visit. Obviously, the previous panel's recommendations that Dr. Gordon Law be considered as the project director has borne fruit, and Dr. Law must be congratulated for having developed a sense of mission at the project and at the same time, delegating a good deal of authority to the component directors, who are very able and creative.

2. On the other hand, the project's proposal does not convey the sense of mission nor the tremendous excitment that is felt and is visible at the project. Specifically, the proposal has failed to indicate the problems which it has attacked over the past fiscal year, its rationale for decisions made and activities undertaken, and the status of those major problem areas at the time of proposal submission. There also is an absence of a listing of products and intended audiences which the project plans to develop and produce, other than the film for telecast and final report to the National Institute of Education, and its conceptualization(s) after the satellite has moved on to India.*

The launch of the ATS-6 (the sixth of NASA's Applications Technology Satellites) had been postponed several times by NASA, but it finally occurred on May 30, 1974. The summer was occupied with technical tests of transmissions and receiving equipment by Broadcast and Engineering staff, frantic production by Program staff, and a variety of plans and activities by other units. Actual taping of "Time Out" had begun in March and was in full swing by May. By the start of school in September, 30 of the scheduled 69 tapes were complete. The last was completed December 6.

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*STD reviewers of an earlier draft contended that the criticism in the second "observation" was unfair in that NIE had specifically requested that the proposal referred to confine itself largely to operational matters, having criticized an early one for focusing on goals with fewer details about implementation. They thus were "damned if they did, and damned if they didn't." Without passing judgment on this particular instance, the author's general conclusions about the objectives expressed in early STD proposals are contained in the following section.

On September 9, 1974, broadcasts of "Time Out" began, and other formats following on schedule. The Friday information portion of "Time Out" began October 4. The satellite and receivers have functioned well with the exception of audio transmission carried by ATS-3, which was launched in 1967. The visual quality of the pictures received in the classroom has been uniformly excellent.

At this writing, the management of the STD, like other portions of the ESCD, is seeking funding beyond its current termination date in summer, 1975.

The Federation is contributing leadership and staff support to current efforts to form a consortium of potential satellite users. Former New Mexico Governor Jack Campbell, executive director of the Federation, and Dr. Law are members of the proposed consortium's eleven-man interim working group on organization.

STD Goals

A discussion of STD goals and objectives has been deferred on the theory that rigorously defined experimental objectives are rare in any large-scale social action project. Normally, goals must to some extent be inferred from behavior and accomplishments, rather than taken verbatim from official documents. It is appropriate, however, to examine formal statements of purpose.

The first comprehensive proposal produced by the Federation (and the organizations then associated with it) was that of August, 1971, with a $26 million budget. Although that document used the word "experiment" to describe the proposed activities, it contained no strictly experimental goals. The most explicitly stated objective was "to reach people who have been deprived of TV due to the economic infeasibility of conventional TV

distribution and topography of the region." The proposal continued:

> The 1970 report to the President by the Commission of Instructional Technology (McMurrin Report) asks whether technology can help meet the needs of the poor in urban and rural areas and on Indian reservations. The ATS-F satellite, the Rocky Mountain region, the following experimental plan and the proposed organizational structure can begin to answer that question. The project is viewed as a service to the region which can address old and new social problems, and also as a long overdue opportunity to utilize and test available technology for educational benefits and cost effectiveness.

In the above paragraph and elsewhere in the proposal, the "experimental plan" (or sometimes, "the experimental year") was described as something distinct from "the proposed organizational structure."

A proposal submitted January 10, 1972, set forth the premise that the application of technology to education had been impeded by misunderstanding and fear of school personnel about the new techniques." It continued as follows:

> We have had the period of disbelief, skepticism and trial with...other technology experiments. It is now time to determine the degree to which modern technologies can enhance instruction with substantial cost benefits and whether school personnel, students and their families can be trained and persuaded to use them. The experiment has as a primary focus the definition of the kinds of mechanisms which should be developed to insure the transfer and utilization of the experimental outcomes to the educational system at large.
>
> All the component parts (hardware, software, and utilization) of the proposed design are theoretically sound. Each has been demonstrated to be an effective tool on a limited and singular basis. The use of these components as an integrated system in varying configurations has not yet been demonstrated. Learner effectiveness and related costs are still unknown. This experiment addresses these unknowns and seeks to demonstrate which system configurations have the greatest impact upon the learner and are most cost effective.

The July, 1972, proposal began with a discursive essay on problems

facing social institutions, the role of technology in redistributing knowledge in society, and the need to involve users in program decisions. In regard to objectives, it was less explicit than the January document, though more detailed about operational plans. Four expected benefits of the STD were identified:

> (1) ...new ways to apply knowledge to persistent social problems, particularly in the field of education.
> (2) ...important information about the effectiveness of such a communication system [the ATS-6 linked to existing ground facilities, including broadcast television, CATV and microwave], the costs that will be inherent in the expansion and modification of such a system and a generally reliable measure of public acceptance...
> (3) ...new ways [for service institutions to provide] effective and efficient service because of the increased availability and accessibility of new knowledge.
> (4) ...encourage[ment to] the private sector to expand to develop new ways provide social services.

The clarity of a set of stated objectives often lies in the mind of the reader, of course. The Stanford study (pages 53-58) also concludes that the early Federation proposals were consistently unclear about goals and objectives. The study quotes a series of memoranda from Federal officials who made the same comment.

The author has not examined the Federal records dealing with these proposals, but no explicit set of Federal objectives has been discovered on file with the STD until the memo of understanding of June 8, 1973. The statement of goals in that memorandum was short:

> (1) To demonstrate the feasibility of a satellite-based media distribution system for isolated rural populations.
>
> (2) To test and evaluate user acceptance and the cost of various delivery modes using a variety of materials.

"Feasibility" presumably refers to a good deal more than technological feasibility. That was never seriously in doubt, and could have been tested

at much lower cost. What was to be demonstrated was the feasibility of putting together a working service delivery system, whose users would be the judges of its benefits. What would be measured would be user acceptance and cost savings. The stated goals did not require measuring educational benefits to students, either cognitive or affective, although the STD is attempting to measure both. The STD Research staff states that measuring learning gains was insisted upon by participating state and local school personnel. Strictly speaking, the effect of the Federal memo was that it seems possible for the STD to achieve its official goals without answering the question: "Except as a matter of cost or clarity of picture, does it make any educational difference whether a message reaches a classroom via satellite or some other means?"

Before turning to one case where it might very well make a difference--i.e., when interactive or two-way communication is involved--some comment in regard to STD objectives seems appropriate.

One conclusion of the Stanford study was that there was "a mismatch in expectations between Federal and on-site planners that plagued the Demonstration throughout its entire preplanning, planning, and early operation periods." The written record is not clear what the Federal expectations were, and the STD management suggests that they varied from office to office. A review of early Federation proposals and observations of recent STD activity led this writer to the conclusion that STD planners on the Federation side never attempted to design an educational experiment, if by that word is meant a systematic attempt to establish a causal relationship between some specified set of actions and outcomes. Instead, they appeared from the start to be interested in developing a lasting telecommunications system for the Rocky Mountain region.

In reviewing an earlier draft of this paper, Dr. Law and Dr. Kenneth Lokey, Deputy Director of the STD, took strong exception to the preceding conclusion. They made two points. The first was that early STD proposals did request substantial funds for educational content, and that the overriding emphasis on technical feasibility came at NIE's initiative. The second is that even a one-year satellite-based demonstration requires substantial investment in hardware with a useful life of several years, so that it is necessary to design and install many of the components of an operating system if any project at all is to be undertaken.

Evaluation of the first point would require considerably more space than is merited by an issue that finally reduces itself to conjecture about STD management's motivations. The second point is more material. Whatever the goals of the parties involved, the Federal government committed itself to developing a prototype telecommunications system for a region without a clearly articulated set of educational goals. If acceptance of the system's products proved high, the "experiment" could be described as a success by its regional sponsors. Faced with requests for future funding, the Federal offices would have to choose between letting hardware with a long useful life go underutilized after a "successful" application, or providing funds for further "successes."

Once the Office of Education had expressed willingness to support a project of substantial scope (i.e., one creating a multi-state delivery system with goals extending beyond demonstrating technological feasibility), it was difficult to set bounds to the STD activity without reference to some experimental goals. This kind of project requires an aggressive and committed management with enough political sophistication to handle difficult institutional problems. Such management cannot be expected to accept

arbitrary limits on the scope of their activity. Invoking agreed-upon experimental goals would have been one non-arbitrary way to establish bounds. Why was this apparently not done?*

The actors in the history did not lack the sophistication to formulate such goals. One explanation might be that no one's institutional interests required, or were well served by, raising questions about the educational purposes and terminal objectives of the prototype telecommunications system being created. That would not seem to be true of NIE, however.

There is another possible explanation, which it will be the purpose of a later study to evaluate. It is that there is no rationale for Federal support for applying satellite technology to educational needs which lends itself to experimental justification, except perhaps that of possible cost savings over some alternative delivery system. As the April, 1973, memo of understanding implicitly acknowledged, if one believes satellites are needed, what one does is demonstrate that a supporting delivery system will be accepted. Experimental aspects would be confined largely to software and within-classroom technology, and even these would not necessarily determine the main question of system acceptance.

Two objections to the preceding generalization occur immediately. One objection is that, in a social system, the whole is frequently larger than the sum of its parts. It may be that the broadcast range of satellites, which ignore political boundaries, makes them a naturally potent force for institutional change. This consideration will be pursued, but not in this paper.

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*It has already been noted that this paper is not based on USOE and NIE records. If later review of Federal files and conversations with Federal officials show that there were stated Federal objectives, this question is misphrased. It might then become, "Why were Federal experimental objectives never successfully imposed upon the STD?"

Another objection is that satellites enhance the opportunity for interactive communications. (This is not necessarily uniquely true of satellites; cable systems may be designed to do so as well.) If this capacity is highly prized, comparison with other systems must take it into account. The extent to which the STD presently appears to illuminate this issue will be the subject of the next section.

Interactive (Two-Way) Capability

The first major Federation proposal (July, 1971) said the following about the potential of two-way communication for education:

> The Federation's experiment seeks to create the kind of learning that goes on excitedly and enthusiastically outside school. Two-way communications will enable the public school component to feature live student/astronaut conversations. Students in New Mexico will have an opportunity to talk to students in Idaho or Wyoming, or to forest rangers battling a forest fire, or to power plant operators. A visiting student from Kuwait may be attending high school in Salt Lake City, but he will be able to share his observations, via the ATS-F, with students in Window Rock, Bozeman or Durango. Studying occupations in the region, students will have an opportunity to talk first-hand with persons performing tasks in a water treatment plant, working in a distant school for handicapped children, managing a ranch or teaching on an Indian reservation. The possibilities are limitless! And so will be student and parent interest.

The material produced by the STD for public information continues to describe the "intensive sites" as a key feature of the demonstration.

There have been problems in practice, however, both technical and conceptual. The most obvious technical problem has been that classroom-to-studio voice transmission for "Time Out" has often been very nearly unintelligible. (This comment is based on an unsystematic sample of about six interactive periods throughout the fall semester and review of staff records. The STD's December report suggests that technical difficulties were mostly confined to the first few weeks of broadcast. This may be true as a generalization,

but it cannot be totally correct, since the classroom questions in at least one December session could not be understood even by the studio moderators on camera.)

The STD explanation for the technical difficulties is that two-way audio communication must take place via ATS-3, a less powerful satellite launched in 1967 and broadcasting on VHF. The ATS-3 now operates below its original full power, and the Federation must compete for power with other users. The STD management is highly critical of the Federal decision to omit voice transponders on the ATS-6 at a frequency near the 2.5 GHz of the video telecasts. No attempt to document the Federal version of this decision has yet been made by this writer.

That there have been problems does not mean that they will not be solved as others have been. There appears, however, to have been a long-standing tendency to define interactive problems as primarily technical when the conceptual ones are at least as important.

For example, the proposal submitted to NIE in August, 1973, for digital response pads to intensive sites was highly specific in regard to the technical parameters of the proposed system. The explanation of the educational assumptions underlying the proposal were contained in a page-and-a-half appendix, citing several items of literature to the effect that learner participation and prompt feedback stimulate learning. The only non-technical objective about which the proposal was clear and detailed was the timeliness of the digital demonstration as a way of influencing private investment decisions in the technology.*

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*After reviewing an earlier draft of this paper, STD officials said that an April, 1973, proposal was more detailed on educational objectives. That discussion was not referenced in the August proposal. Pending a review of the earlier document, I have decided to let the paragraph stand as originally written, but readers are alerted that it may seriously understate the STD's early attention to the educational goals of interaction.

The 1974 NIE site visit had this to say about the state of planning for interaction in April:

> According to the STD publicity brochure:
>
> This interactive capability is one of the key features of the demonstration and one of the main factors to be studied both for educational and telecommunications implications for the future.
>
> The program component may not be prepared to fulfill this commitment. The discussions with program division staff did not indicate any extensive effort had been made to think through the alternatives as to what could possibly happen during the interactive portion--various kinds of audience reaction, the logistics of handling an excess of questions, how to edit and attach priority to questions, what happens if a student in one school wants to talk with a student in another school, and so on.
>
> Furthermore, there is no impression there were any plans to undertake such a thinking, planning, and testing exercise prior to the broadcast of the first few programs.
>
> It seems that, given only six minutes "on the tube," the potential for disaster is real and that STD should plan alternatives for avoiding it. Otherwise, the ultimate evaluation could be: "Here's what we did wrong!" as opposed to: "Here's what worked and here's what didn't work."

The STD presently has a task force addressing the goals of its interactive programming. The conceptual problems are quite difficult, being basically an immensely expanded version of the problems any teacher sometimes has when trying to stimulate student discussion.

At present, it is misleading to use the word "interaction" as a blanket description of whatever portion of STD program which is not pre-taped, since studio comments and short video clips occupy a significant portion of "interactive" periods.

The format of the six-minute interaction period following the Monday-Thursday broadcasts of "Time Out" is a poll of some number (usually about four) pre-selected sites to elicit questions. The polling is time-consuming, and questions usually must be repeated by the moderators in order

to be understood by the veiwing audience. The STD explanation for the polling procedure is that it gives every intensive site a turn, and prevents a few schools from monopolizing the question periods. The sessions also reminded this observer of a classroom where, if students are not called upon by name, they will not ask questions.

On Fridays, when the entire 35-minute period is devoted to non-taped programming, the STD has experimented with differing formats for stimulating student response. One format has been "mini-dramas" in which local high school students act out responses to problems of career choice; comments are invited from students at viewing sites. Another has been debates between classes at two sites, who feed arguments to student spokesmen in the studio. Other formats have included job clips and interviews with workers in some specified occupation, about which questions are solicited. Little or no attempt has been made to relate the emphasis of the Friday sessions to the themes of the immediately preceding week.

The STD's December report describes acceptance of the interactive sessions as "mixed." Conversations with State Coordinators and others who have visited classrooms suggest that two-way audio is popular with the schools which have it. Students apparently enjoy the chance to talk over the network.

There is no reason to doubt that "interaction" takes place in conventional ways within participating classrooms--between students and their own teachers, for example. The STD will attempt to determine if any learning gains are associated with possession and use of the two-way equipment. Conclusions in this regard would be obviously premature. Since less actual student communication via satellite takes place than a casual reading of broadcast schedules would lead one to believe, it is presently hard to see why a student is worse off without the equipment if his teacher uses the time to stimulate discussion. The STD staff faces the difficult problems of

(a) increasing the amount of interaction that actually takes place via satellite, and (b) explaining why it is important that it should take place in that way.

Topics for Later Reports

Quite apart from any inadvertant errors of fact or interpretation this report may contain, there are certain large omissions. The purpose of this concluding section is to indicate some of those. For convenience, several can be listed without much comment.

--As already noted, the present narrative treats inadequately the Federal agency viewpoint of events in STD history.

--The local viewpoint is almost entirely missing. This omission will be partially remedied in later drafts, but is likely to remain a problem.

--The technological contribution of the Federation to the ESCD should have been discussed, if only as a matter of record. The Federation has provided technical support for Appalachia, and its advice is widely sought on technical matters. In addition, its capital investment in broadcast facilities may be expected to remain a factor in its own decisions and those of Federal agencies.

--"Time Out," broadcast to a junior high school audience, is the principal product of the STD, but the other formats should be considered in more detail than has been done here. In particular, the adult audience's use of interactive capability needs reporting.

--The materials distribution service of the STD, which has been extremely popular with teachers, is also worth more attention.

In general, this paper should be regarded as an extended preamble to

an attempt to determine how the Federation STD history and experience bears on the pros and cons of Federal financial and other support for the use of satellites in education. It has already been suggested--with fewer caveats than so large a generalization warrants--that there may be no educational policies served by such investments. Much of the case for satellites per se (as distinct from the use of films and videotapes in the classroon) appears to rest on (a) their possible cost-effectiveness as a transmission link, (b) their capabilities to facilitate two-way communication, or (c) their stimulus to institutional change as the case of a system which almost by necessity cuts across conventional political and organizational boundaries. Each of these areas is worth more thorough consideration.

The next paper on the STD should be supplemented by some preliminary cost work (not to be performed by the present author).

It will also attempt to deal in more detail with what can be learned about the issue of interaction.

The STD experience bears on the issue of satellite's possible catalytic properties in several ways. The STD proposals and publicity material contain repeated reference to a "user-based" system, by which is meant considerable consumer participation in needs assessment and program decisions. It will be important to observe how this concept has been translated into practice. It is important because a satellite-based telecommunications system may in fact break down parochial barriers. It may also create in their place still larger institutions which are less susceptible to user control.* As a matter of

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* To take a single example, the decision to make the "Time Out" broadcasts just under 29 minutes in duration was based on the need to accomodate public television stations schedules (a half hour, including time for station identification). A program of this length occupies a substantial portion of most class periods, and some State Coordinators have reported that there is teacher dissatisfaction on this score. The STD management states that the approximately 30-minute time period was chosen after extensive consultation with schools. There is no evidence that this is an important problem, and it is mentioned simply as an instance of how the requirements of a large system may have impacts at the consumer level.

value judgment, there are arguments to be made on both sides of the question, but the STD experience provides valuable empirical data for clarifying the debate.

In a similar context, the role and functions of the STD Utilization staff merit more attention. They have the potential for being a catalytic force in themselves. Their impacts may or may not be separable from those inherently related to a satellite-based broadcast system.

It would also seem desirable to ascertain the extent to which the very thorough research on viewer acceptance planned by the STD will bear on the issue of "local interest" material vs. more general content-oriented material in educational programming.

One final comment on the STD and what the reader can expect from these reports seems required. Except as it was a major factor in the historical record, this report has not offered any judgments on the administrative management of the STD operation. To do so is beyond the required scope of the ERPC contract for this study. It would become necessary, however, if poor execution appeared to confound the effects of some policy. This is not presently the case. The STD appears to be a well-run operation, and the production record of the summer and fall bears out this generalization. Every organization has its problems, but those of an administrative nature have been ignored in this account without any sense of distortion on the part of its author.

APPALACHIAN EDUCATION SATELLITE PROJECT

Background

One of the prime users of ATS-6 time is the Appalachian Education Satellite Project (AESP), which, by means of satellite transmission of video and audio, offers four graduate-level teacher training programs in career education and elementary reading to 1200 teachers in eight Appalachian states.

The National Institue of Education and the National Center for Educational Technology granted approximately $2.2 million to the Appalachian Regional Commission for implementation of this teacher training-by-satellite effort over a period of 2 1/2 years.

From the Appalachian states included within the satellite's transmission area, five main Regional Education Service Agency (RESA) sites have been selected to implement the project on a local level. Two ancillary sites for receiving satellite transmissions are affiliated with each main site, for a total of 15 receiving sites where teachers meet for "classes" via satellite.

The University of Kentucky in Lexington, Kentucky, is the site of the Resource Coordinating Center for the project. Here all software and programming for the four courses to be offered is developed, produced and evaluated.

Participating teachers have been able to choose from summer courses in elementary reading and career education, and a series of 16 live interactive seminars in career education for teachers of grades 7-12 aired in the fall of 1974 and spring of 1975. Summer course activities included viewing videotaped television segments, responding to 4-Channel audio reviews and evaluations, laboratory activities, and participation in four live seminars for each course.

Each teacher successfully completing either of the four courses will earn three graduate-level credit hours that will be recognized and accepted at a number of colleges and universities throughout Appalachia.

The immediate educational objective of the AESP is to improve the effectiveness of the classroom teacher, thereby upgrading the quality of reading and career education instruction available to the Appalachian student. The Project will also demonstrate the feasibility of producing high-quality, revenue-shared courses in multiple disciplines for cross-state delivery via satellite.

The fall course in career education began distribution on September 3, 1974. The course is in the Middle (or Junior High) and Secondary School. Originally planned for junior high school teachers, the course is now open to senior high teachers as well. Vocational education teachers are invited to enroll, but the course is aimed at career education as a part of the more basic academic curriculum. Teachers, administrators, counselors are urged to consider the course. The format consists of sixteen live, interactive seminars.

Participation in each of the seminars is encouraged. Questions from the sites are accepted at any point during the live presentations. The panel tries to deal with each question while the seminar is on the air. If a student has a question, he gives that question to his site monitor so that he can contact the panel. Feedback and input from the student is considered an essential element of this course.

Several members of the staff at RCC visited each main RESA and as many sites as possible to answer questions, accept criticism, and provide support for and about the fall career education program and the work at RCC.

Besides the interactive visits, Lowell Eberwein, director of the reading component, and Paul LeVeque, the producer of the reading television programs,

visited site areas in a search for prospective school systems to utilize in spring semester's reading course.

NOTE: This "Background" and the following course overviews have been drawn completely from Appalachian Education Satellite Project (AESP). The "Background" consists of nearly verbatim excerpts from the AESP's newsletter "The Tracker" (June, 1974 and July, 1974 issues) while the following course overviews are verbatim quotations from AESP course descriptions. For these documents, contact:

Appalachian Education Satellite Project
Resource Coordinating Center
306 Frazee Hall
University of Kentucky
Lexington, Kentucky 40506

DIAGNOSTIC AND PRESCRIPTIVE READING INSTRUCTION KINDERGARTEN THROUGH THIRD GRADE TEACHERS

Course Overview

The Diagnostic and Prescriptive Reading Instruction (DPRI) course is designed to offer teachers individual experience in diagnosing children's specific reading problems and locating materials to teach the needed skills. The course features classroom teachers and students illustrating new and innovative teaching techniques. The course is practical, classroom oriented, and provides teachers with the following:

- diagnostic procedures
- procedures for connecting the diagnosis with prescriptive instruction
- prescriptive instructional techniques

CAREER EDUCATION IN THE ELEMENTARY SCHOOL

As an introduction to career education, this course surveys the major principles, concepts, and practices of career education in the elementary school. The eight week course includes twelve half-hour videotapes, four live, two-way interactive seminars, feedback, and ancillary activities that illustrate actual application of the career education concepts.

Course Overview

The Career Education in the Elementary School course combined television and laboratory experiences in offering the students a practicum wherein they viewed a televised program and applied what they saw toward the development of a career education learning package. The videotapes feature classroom teachers and students illustrating career education concepts, and interviews with practitioners and authorities.

Successful completion of the course should allow the student:

(1) to comprehend the major principles and practices of career education in an elementary school setting;

(2) to recognize the need of career education in an elementary school setting;

(3) to recognize the formative nature of the career education concept and beware of areas of possible conflict among educators;

(4) to introduce career education to an elementary school staff.

CAREER EDUCATION IN THE SECONDARY SCHOOL
(grades 7-12)

Course Overview

Career Education in the Secondary School combines television instruction and laboratory experiences in offering a forum in which teachers can prepare to successfully infuse career education into their curriculum and to effectively aid in the implementation of career education programs in their schools. The television instruction consists of sixteen one-hour live interactive seminars; on each week's seminar, career education specialists and practitioners will appear with host and moderator Dr. Rupert Evens, a noted career educator from the University of Illinois, to challenge and guide students in their development

of an appreciation of career education. The seminar format, with its interactive capability, allows students the opportunity to interact with prominent figures in career education.

APPENDIX B - PART II

SOME CONSIDERATIONS TOWARD A HISTORY AND ANALYSIS OF THE APPALACHIAN ESCD

This report will describe some of the observations and speculations resulting from regular contacts with the Appalachian ESCD personnel, activities and organizations during the past three months. The material presented here is tentative, and is prepared for the dual purposes of (a) clarifying the thoughts and perceptions of the author, and (b) eliciting comments and suggestions from the readers that could assist in further observations and analyses.

The activities of the Appalachian ESCD can be seen and understood from a broad perspective which spans a number of years and includes a wide range of events, such as:

--the founding of the Appalachian Regional Commission (ARC) and the evolution of its "brokerage" role between the member states and agencies of the Federal government,

--the evaluation of the critical educational needs of the region, particularly for teacher in-service education,

--the involvement of ARC in the ESCD, even though the project required ARC to act as a project operator, rather than a broker for the activities of the separate states,

--the selection of the agencies and persons to conduct the activities of the project,

--the experiences of the persons and institutions that have been affected by the project.

A document providing both a chronological and an analytical history of the project will be prepared for a subsequent quarterly report. The completeness and accuracy of the document will be enhanced by the critical review of active participants in the project, prior to its final release.

The Decision to Participate in the ESCD

Several factors have been observed to influence both individuals and organizations to participate in the Appalachian ESCD--and these factors seem to have been common throughout the project, from the initial involvement of ARC down to the individual teacher enrolled in the program. In each case, individuals and organizations have had the options of either involvement in the project or participation in some alternative activities (only a few newspaper writers seem to have taken the option of active opposition to the project). Factors affecting the decisions to become involved have included:

1. Time

   Teachers were eager to take a college-credit course locally, thus avoiding the driving time required to trav l to a university. At the same time, they were concerned about the amount of time required for out-of-class activities (homework) by a high quality course (and they expected that).

   Agencies participating were concerned about the limited time-duration of the project, but felt that the project was helping them take steps toward their own long-range goals. Project personnel were also concerned about the short length of the project, and thus tended to become involved as an interim or part-time activity; others were willing to become involved on a full-time basis because the work was seen as a stepping stone to their own long range interests and goals.

2. Costs

   Teachers were attracted by the chance to get college credit at minimum (or no) tuition cost.

Agencies had considered the ratio of Federal to local funding, and the potential for further support beyond this project.

3. Skills

No teachers were interviewed who seriously questioned the adequacy of their initial competence (but the only teachers interviewed were those who had registered and enrolled in the courses).

The contracts awarded to the participating agencies had clear specifications for the background and competencies of the persons to be involved, and ARC retained veto rights on the hiring of the major personnel.

4. Goals

The teachers interviewed all reported that the course offerings seemed to provide content they needed.

Persons in the participating agencies indicated that they had been deeply concerned that the project goals were similar to their agencies long-range goals and interests. They were all concerned with education, teacher in-service courses, educational television. The experience of project involvement (e.g., new electronic equipment and coordination with several universities) would have positive residuals for them.

5. Reputation

The "glamor" associated with the satellite-based project was mentioned by everyone as an intriguing but minor aspect of the project. While this aspect of the project may have been influencial for public relations and recruiting, it did not appear to be a continuing critical factor.

In a few cases, teachers and agency personnel joined the project but dropped out or were released when the above factors were not positive; for example, teachers dropped when the commuting time was large and the course content did not appear to be what they had expected. Agency personnel have terminated their associations with the project when it appeared that their goals and skills didn't match expectations for their roles in the project. Similarly, organizational structures have been modified to achieve a better match with the project's expectations and requirements (changing work distribution or adding new personnel with specific characteristics).

In every location visited (ARC, RCC, Cumberland and Fredonia), it was observed that one individual has played a key role in initiating and supporting the ESCD project activities. These "prime movers" became involved in the project in different ways, but each learned enough about the project to become convinced that it was congruent with local goals and interests. As this study continues, the role and functions of this hypothetical "prime mover" will be examined further.

The Program Media

A variety of technical equipment and media are used in the ESCD program:

1. The ATS-6 satellite-based educational television system.
2. The ATS-3 satellite-based VHF audio talk-back system.
3. The teletype system for live interaction with the RCC studio.
4. Print materials delivered through the U.S. mail.
5. The telephone for back-up audio contacts with the RCC, and for between-class coordination of efforts.
6. The computer for conducting materials search and providing a print-out of reference materials.

Two types of preliminary estimates have been made of the function and influence of these media: an estimate of the relative importance of the contribution each makes to the overall program, and the relative sensitivity of the program to variations in the quantity and quality (how much and how good) of each individual form of media. For example, it might be that although the teletype plays a relatively small part in the overall program, variations in the quantity and quality of its contributions could make a substantial difference in the overall affect of the program.

The numerical estimates presented in the table, below, are based on the tentative and personal conclusions of this author, and have been derived from

reading the literature of the effectiveness of various media, from personal observations of the programs in both studio settings and classrooms, and from discussions with program participants and other EPRC members. Although the numbers may give the appearance of precision and accuracy, they are only estimates of the relative magnitude of these effects. This table is presented, here, in an initial attempt to examine the relative influence of these media.

The ESCD Media	% Relative Importance	%Relative Sensitivity
ATS-6, ETV, audio-visual	45	20
ATS-3, VHF, audio	5	5
Teletype, Q-A in real time	10	20
Print materials, mail delivery	30	45
Telephone	5	10
Computer print out references	5	-

The table suggests that the ETV system appears to account for approximately half of the important contributions to the total program as it impacts the learners, contributing substantially more than the next most significant media--the print materials. Yet, it is estimated that variations in the quantity and quality (how much and how good) of the print materials would have somewhat more than twice as much influence on the program as variations in the ETV materials. The reasoning behind this estimate includes cognizance of the broad spectrum of print materials provided: reference materials, learner study guides, instructions for classroom instructors, feedback sheets and examinations. As yet, there is little if any hard data to support these estimates. As the study continues, a variety of participants will be asked for their intuitive estimates of these figures in order to find a concensus. Readers of this report are invited to propose another set of values of this

table, and similar estimates for other portions of the program.

Learner and Institutional Outcomes

Although the Appalachian ESCD was initiated to meet the needs of teachers throughout the region for new skills and knowledge, it is likely that the most significant effects of the program will be seen in two distinctly different types of outcomes: (1) changes in the participating teachers, as intended, and (2) changes in the institutions that have been involved.

Participants. Changes in teachers may be most visible in what they say about themselves, what they do differently in their classrooms, and what their supervisors say about changes in their behaviors. The RCC Evaluation Mission will be reporting on repeated measurements of teachers' knowledge and attitudes relative to the program content--and these results will, later, be incorporated with data from conversations with and observations of teachers involved in the proejct. The following tentative conclusions have been reached from contacts with participants:

--the programs have been most effective when teachers came to the courses with their own needs and expectations, and these needs and expectations matched the content and activities of the program courses (they wanted to learn better methods of teaching reading, and that was what the course was really about);

--teachers were most vigorous and appeared to learn most when they experienced support from other teachers in their own schools, from their own supervisors, and from the other participants in the course;

--the programs were best remembered and most likely to influence practices in classrooms later, when the participants saw other teachers using materials and methods in ways the participants were expected to learn,

and then had the chance to discuss these examples and their own teaching problems with the other members of the class;

--there was a substantial time delay between exposure to new materials in the classroom, and implementation of these new ideas or methods in the participant's own classroom.

To what degree are these outcomes functionally related to the characteristics of the particular media used in the program? Are they characteristics of a satellite-based educational system, or would they have been observed in another program using a different mix of media? There is no hard data to support firm answers to these questions, and it is unlikely that valid data could be obtained that would provide such answers. Nonetheless, it is possible to speculate about these issues.

There is a long history of experiences and research to support the importance of matching a course to a learner's needs and expectations. This does not seem to be related to any particular media (e.g., satellite telecommunication), but is characteristic of education, generally. The same could be said for the second set of generalizations (the importance of group support) drawn from current interviews.

The third set of generalizations (seeing real teachers in real classrooms and discussing these observations) can be more nearly related to the specific characteristics of an ETV presentation. The work of Bandura on psychological modeling suggests that the observation of a "model" performing a task can facilitate the imitation of that performance; the more "real" the model's performance, the more likely the imitation. The TV presentation of such models (particularly when the participants knew that these models were specially selected and filmed for this project), could provide a strong "psychological modeling" effect that would be much weaker with another form

of media (e.g., if described verbally, in part materials). It is not known whether this same effect could be achieved as well or better through the use of video tapes; the filmed sequences were "canned" rather than "live," and there may have been some advantages for a class to be able to stop and replay certain sequences if they had video casettes, rather than an ETV broadcast.

The fourth set of generalizations (delay between learning and using), might well be a function of the media used. Again, Bandura's work with "modeling" suggests that certain forms of media are more effective than others in inducing quick changes in learner performance. Although there is no data from this study to suggest that delay time is a function of a particular medium, other studies would tend to support the importance of realistic models (such as full-color television images of real teachers in their real classrooms).

Institutions. Institutional changes associated with project participation were noted and commented on by project participants over the entire spectrum of the organizational structure of the project, from the ARC to the participating teacher.

Several teachers described the new working relationships they have developed with those in their ESCS classrooms (although the beginnings of these relationships had existed prior to participation in this project). In a small number of cases, some participants organized small groups in their own schools to present and discuss the materials they learned in this project (although some had done this after participating in other educational activities). Several teachers commented that they now felt free to contact the local RESA directly for personal assistance or the loan of materials, without having to go through all of the standard channels to borrow materials.

Some local RESAs have experienced this ESCD project as a major step in their long range goals for an educational telecommunication system for their communities; and this local system would have a strong ground-based distribution system interconnected with the local PBS. This local telecommunication network is seen as having a strong influence on the local community in the future through the schools and through community educational programs.

No strong influence on or by the states or by state personnel has yet been observed, nor has it been described by any participant, even upon direct questioning.

One local administrator of a large elementary school has been able to use participation in this project as a further aid in integrating several special projects for the benefit of the pupils, the teachers and the local community.

Several universities and community colleges have extended themselves to grant graduate credit to those teachers who meet the standards for successful performance as determined by the University of Kentucky. The local faculty members retained as consultants to this project have been an important factor in obtaining this approval.

There is considerable conversation about the desire of college and university faculty members for copies of the ESCD materials for use in their own teaching, but little if any distribution of materials has yet occurred.

Reference Materials

The following materials have contributed concepts that have guided the observations made of the ESCD project, and have helped in the interpretation

and integration of data from these observations.

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APPENDIX C

THE ALASKA EDUCATIONAL SATELLITE COMMUNICATIONS DEMONSTRATION (AESCD)

A Preliminary Analysis of the Development of the AESCD Project Design

THE ISSUES:

1. What accounts for the proportion of the entire AESCD budget devoted to programming?
2. What acounts for the proportion of the AESCD programming budget devoted to original programming?

Prefatory Remarks

1. One of our goals is to determine whether demonstrations are good ways for the Federal government to attain those of its objectives which are aimed at applying new technology to education. Our purpose here is not to judge the past but to inform the future.

Since the demonstration project is one kind of live option the Federal government usually has open to it for achieving its objectives, it is important to understand how the nature of Federal technology applications demonstrations itself helps or hinders the attainment of Federal educational goals.

There are two general questions in this area which are germane to our policy analysis. The first is concerned with the harmony of means to ends: are Federal technology applications demonstrations primarily useful as lessons-learning experiments, or are they more fruitful as ways of fulfilling local educational needs, or are they more appropriate to the development of new institutions and operational infrastructures for utilizing the new technology?

Second, given the appropriateness of the technology demonstration format as a means for achieving certain educational ends, how should telecommunications demonstrations be designed and conducted in order to best realize those ends?

This working draft is part of a broad task aimed at studying the ESCD in order to intelligently discuss the above questions. The draft deals only with the policy making which occurred during the period when the Alaska ESCD was on the drawing board.

2. This brief discussion is intended to offer one sketchy, but hopefully coherent and plausible, answer to the two "issues" questions. The general focus of our analysis of the development of the AESCD project design is on the question: Which future Federal telecommunications policies will result in which types of future telecommunications projects? We want to learn about the connections between policies and types of projects in order to inform future policy making.

This working draft is not intended to settle accountability issues and questions. We are quite open to the possibility that the AESCD unfolded in the only way that it could have and that the decisions actually made were the best of all possible decisions that could have been made. But saying this does not tell us much about the causal and functional connections between decision points and events, connections it is important to understand when confronting new project proposals and policy choices in the future.

The Problem

The ATS-F Satellite Tellecommunications Demonstration was originally understood to be an experiment with the application of a new communications technology to the delivery of certain social services. It was assumed that the knowledge to be gleaned from it would inform future educational policy

makers and communications systems planners about whether or not (and how) satellite technology could be effectively, efficiently and profitably used to either improve the delivery of those social services or initiate the delivery of new services. Participants in the experiment were presumed to adopt a neutral posture toward satellite technology's desirability generally and toward its potential advantages to educational service delivery in particular.

Physically, a satellite system is a medium which conveys either or both video and audio messages. The messages conveyed are no more exotic than the messages conveyed to television and radio receivers in the home. So, on the face of it, the kind of message conveyed in satellite telecommunications systems is not functionally related to the satellite mode of message conveyance per se.

The unique virtue of a satellite is that it does make possible instantaneous conveyance of video messages between communicators who cannot be similarly connected by other modes of video broadcasting. But this seems to be the only unique characteristic of satellite telecommunications. A priori, the medium would seem to be more important than the message.

Satellite technology's potential advantages to the delivery of educational services therefore seem to fall primarily within two categories: possible cost decreases relative to other conventional types of message conveyance and possible decreases in the time required to convey the messages.

The a priori insignificance of the message relative to the medium suggests that a budgetarily limited satellite technology experiment would not be expected to emphasize the development and use of diverse kinds of messages and diverse ways of creating and producing educational programming. The AESCD's budgetary commitments to programming generally, and to original

programming in particular, therefore merit explanation.

Discussion

Answering the AESCD programming issues is made difficult by the public inaccessibility or ambiguity of much of the relevant data. Yet perhaps enough is known to draw some tentative conclusions.

For instance, it is known that

1. AESCD project design responsibility was assumed, from February, 1972, to January, 1973, by the Alaska Educational Broadcasting Commission (AEBC); the AEBC tried to harmonize its project goals with those of the HEW Office of Telecommunications Policy (OTP),*
2. The National Center for Educational Technology (NCET) was often in touch with the Alaska Department of Education (ADOE) during this period but not with the AEBC whose intermediaries with NASA were HEW-OTP and the Corporation for Public Broadcasting (CPB),*
3. the ADOE did not collaborate extensively in the 1972 development of the AESCD project design,*
4. interested parties in the Alaska Governor's office were very impressed with the U.S. Department of Commerce (Office of Telecommunications) needs-assessment report "Planning for Telecommunications System Development in Alaska" (April, 1971),
5. it was not decided whether the STD was a broadcasting or a telecommunications experiment until around December 1972 or January 1973 (resolution of this issue prompted a transferrence of authority from the AEBC to the Alaska Governor's Office of Telecommunications (GOT),*

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*Practical Concepts, Incorporated has responsibility for the relevant AEBC documents which are on file at the Center for Northern Educational Research, University of Alaska, Fairbanks, Alaska.

6. at the NASA User's meeting in Washington on February 8, 1973, AESCD project design proposals were submitted by both ADOE and the AEBC (OE and NCET representatives ostensibly supported the ADOE proposal), and

7. the overall character of ADOE's February revision of the AEBC proposal was generally accepted by NCET.

These points suggest that in 1972 and part of 1973 there was no unambiguous and consistent policy which guided the developing of the AESCD project design. Instead, it appears that three pairs of state and federal agencies variously exchanged and shared policy making responsibilities during the evolution of that project design:

1. the AEBC and the HEW-OTP with some support from CPB,
2. the ADOE and the HEW offices of OE and NCET,
3. the GOT and later, from July 1973 to the present, the National Institute of Education (NIE).

So the locus of policy making responsibility for the AESCD design work seems to have often been ambiguous. The extent of this ambiguity is difficult to measure. Any such ambiguity would understandably proudce a confusing and volatile goal-setting environment for all concerned participants because each of the state and federal pairs of agencies had its own slightly different conception of how the AESCD's objectives should be ranked.

All three policy-making pairs agreed that the spectrum of AESCD objectives included

1. lessons to be learned from the AESCD experience which could help Alaska's future planners to intelligently develop Alaska's permanent operational telecommunications system (this is the "planning" objective),
2. the fulfillment of Native education needs (this is the "educational" objective), and

3. the actual development of an embryonic operational telecommunications system (this is the "operational delivery-system development" objective).

However, the three policy-making pairs seemed to have ranked these three types of AESCD objectives in three different orderings. The first pair, AEBC-OTP, seems to have stressed the lessons-learning or planning objective. The second pair, ADOE-OE, seems to have given relatively greater emphasis to the fulfillment of Native education needs and thus to the educational objective. And the third pair, GOT-NIE, seems to have given comparatively greater weight to the operational delivery-system development objective.

So the three different policy-making bodies appear to have seen the AESCD in three different configurations of objectives wherein the planning, the educational, and the operations development objectives received relatively different preference rankings. The real differences among the three pairs may have been more attenuated than indicated here. But, however marked, the differences may have been responsible for the nature of AESCD programming policy.

A sense of the difference between the AEBC and the ADOE points of view can be gained from a look at their respective goal statements. The AEBC-OTP had primary policy-making responsibility for the AECD design during the earliest phase of the design's development. The AEBC-OTP policy was expressed in the December 1972 AESCD project design proposal. That policy was not committed to the stance that the new technology will have direct and measurable impacts on student learning outcomes. But that AEBC design proposal did reflect a commitment to the hypothesis that educational improvements might result from

1. teacher training and consultation,

2. new ways of distributing instructional materials throughout the system,
3. utilization of computer capabilities for both management operations and pedagogical purposes,
4. managerial coordination of the educational organization, and
5. viewer inputs into programming designs by way of the technology's interactive capabilities.

The AEBC declared that the "Principal Objectives of the ATS-F Experiments" were

1. "To develop the information base necessary to make sound investment decisions at the federal, state, and local level with respect to social service delivery systems,"
2. "to promote the institutional relationships at the federal, regional, state, and local levels that will facilitate the introduction of productive technology and encourage needed institutional reform, and
3. to persuade private enterprise to expand their efforts to develop new services to meet social needs."[1]

The AEBC objectives were thus ultimately aimed at the development of an operational telecommunications system. But this does not imply that it conceived of the immediate HET demonstration as primarily aimed at creating an embryonic satellite telecommunication system infrastructure, at advancing (what we have called) the "operational delivery-system development objective."

> Alaska's interest in participation in the Health and Education Telecommunications (HET) Experiments is based upon the opportunity for utilizing experimental satellite programs to develop useful information for planning future telecommunications systems.[2]

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[1] Document on file at the Center for Northern Educational Research, University of Alaska, Fairbanks, Alaska.

[2] Alaska/ATS-F Health/Education Telecommunications Experiment, "Program Plans," December, 1972. Office of Telecommunications, Office of the Governor, State of Alaska, p. 3, (emphasis added).

> Telecommunications systems have generally evolved through a series of steps representing increases in scope or advances in technology; each improvement, in itself, small in relation to the whole. When major advances are being considered, in which revolutionary changes could be effected in one giant step, planning risks become alarmingly high... Until the users obtain experience with a service, they cannot accurately define their needs: It is far better to obtain knowledge through experience before planning is completed rather than after the system is installed.[3]

These paragraphs clearly indicate that AEBC's primary objective was not to actually develop the infrastructure of Alaska's telecommunications system but rather to find out how to go about developing that infrastructure.

That the AEBC did not emphasize the educational objectives is equally clear from the following paragraph:

> Alaska's objective is not to determine if a satellite is useful, but how the technology might be most effectively used. The primary interest is not in precisely measuring the instructional efficiency of various programming and dissemination techniques, but in exploring effective ways of utilizing the technological resource at hand. The process of education is so complex that, in a short-term demonstration, it is not possible to search for optimal designs; instead, the search is for a determination of the utility of various techniques.[4]

The "educational goal" for the AESCD is to actually begin fulfilling Native educational needs. The above paragraph makes it plain that the AEBC thought of the AESCD as an experiment aimed at lessons-learning for future planning because the AEBC thought that the only educational goal that the AESCD could have was to find out how to best fulfill Native educational needs. Nowhere in the AEBC proposal was there serious consideration of the AESCD's actually fulfilling Native educational needs as a possible AESCD objective.

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[3] Ibid., p. 4.

[4] Ibid., p. 5, (emphasis added).

Let us now turn to the ADOE's February 1973 revision of the AEBC's December 1972 project design proposal. Apparently the ADOE was significantly influenced by Worldwide Education and Research Institute's investigation of the critical education needs in Alaska:

> While much such experience could no doubt be gained from dealing solely with available, pre-pared "packages" in teacher training, educational program or course offerings and management strategies, the Department feels the necessity of directing all experimental activity during ATS-F toward identified needs of Alaskan students.
>
> In January, 1973, Worldwide Enterprises, an education consultant firm under contract to the Alaska Department of Education, completed a statewide assessment of learning needs. In all, twelve critical educational needs were identified; the first four seemed to Alaska Department of Education planners and decision makers to be particularly applicable to utilization of the ATS-F experiment. These are:
>
> "(1) Youngsters need to learn basic communication skills,
> (2) Learners need to learn good health habits and accurate information about sex and drugs,
> (3) Learners need instruction which recognizes differences in individual learning styles and they also need more options in education than are now available to them, and
> (4) Learners need to be able to work with numbers at a functional (6th grade) level of proficiency or higher."
>
> ...ATS-F program strategies...must place major emphasis on the student himself...Therefore, it was determined that several objectives would be identified and prioitized in relation to each of the four needs, and that the experiment's time and resources would then focus on specific objectives for each of the critical needs.*

Specific programming in the ADOE design proposal included:

I. Early Childhood Development - Language
II. Basic English Oral Communications Skills
III. Intercultural Exchange
IV. Teacher Inservice Training
V. Interactive Health Education
VI. Computer-Assisted Instruction
VII. Viewer-Defined Programming

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*Alaska/ATS-F Health/Education Telecommunications Experiment, "Program Plan Revisions," February, 1973. Office of Telecommunications, Office of the Governor, State of Alaska.

The first three of these programs were ADOE additions to AEBC's list of delivered programs. The major AEBC item missing in the ADOE design was the development of a library information network.

The earlier AEBC AESCD project design proposal recommended using only pre-existing (packaged) programming. The ADOE project design proposal shows that ADOE made two assumptions:

1. that the needs of the Alaska Native student are significantly different from the average U.S. student's needs toward which most packaged educational materials are aimed, and
2. that the AESCD should be used to contribute to the fulfillment of those Native educational needs (we called this "the educational objective").

When combined, these two ADOE assumptions resulted in replacing AEBC's "packaged programming" policy with a commitment to devote much of the AESCD's programming resources to the origination of new programming.

It's reasonable to conclude that these two assumptions partially account for the AESCD design's stress on original programming. But it's equally obvious that the ADOE's two assumptions do not explain the AESCD design's stress on programming per se. The ADOE educational assumptions explain the sizable proportion of original programming within the AESCD programming budget. But why was the AESCD programming budget itself proportionately so large in the total AESCD budget? This is the more fundamental, but also the more problematic, question.

On the basis of the AEBC design proposal, it's fairly evident that the AEBC's objective was to experiment with the new service-delivery systems capable of being fabricated with the new technology; hence, the packaged programming. The AEBC budget was very large ($4.105 million vs. ADOE's $1.671 million). But this was due to the AEBC's desire to make the project

experimentally legitimate. In contrast, the ADOE's budget reflected its desire to make the project pedagogically legitimate.

Since the notion of "legitimacy" figures crucially in this historical analysis, a few words about it are in order. In the present context, legitimacy relates to both professional (non-governmental) standards of experimental/educational respectability and to those standards of acceptability in terms of which the Alaska designers believed the Federal government would appraise the AESCD project design. So both the professional scientific and the professional educational communities were implitiely appealed to as sources of guidance during the design development phase. For example, the AEBC stated that "Wherever possible, experiment planning will be directed toward incorporating means for performing evaluations according to scientific principles."[5]

The designers introduced non-political, non-governmental and sometimes academic criteria into their deliberations. They assumed that the Federal government accepted the same criteria and would measure overall AESCD project design acceptability in terms of those criteria.

Both the AEBC and the ADOE thought that a heavy emphasis on programming was necessitated by any effort to make the entire AESCD design legitimate as a whole (whether experimentally or pedagogically). Consequently, the legitimacy issues became focused on the programming. In retrospect, we may infer that the crucial issue to the designer became whether or not the programming was experimentally legitimate or pedagogically legitimate. But, for each designer, this issue may have become expressed more simply by a

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[5] Alaska/ATS-F Health/Education Telecommunications Experiment, "Program Plans," December, 1972. Office of Telecommunications, Office of the Governor, State of Alaska, p. 6.

question like "Is the programming legitimate?" Of course, answers to such a question were appraised against either a standard of experimental legitimacy or a standard of pedagogical legitimacy depending on which group was asking the qeustion. But the important thing to note is that design thinking probably moved from experimental legitimacy and pedagogical legitimacy to just programming legitimacy per se.

The issue of programming legitimacy was implitiely raised by the budgetary structure of the AEBC's earlier design proposal. Conversations with the various actors in Alaska and examinations of available correspondence indicate that the Federal government apparently never made it very clear to Alaska that programming legitimacy itself was not the central acceptability issue for the entire AESCD project design. The Federal government's lack of clarity on this score was taken as tacit sanction of programming legitimacy as THE paramount criterion of overall project-design acceptability.

The February, 1973, transferrence of project-design responsibility from AEBC-OTP to ADOE-OE was naturally accompained by a corresponding change in the thinking about this paramount criterion of overall project-design acceptability. That criterion was no longer believed to focus just on the pedagogical legitimacy of the programming because ADOE was already committed to the two educational assumptions noted above. Because of the influence of those assumptions, we can now see that the issue of AESCD design acceptability became finally largely focused on the pedagogical legitimacy of the original programming.

GOT's role in the project-design decision-making during this period is not clear. It's objective for the project was the development of an embryonic telecommunications system with a concentration on hardware deployment and management structure. GOT apparently did not feel that its responsibility

covered demand for, and utilization of, services by users. GOT felt it was primarily responsible for the actual delivery system and only secondarily responsible for possible delivery systems which future planners might want to appraise and rank, for the services delivered, and for the demand for and utilizations of those services. So GOT's policy-making really only paralled and supplemented the AEBC-ADOE flux of goal-setting.

The eventual concentration in NIE of ESCD responsibility in Washington was complemented by a shift in authority in Alaska to GOT. NIE may now feel that the actual funding level for the Alaska ESCD is insufficient for the attainment of either the planning goal (experimental legitimacy) or the educational goal (pedagogical legitimacy). Since these are the only two goals which can justify a concentration on programming, it is likely that the only justifiable objective of the AESCD is that of developing an operational embryo of Alaska's telecommunications system, GOT's primary objective.

Whatever else might be said, harmony between funding and goal-setting was not achieved until most of the project-design work had been completed. Why was it not achieved earlier? Any attempt to answer this question should consider these possibilities, (1) that Washington's contact with Alaska was often only with the GOT whose own priorities were sometimes different from those of her Alaska project designers, (2) that the Federal government neither investigated nor collaborated extensively with the actual work on the project design, and (3) that the Federal government did not publicly specify the exact amount of funding that would be available to the AESCD until the basic design work was completed. By the time funding-level clarity was achieved, the flexibility left in the design permitted only gross line-item excision.

In retrospect, it may now look as if the AESCD's present actual funding might have sufficed for fully developing GOT's envisioned embryonic operational telecommunications delivery system if the AESCD design had stressed operations development, and not the programming, from the beginning. The interesting question now is whether the final project design harmonizes enough with the present actual funding level to achieve either experimental legitimacy or pedagogical legitimacy or operations development legitimacy.

Future Research and Analysis

This completes the first cut at setting up the AESCD programming issues for future deliberations. The issues and the foregoing discussion could admittedly stand clearer and more detailed elaboration. But of much greater importance is the direction we should take in formulating and analyzing the relevant Federal policy issues.

Much will depend, of course, on the short-run outcomes of the AESCD still to be observed and recorded. Once these outcomes have been identified, attempts will be made to determine, as best we can, which outcomes have resulted from the actual evolution of the AESCD project-design discussed in this paper. Estimates will then be made of what would have happened if things had happened differently. What would have been the outcomes of:

1. early clarification of the exact amount of funds available for the project?
2. early and unchanging delegations of responsibility for project design decision-making?
3. early and clear enunciation of the goals for the project and unchanging guidance by those goals of subsequent decision-making?

Answering these questions will put us into a position to address the key

Federal policy issue:

> In the future, should Federal agencies use the demonstration mode of intervening (in behalf of technology applications to education) in the way that that mode was used in the AESCD; or should future demonstrations be regimented earlier and more systematically with respect to any or all of the three points mentioned in the preceding paragraph; or should the demonstration mode of intervention be avoided altogether in the future?

At stake are

1. whether the development of project designs should be allowed to unfold without intensive Federal direction, and
2. whether an all-embracing and systematic master-plan should be formulated and adopted at the outset on the Federal level.

The second of these is clearly a sub-case of Option 2. (page 4, Section III of this Report); both concern the desirability of early, visibly coherent, and systematic planning to which actors are committed over periods of various duration.

The above policy issue will guide our future research into AESCD programming policy-making. Further inquiry into the historical facts will be pursued only if prompted by requests or criticisms by our readers.