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ABSTRACT

The first of four volumes, this executive summary briefly discusses the educational situation in Alaska in terms of geography, climate, and ethnic groups; reviews the state's involvement in the National Institute of Education's Education Satellite Communication Demonstration; describes project management and introduction of the innovations; and reports on the three systems developed by the Educational Telecommunications for Alaska Project, which was undertaken in 1977 to provide support for schools throughout the state. The Administrative Communications Network, which provides administrative and instructional support among the state's 52 school districts, Regional Resource Centers, and the State Department of Education, is reviewed in terms of objectives, electronic mail box (EMS) operation, a user evaluation, and its current status. The objectives of the Alaska Knowledge Base System are outlined, and information is provided on its implementation, database content, and access to the database, as well as its current status. A description of the Individualized Study by Telecommunications (IST) system includes the objectives, the IST model, pre-operational evaluation of course effectiveness and student and teacher attitudes, and cost effectiveness. A brief glimpse of the future closes the report. (JL)

# EDUCATIONAL TELECOMMUNICATIONS FOR ALASKA



## VOLUME I

## EXECUTIVE SUMMARY

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*The foundation of every state is the education of its youth.*

*Dionysius*

# FOREWORD

It was with considerable excitement and some trepidation that the Department of Education undertook the Educational Telecommunications for Alaska Project in 1977. The Project was viewed with excitement since technology appeared to offer great potential for solving some very difficult problems facing public education in the State. It was viewed with some anxiety because the solutions posed involved complicated and relatively untried technologies which presented educators with strategies that were in part unfamiliar and mysterious.

No other state education agencies were investing such a large amount of funding in what some regarded as a very risky venture in modern technology. However, the State took the position that the Project offered possible solutions to educational problems where no alternative solutions were known to exist. It was regarded as a capital investment that could pay large dividends for years to come. The systems developed by the Project were to be thoroughly evaluated. Only those that were judged to be successful and to hold long-term potential for improving education in the State were to be maintained beyond the term of the Project.

In retrospect it is interesting that there was such a high degree of caution at the onset of the Project. The systems developed by the Project are now an integral part of the educational delivery system in the State. They are used by a wide variety of educators -- State and local administrators, teachers, local support staffs, and, most importantly, students in many, many communities.

The Project was designed to address three basic needs. These were as follows:

- The need for faster, more efficient communication in support of the administration of schools in the State.
- The need for quick access to information about educational resources.
- The need for instructional support for rural high school students.

Three systems were designed to address these needs:

- An administrative communication network (electronic mail system) that interconnects the Department of Education with the 52 local school districts and other educational agencies in the State.
- A computerized "Alaska Knowledge Base" containing information about a variety of educational resources and accessible via the electronic mail system.
- A microcomputer-based method for providing instruction to rural high school students and a set of core courses for ninth and tenth graders.

Today much of the time-critical written communication associated with the statewide administration and support of local school districts is transmitted via the Administrative Communications Network. Teachers and administrators regularly consult the Alaska Knowledge Base to locate educational resources to apply to problems they encounter. Virtually all school districts in the State utilize microcomputers for a portion of their instructional program and students in small rural high schools have available to them a variety of high school courses because of the project.

The Project has had a major impact on the nature of education in the State. In fact, largely through the impetus provided by the Educational Telecommunications for Alaska Project, Alaska is regarded as a leading state in the application of educational technology. The Department is very pleased to have received the support provided by the National Institute of Education and the State of Alaska. We anticipate continued work in educational technology in the years to come.

Successful institutionalization of the Educational Telecommunications for Alaska Project is documented in a set of four final reports, one covering each of the three educational systems and an Executive Summary. This volume contains one of those reports.

In fulfillment of its commitment to the National Institute of Education, this set of documents is submitted in the sincere hope that the reports will also provide insights and information useful to others in their efforts to improve the quality of public education in the future.

MARSHALL LIND
Commissioner
Alaska Department of Education

# ACKNOWLEDGEMENTS

The Educational Telecommunications for Alaska (ETA) Project has affected a number of significant changes in educational administration and instruction in Alaska. These changes represent improvements in the quality of public education in the State. The Project involved highly complex applications of modern technology to identified educational needs. However, the complexity of coordinating the efforts of many individuals and groups was by far the most difficult problem addressed by the Project. The success of this Project was due, therefore, to the contributions and willingness to cooperate on the part of a large number of persons.

Throughout the term of the Project the support of the State Board of Education, the Governor's Office, the Alaska Legislature, and the National Institute of Education has been paramount. Without this support and the endorsement of the Commissioner of Education, Marshall Lind, the Project would not have been possible.

The design of the Project was developed in 1976-1977 by a team of individuals led by Ernest Polley, then Coordinator of Planning and Research for the Department of Education. Polley's continued support during the term of this Project was essential.

The Educational Telecommunications for Alaska Project was managed by a core staff of Alaska Department of Education personnel. The staff were located first in the office of Planning and Research and later in a new Office of Educational Technology and Telecommunications which came into being largely as an outcome of the Project. The ETA Project director in DOE was William Bramble who in July, 1981, became director of the Office of Educational Technology and Telecommunications. Ed Obie served as assistant Project director until July, 1981, when he was appointed Project director for the remainder of the Project term. Professional staff at DOE assigned to the ETA Project included Paul Berg, Rosemary Hagevig, and Bee Tindell. Other individuals in DOE who contributed to the overall success of various components of the Project included Alexander Hazelton, Eula Ruby, Sandra Berry, and Dan Boone.

Assistance in the development of the Project design was provided by the Northwest Regional Educational Laboratory (NWREL). Upon approval of the initial grant award from NIE in September, 1977, and, with the commitment of NIE and the Alaska Legislature to support the multi-year effort, NWREL became the Design and Implementation Contractor for the Project. NWREL designed, developed, and pilot-tested the major technological systems included in the Project. In addition, NWREL produced the computer-based courseware for rural high schools. The overall NWREL effort was administered by Tom Olson and, later, Ethel Simon-McWilliams. NWREL staff who contributed to basic systems design and development included Judy Edwards, Hal Wilson, Stuart Brown, and Ralph Van Dusseldorp. Ann Murphy, Kathy Busick, Craig Copley and many others from NWREL contributed to the development of computer-based courseware.

Key support for the installation of the data communications network was provided by two other State agencies. The Division of Data Processing, Department of Administration, provided for the procurement, installation, and operation of data processing elements required for the Electronic Mail System and educational data bases developed by the Project. The contributions of David Riccio and Stan Hamlin were critical in this regard. The data

communications network established for this system was implemented by the Division of Communications, Department of Transportation and Public Facilities, with considerable input from Walt Pierce of that agency.

Two intermediate education agencies performed important functions related to pilot testing and implementing the systems developed by the Project. These were the South East Regional Resource Center in Juneau and the South Central Regional Resource Center in Anchorage. The contributions of Alan Barnes, Luanne Packer, Linnel McCrumb, and Jane Harrington were especially noteworthy.

Other individuals or agencies contracting to DOE or related State agencies made substantial contributions to the success of the Project. Transalaska Data Systems installed and maintained microcomputers at sixty locations in the State. Karen Parr developed instructional materials and provided training for the computer-based education courses developed by the Project. Glenn Cowan and Janelle Cowan contributed additional training and support for these courses. Computer programming support was provided to the Department by Mike Noel and Charles Dockery. The evaluation of the computer-based instruction courses was conducted by Education Skills Development of Lexington, Kentucky, with contributions from Emanuel Mason, Timothy Smith, and Frank Gohs.

Extremely important to the success of the systems and the particular products developed by the Project were the many contributions of administrators, teachers, and other staff of local school districts in Alaska. These individuals served to keep the Project on track in design and development through participation on numerous design and advisory teams that existed during all phases of the Project. Additional individuals too numerous to include assisted with pilot testing and implementation of the Project components. By the conclusion of the Project every one of the 52 school districts in Alaska had participated. Noteworthy too was the involvement of several hundred students in Alaska schools who participated in pilot tests of instructional materials. Students in public schools, of course, are the ultimate beneficiaries of the Project. It is fitting, therefore, that the participation of these students should result in educational gains for all the children of Alaska for years to come.

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# PROLOGUE

The Educational Telecommunications for Alaska (ETA) Project represents a relatively rare phenomenon. A technologically supported innovation on a grand scale, introduced and accepted in fewer than five years, it promises to transform the way education is provided in rural and, to some lesser extent, urban Alaska. Perhaps it was an idea whose time had come – although, when first conceived, there were few indications to that effect. Rather, it is believed that the thorough and exhaustive planning that continued throughout the Project's life as well as the fact that management was not afraid to make drastic changes when the situation demanded, were major factors in its success. That planning included as much detailed attention to ways to overcome resistance to change that accompanies innovation requiring behavioral modification as to the implementation design of the Project itself.

Each of the ETA components: Administrative Communications Network, Alaska Knowledge Base System, and Individualized Study by Telecommunications, has been documented in its own volume and is presented in historical fashion. Each tells a complete story from conception to institutionalization thus enabling the reader to understand the context within which decisions were made and changes implemented. In this way, it is hoped that the reader will be able to relate the lessons learned to his/her own situation.

It is the desire of the Project sponsors, National Institute of Education (NIE) and Alaska Department of Education (DOE), that these volumes be useful guides to others in their effort to introduce change. Thus, within each volume, special care has been taken to direct the reader's attention to the lessons learned from the numerous formative evaluations conducted. In most cases, these lessons have been generalized to show their applicability to others.

# THE DAWN OF A NEW ERA

A school superintendent in Adak, an island 650 miles west of the tip of the Alaskan peninsula, receives a message at a microcomputer that an important workshop will be held in Anchorage on teaching learning skills to hard-of-hearing primary school children. By the end of the day, the superintendent has made arrangements for travel and notified the workshop sponsor, by a computer message, that two teachers will attend. Had the notice about the workshop been sent by mail, it would probably have arrived after the workshop was over.

In an Alaskan Indian village on the Yukon River, a committee of parents and teachers has been working on improving curriculum. It has identified social studies in Grades 4-6 as a problem area because conventional texts and materials have little relevance to village children. Resources are needed, but the Department of Education in Juneau is 950 miles away.

A trained operator in the school office places a phone call and "searches" the information stored in the computer in Juneau. Abstracts appear on the screen; those that look promising are recorded on the attached printer. One describes a recent text series; three describe audio-visual materials made by other Alaskan teachers; another outlines a successful innovative program on the subject at another rural Alaskan village school – its staff will travel to share their experiences. Using these abstracts, the parent-teacher committee gets the help it needs.

In an Eskimo village 200 miles above the Arctic Circle, two teachers supervise the education of 23 elementary and five high school students. The temperature outside is -32° F. The twilight of a January midday is a reminder that the sun won't rise for another three weeks. Winter storms have prevented the mail plane from landing for 12 days. There is no way in or out of the village.

In the classroom, the lone high school teacher gives a lesson in consumer mathematics to four of the students; the fifth sits at a microcomputer and reads the question presented on the screen. Having just read the text on the subject and listened to a dramatic dialogue on audio cassette tapes, the student presses a "C" on the keyboard and is rewarded with a "CORRECT" on the screen.

These are only three of many examples of what the Educational Telecommunications for Alaska Project has meant to administrators, school staff, concerned parents, and students in rural Alaska. Born of the pressing need to provide quality education to all students, regardless of location or size of community, the ETA model promises a new way to educate students in Alaska.

# THE ALASKAN CONTEXT

To understand the need for the ETA Project and the way it evolved, requires an appreciation for the Alaskan environment. Like most aspects of life in Alaska, the educational system is driven by conditions imposed by the very vastness of the State and the inhospitable climate that prevails during much of the year.

Alaska is the largest state, yet contains the smallest total population with more than 280 communities widely scattered over 586,412 square miles. Sixty percent of the inhabitants live in or near the three cities of Anchorage, Fairbanks, and Juneau, that are in boroughs containing 2 percent of the State's total land. The remaining 40 percent of the residents represent a population density ratio of one person per four square miles.

About one-sixth of the inhabitants are Eskimo, Indian, or Aleut. The major cultural groups are Inupiat Eskimo, Yupik Eskimo, Aleuts, and Athapaskan, Tlingit, Haida, and Tsimshian Indians. Alaska has six major languages, other than English, with more than 50 significantly different dialects.

Forty percent of all Alaskans, and 60 percent of all schools are located in communities of fewer than 1,000 people. Isolation is often a fact of life, frequently by choice. The major contributing factors to isolation are geography, weather (one-third of the State is north of the Arctic Circle), and distance between communities.

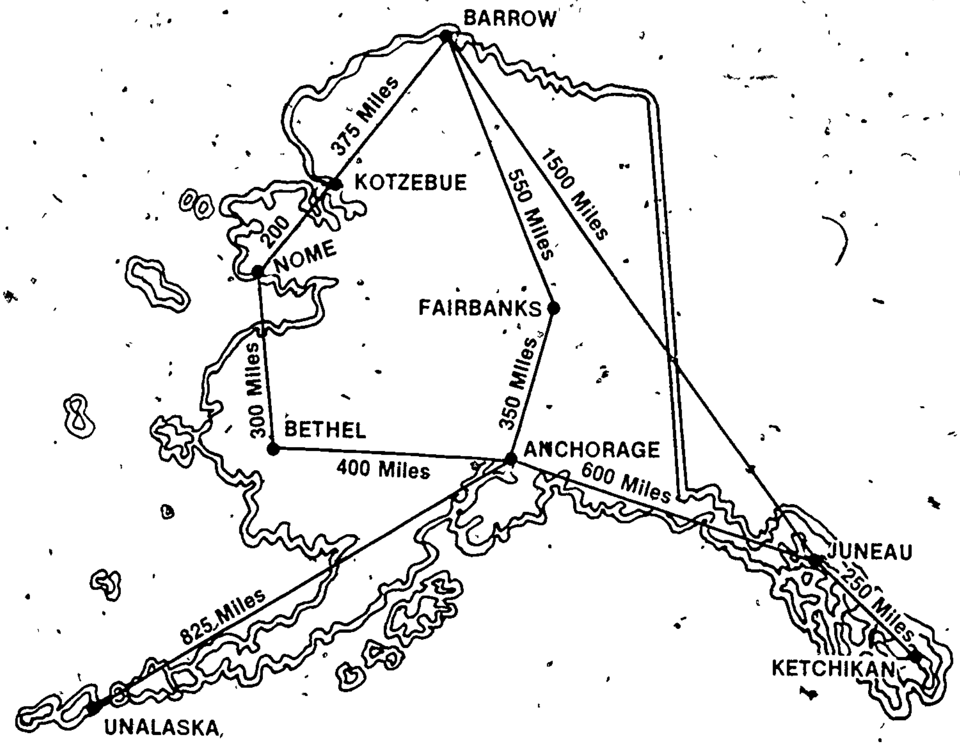
The rugged topography creates a diversity of climates. In the north, fierce, long winters have nights 24 hours long. The 2,000 mile Aleutian chain is wet, foggy, cold, and frequently windy, year-round. Temperatures in the Interior Region can vary from -50° F. in winter to +90°F. in summer. Southeast, the most temperate region, can have more than 100 inches of precipitation a year in some areas. The extremes of weather limit activities and contribute to Alaska's high alcoholism rate and in other ways, adversely impact daily life.

Distances in Alaska are vast (Figure I-1). From its west to east coasts, the State stretches the distance from California to Florida and the northernmost community, Point Barrow, is 1,500 miles from the southernmost city, Ketchikan. These great distances contribute substantially to a sense ~~of~~ isolation and remoteness.

The environment also makes employment in many industries highly seasonal. Many isolated, rural areas with depressed incomes still rely to a substantial extent on subsistence hunting and fishing. Students of families that depend on a subsistence style of living may be out of the classroom for weeks at a time to help either by hunting and fishing or by working to earn money sorely needed for survival.

Figure I - 1

DISTANCES BETWEEN SELECT CITIES




Power, fuel, and other goods and services are very costly because of the limited market and transportation costs. In 1970, Alaska had one mile of road per 52,212 acres of land as compared to Arizona (one mile per 2,203 acres) which contains the next smallest ratio in the nation.

Alaska may well have more communities and schools that are not on any road system than the rest of the country combined. More than 150 rural schools are not on any connecting road system at all. Even those that are on connecting roads often find these arterial roads impassable in the winter.

Weather is a major cause of unreliable bush mail service; if the river is freezing, or a storm hits, the mail plane cannot land. It has not been uncommon for a rural administrator to receive a request for information requiring a response two days after the response was due – and three weeks after the request was mailed.

Telephone communications, before commercial satellites, were carried by a potpourri of systems put together by RCA Alascom, Alaska's commercial long-lines carrier. In 1973, the first interim satellite links were installed on the Canadian satellite, Anik II, transferred to Western Union's Westar II two years later, and finally to the RCA Satcom in 1976. There still remain many small communities that rely on radio telephone circuits.

# ALASKA'S INVOLVEMENT WITH EDUCATIONAL SATELLITE COMMUNICATIONS

## EDUCATIONAL DECENTRALIZATION

Until June, 1975, there were city and borough school districts governed by locally elected school boards; schools outside organized city or borough boundaries were operated by the Alaska State-Operated School System (ASOSS); and a number of village schools were operated by the Bureau of Indian Affairs (BIA). In June, 1975, the Alaska Legislature decentralized the ASOSS and placed governance of rural schools in the hands of regionally elected boards, thus creating 21 new Regional Educational Attendance Areas (REAA).

In May, 1976, the State Board of Education adopted new regulations requiring districts to provide an elementary school in each community which had eight or more children available to attend. Further, the regulations required a high school in each community to serve even one student, unless the school committee declined. The change to greater local control and greatly expanded educational opportunities increased the demand for Department of Education services.

## EDUCATIONAL SATELLITE EXPERIENCE

Just three years after the first commercial satellite went into service, Alaska's planners recognized the potential of communication satellites to help meet some of the State's pressing social needs. In 1968, a Satellite Task Force was established to determine the total requirement for communication services existing and projected. This led to a proposal to the National Aeronautics and Space Administration (NASA) to test applications of one-way and two-way audio via the ATS-1 satellite.

The first satellite experiments for education were begun in mid-1971 and over the next two years, more than 25 villages with no existing telephone or television service became involved in the interactive project. Programming was varied, including health aide training; Native legends; administration, teacher, and classroom exchanges; and direct village contact with library services. In 1972, "A Proposal to Develop a Plan for Alaska's Unique and Innovative Education Demonstration Employing ATS-F" (in orbit, this was re-designated the ATS-6) was submitted to the U.S. Department of Health, Education and

Welfare (DHEW). This was of particular interest because not only was the ATS-F capable of relaying audio/data to inexpensive earth stations, but television as well. This proposal was funded as part of NIE's Education Satellite Communication Demonstration (ESCD).

When ATS-F was launched in 1974, the educational experiments had been fleshed out by the DOE and had as its primary objectives: (1) establishing two-way communication between participating educators that approximated face-to-face communications; and (2) gaining "hands-on" experience with live video/audio communications for planning and decision-making at a variety of administrative/school staff levels.

The $1.7 million project resulted in 100 hours of original television including: (1) instructional programming for 1,200 K-5th Grade rural school children and 150 rural educators, as well as the thousands of students in Fairbanks; and (2) programming covering current topics of interest for the general population which reached some 9,000 residents. The momentum generated by the ATS-6 demonstration convinced Alaskan educators to make an in-depth assessment of an operational telecommunications-suported system to meet their identified needs. Planning grants from NIE and the Alaska Legislature led to the development of a proposal to NIE which was to result in an operational, user-supported system using satellite and other technologies. The resulting proposal was entitled, "Educational Telecommunications for Alaska," (ETA).

# EDUCATIONAL TELECOMMUNICATIONS FOR ALASKA OVERVIEW

The mandate to which the Project responded was, in very broad terms, to apply technology to meet the most pressing needs of education as identified by the detailed assessment conducted by the DOE. Analysis of those needs showed there existed an interlocking chain extending from the administrative level of rural school districts through to the student level. In essence, for the technology to be most effective, each link -- administrators, school staffs, and students -- required assistance. Lack of support at any higher echelon of the educational hierarchy would weaken the effectiveness of the technology's ability to provide the quality educational experience which the students had the right to expect. Administrators required the ability to input and receive timely information in order to interact effectively with Federal and State agencies on behalf of the schools and communities of which the schools were such a vital part. Teachers sorely needed access to ideas, knowledgeable colleagues, and information in order to construct the best curriculum limited resources could provide. Students deserved access to a full, quality curriculum in order to grow and compete effectively in a rapidly changing technological world. Thus, the Project chose to pursue three distinct yet supportive objectives, each aimed at bolstering a key element of the educational structure:

- to provide an administrative and instructional support communications network among the State's 52 school districts, Regional Resource Centers, and the Alaska State Department of Education (the Administrative Communications Network);
- to provide Alaskan teachers and administrators rapid access to repositories of information about a variety of instructional materials, research documents, and human resources for administrative decision-making and curriculum development (the Alaska Knowledge Base System ); and
- to design and demonstrate comprehensive telecommunications-mediated instructional courses for small rural secondary schools in Alaska (the Individualized Study by Telecommunications).

# PROJECT MANAGEMENT

The management structure required was one which would permit carrying on essentially three projects simultaneously. Although mutually supportive, the three components required a variety of expertise, many of which were not duplicated across components. Thus, the Project Office was organized around a small cadre of skilled professionals knowledgeable in the requisite fields and known to the educational community. The vast majority of detailed work was carried out by contractors operating under very tightly defined performance objectives.

From the very beginning, policy, utilization, and implementation decisions were separated from technical decisions in order to ensure a "user-driven" project. The former responsibilities were vested in the user agencies, the State Board of Education, DOE, and the 52 school districts. The latter responsibility (technical decisions) resided with Project management and its contractors; a Design and Implementation (D & I) Contractor and the Regional Resource Centers (RRCs). In actuality, as the Project progressed, the role of the RRCs diminished as many services were contracted out to commercial sources. The responsibilities of the major participants are shown as follows:

- *State Board of Education*
  - ensure that Project policies and procedures were consistent with statewide policies;
  - approve scope of work plans.
- *DOE*
  - plan and monitor Project activities;
  - ensure contractor performance;
  - ensure component utilization and implementation;
  - evaluate project performance;
  - perform agency and legislative coordination and liaison.
- *User Advisory Committees*
  - review all ETA component designs;
  - participate in course selection;
  - participate in developmental specifications and provide input into the revision process of all ETA components.

- *Local School Districts*
  - assist in the review and development of products;
  - participate in field tests;
  - assist in revision of components;
  - assist in determining the roles of the RRCs;
  - provide evaluation data.
- *Design and Implementation Contractor*
  - design, collect, and analyze data for evaluation;
  - provide assistance (technical and content) to all participating school districts.
- *Other Support Contractors*
  - perform evaluations;
  - provide training;
  - provide course development and materials distribution.
- *Other Supporting State Agencies*
  - define and develop the communications network;
  - define and develop the State's computer capability in support of the ETA components;
  - purchase and operate the data communication system;
  - purchase and operate the necessary computer support equipment.

# INTRODUCTION OF THE INNOVATIONS

Introduction of a single innovation is risky; introduction of three, simultaneously, constituted a large gamble on the part of the DOE, but one with potentially equally large rewards. If the Project succeeded, rural students of Alaska would some day receive the same rich curriculum of courses their urban counterparts received. Both the DOE and the sponsoring Federal agency, the National Institute of Education, felt the reward warranted the risk. In 1977, a Memorandum of Agreement was signed, both parties pledging financial support for four-and-one-half years. Over that period, the Project was to prove itself sufficiently attractive so that the users would request continuance and provide financial support, or the Project would die.

The blueprint laid out to achieve acceptance of the Project incorporated detailed planning of the introduction, implementation, and institutionalization of the operative components. Recognizing that the ETA concept required change in established ways of doing business, great care was taken in the method and sequence of introducing the three components. The Administrative Communications Network was implemented first. The rationale was that this component supported the other two, but equally if not more important, it gave superintendents and school administrators the opportunity to work with and "feel" the advantages the technology could bring. This, it was hoped, would gain their support and assistance as the technology was introduced to the school staffs and to the students. The Alaska Knowledge Base System, a resource identification and retrieval system primarily to support school personnel, was introduced next. The phasing was such that teachers and others would have gained hands-on experience and realized the benefits that access to such external data bases promised before the Individualized Study by Telecommunications model was brought into the classroom. Introduction of this third and last phase, IST, was the most crucial because it demanded greater behavioral changes than either of the other two. The success of this strategy is attested to by the fact that, by the end of the Calendar Year 1981, both the Administrative Communications Network and the Alaska Knowledge Base System were operating independent of ETA support and the IST was well on its way.

Planning alone, however, was not the answer to the successful institutionalization of the ETA components. It was a very important step, but only one of many. Over the four-and-one-half years of the Project's existence, a scheduled set of activities was religiously followed, aimed at, first, raising awareness; second, making all participants and concerned parties comfortable with the technology and knowledgeable about its potential; and, third, providing continuous support during the actual introduction of the technology to the users. The institutionalization program consisted of:

- briefings and updates for the State Administration, State Legislature, educators at all levels, students, community governments, parents, and other interested parties;
- presentations before educational conferences throughout the State;
- distribution of newsletters and other materials explaining the aims of the ETA Project and its components;
- use of the Electronic Mail System (EMS) to keep all participants current on status and upcoming activities;
- workshops on-site and at central locations with hands-on experience for administrators as well as directly involved personnel; i.e., teachers and EMS operators;
- follow-up workshops for refresher training;
- on-site visits immediately following equipment delivery to assist in set-up and initial operation;
- numerous formative evaluations to identify n[illegible]ary changes to the fielded components;

- periodic conferences involving the teachers, EMS operators, experts, and ETA personnel to discuss field experiences and make decisions on any corrective actions to be taken;
- making everyone aware, from the very beginning, that funding and management of the ETA components would be phased over to the users and State operating agencies over the life of the Project;
- involving local representatives and educators in the selection, design, development, and introduction into the field of the technology and courseware;
- listing the names of reviewing panels with all courseware introduced;
- encouraging administrators and school staffs to use the microcomputers for management of local affairs, e.g., school financial matters, student tracking for special programs, etc.

The last two items listed are extremely important in gaining acceptance; unfortunately, they are usually not even considered in the institutionalization process. The last item has the additional advantage of spreading the cost of the equipment over multiple purposes, thus making the educational use even more cost-effective.

The remaining sections provide brief descriptions of the ETA components, their objectives, operation, and the users' evaluation of their usefulness.

# THE ADMINISTRATIVE COMMUNICATIONS NETWORK (VOLUME II)

## OBJECTIVE

In the DOE-conducted needs survey, superintendents and principals expressed, among others, a strong requirement for:

- consultation on programs;
- management assistance;
- assessment of educational statutes;
- coordination of services;
- current knowledge of whom to contact for services.

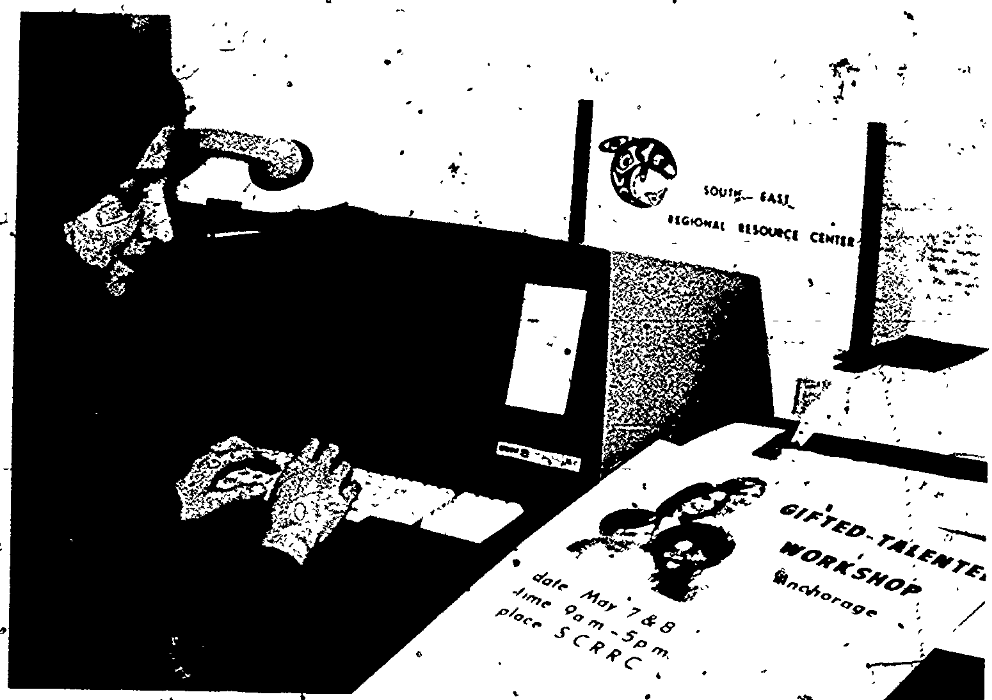
All could be summed up as the necessity for timely and accurate information exchange between and among all levels of the educational structure. Thus, the following objective was established for the Administrative Communications Network:

> "A model administrative network among and between DOE, school district offices, RRCs, and some local schools supported by telecommunications provides more efficient management by permitting timely input and greater communication and field participation."

Implementation of this objective took the form of an Electronic Mail System (EMS). During the course of the Project, the Administrative Communications Network was extended to include other selected educational agencies.

## EMS OPERATION

The EMS is the electronic equivalent of the Postal Service. The major components are still the message originator, receiver, delivery system, and mailbox – only the implementation is different. The originator composes the message but it is written on the microcomputer screen (CRT) rather than on paper. Delivery is to the recipient's "mailbox" via electronic communications rather than physically transported. Transit time is measured in fractions of a second rather than days, or even weeks, as is the case of small, isolated villages. The mailbox is a portion of computer memory, housed in the host computer, located in Juneau, that is dedicated to that recipient. Mail is protected from unauthorized view by assigning a unique identification word and number known only to the individual. To retrieve mail, the recipient calls up the host computer, identifies himself/herself, and is given access to the mailbox. Mail may be withdrawn and displayed immediately on the CRT or it can be stored on a magnetic device (diskette or disk) for viewing at a more convenient time. The messages can be printed out on an associated printer if hard copy is desired. The EMS has the advantage of providing a copy (equivalent of a letter) but delivered at the speed of a telephone call. It has the further advantage of correcting mistakes in a message electronically rather than by having to redo a written page. Also, the same message can be sent to any number of recipients without having to write or type individual letters.




The user has been given two options for accessing his/her mailbox. He/she may choose to dial the host computer and compose and transmit the message(s) during the phone call (on-line); or the message(s) may be composed and stored before calling up the host (off-line). The latter is advantageous in that communication cost to the user can be considerably less than in the on-line mode since connection lasts only long enough to transmit the message(s). The host then processes the messages at a time most convenient to it, placing them in appropriate mailboxes for retrieval at some future time.

## USER EVALUATION

Evolution of the EMS to its final form took about three-and-one-half years. During that time, numerous changes were instituted in response to the users' evaluation of performance and usefulness to them. The following is a summary of some of the important findings relative to user satisfaction or dissatisfaction with the EMS:

- The June, 1980, evaluation report showed that 65 percent of all users reported using the EMS within the last week (prior to the evaluation), 44 percent within the last 24 hours. The data in Table I-1 reflect the variety of users employing the system at that time.

Table I - 1

PERCENT OF MESSAGES BY VARIOUS USERS REPORTED BY NODES FOR A TYPICAL WEEK.

| USER | ANCHORAGE | FAR NORTH | JUNEAU | KETCHIKAN | ACROSS ALL NODES |
|---|---|---|---|---|---|
| Superintendent | 28 | 12 | 27 | 36 | 27 |
| Asst. Supt. | 2 | 10 | 2 | 7 | 4 |
| Principal | 2 | 10 | 2 | 7 | 4 |
| Program Director | 21 | 43 | 15 | 24 | 23 |
| Spec. Ed. Director | — | — | — | 18 | 2 |
| Counselor | 3 | 2 | 1 | — | 2 |
| Teacher | 1 | 4 | 10 | 9 | 5 |
| Business/ Personnel Director | 4 | 18 | — | — | 4 |
| Professional Staff | 6 | 2 | 34 | — | 13 |
| RRC Director | 9 | — | — | — | 4 |
| Secretary | 16 | — | 8 | — | 10 |
| Supply Clerk | 6 | — | — | — | 3 |

- School sites stated (June, 1980, evaluation) that requests for information and response to such requests comprised approximately 35 percent of the messages, and communications with the DOE, 15 percent. The remainder consisted principally of general information, memoranda, and meeting notices.

- Sixty-seven percent of user agencies rated EMS 5 or higher on a scale of 7; 89 percent rated it average (4) or above in the June, 1980, evaluation.

- As an indicator of the value of the EMS to users, the December, 1981, Survey showed that node sites (those sites located near access nodes, i.e., special cities where messages are accumulated and sent to the host computer via high quality communication circuits) had been using EMS on the average of 27 months. At the same time, the average non-node site (sites with local telephone circuits, usually of poorer quality) use was 39 months. Specifically, the June, 1980, evaluation found that almost half of the responding school districts viewed EMS of value primarily because of its efficiency, speed of communications, and enhancement of communications between districts.

- According to the June, 1980, evaluation, EMS features liked least were the perceived lack of privacy, down-time, and inability to send messages directly to the school level.
- In the June, 1980, evaluation report, 62 percent of originators from node sites and 65 percent from non-node sites felt they were more in touch with other parts of the State than before EMS. Table I-2 shows how both originators and operators felt. By December, 1981, however, the percentages had risen to 91 percent and 95 percent respectively.

Table I - 2

**Do you feel more in touch with the other parts of the state now than before the EMS? (Orginator Questionnaire)**

**Do you think the people in your district who know about EMS feel more in touch with other parts of the state as a result of having EMS? (Operator Questionnaire)**

| | ORGINATOR (N = 13) Node | (N = 23) Non-Node | OPERATOR (N = 6) Node | (N = 20) Non-Node |
|---|---|---|---|---|
| Yes | 62% | 65% | 50% | 65% |
| No | 8% | 9% | 17% | 5% |
| Don't Know | | | 33% | 5% |
| Too Early to Tell | 30% | 26% | | |

- Originators of messages (June, 1980, evaluation) estimated that an average of 35 percent of their routine business communications could be handled by the EMS.
- The mean percentage of phone calls replaced by the EMS for the reporting school district sites was 17 percent; the mean percentage of letters was 14 percent (June, 1980, evaluation). The December, 1981, Survey showed that EMS carried 19

percent of the nodal site traffic between districts and DOE and approximately 14 percent for non-nodal sites.

- Most sites stated that the EMS was less costly than phone and quicker than mail. However, 17 percent of non-node sites indicated that the EMS was faster than both mail and phone (June, 1980 evaluation).
- Eighty-five percent of originators from node sites and 74 percent from non-node sites indicated that the ability to communicate or receive communications more promptly through the EMS was advantageous in day-to-day operations (June, 1980, evaluation). The December, 1981, Survey showed a significant increase to 95 percent from node sites and 93 percent from non-node sites.
- Forty-four percent of all originators and 50 percent of ~~the~~ operators (those persons who actually worked the EMS microcomputers) from node sites and 35 percent from non-node sites stated, (during the June, 1980 evaluation) that they received more information of value than previously. However, 42 percent of all originators and 40 percent of the operators at non-node sites felt there was also more unimportant information being transmitted.
- By December, 1981, 45 percent of the responders from node sites stated that the EMS equipment was being used for purposes other than to send and receive messages. Non-node use of EMS equipment for non-routine purposes was 69 percent. This flexibility has been greatly encouraged by the DOE.

## STATUS UPDATE

By mid-1981, approximately 100 messages per day were being sent and received. One administrator, learning of a proposed law via an EMS message from the DOE, sent back testimony by EMS to be given to the Legislative committee the next day. The district office of a remote scattering of schools arranged for nine teen-age Eskimo students to travel to Anchorage for a two-week experience living in city students' homes and working at jobs in which they were interested as careers.

In July, 1981, the ETA Project officially turned over the Administrative Communications Network to the users and operating agencies. The management and funding responsibilities were assumed as follows:

- *EMS Users*
  - acquisition of the terminal equipment through a transfer of title from the State; all new users would purchase equipment directly from vendors;

- equipment maintenance and acquisition of new software;
- until July, 1982, training remains the responsibility of the DOE with the hiring of personnel and their travel to off-site locations assumed by the users; after July, 1982, users assume responsibility for all training-associated costs;
- communications costs to nodal cities.

- *Division of Communications, Department of Transportation and Public Facilities* (Transferred to the Department of Administration in July, 1981.)
  - acquisition, rate negotiation, and maintenance of networks used for the EMS;
  - communications equipment specifications and performance;
  - proper interface with all terminal equipments and the host computer.
- *Division of Data Processing, Department of Administration*
  - management and maintenance of the host computer;
  - recommendations for software changes and additions.
- *Information System Data. Processing Unit, Division of Management, Law and Finance*
  - management and funding of contracts with the Divisions of Communication and Data Processing;
  - development of and installation of additional software applications;
  - management of the PDP 11/70 host computer in Juneau;

- Postmaster role to assist users, keep them informed of status of the EMS (e.g., down for repairs on specific dates, new users recently joining the Network), statistics, and other housekeeping functions;
- EMS revisions, file maintenance, mailbox assignments, and usage policies;
- upgrading of user terminal equipments to state-of-the-art levels.

- *Office of Planning and Research, DOE* – development of new software for local site and Network use.

Thus, by establishing "institutionalization" as a key objective from the very outset, the transition was accomplished in three-and-one-half years. Teachers and administrators in rural and remote communities are no longer isolated from their colleagues, are no longer left out of the planning/fiscal cycles, are no longer in the dark about what is being done by the Legislature or the DOE in Juneau that can impact their way of doing business – and most importantly, they feel their voices are being heard.

# THE ALASKA KNOWLEDGE BASE SYSTEM (VOLUME III)

## OBJECTIVE

The 1976 DOE Planning and Evaluation Survey recommended that, "emphasis be placed on a coordinated plan to disseminate information, Promising Practices, and talent bank." To satisfy this mandate, Project A-TIP (Alaska Talent Information and Promising Practices) was established with funds granted by NIE. Through this project, educators gained access to resources within Alaska and the lower 48 states.

In May, 1976, the State Board of Education adopted new regulations that required the school districts to provide an elementary school in each community which had eight or more children available to attend and, unless the school committee requested otherwise, to establish a secondary school in every community with one or more available secondary students. This, coupled with the creation of 21 new school districts, placed tremendous new demands on DOE for support services. In response, the DOE expanded on the concept of A-TIP and included all known resources under a program called Systematic Planning Around Needs (SPAN). SPAN gathered and organized all data about human and information resources that could be requested and then made available via the U.S. Postal Service.

However, for educators in many rural areas, this could be a slow and frustrating experience. The process could consume weeks, at which time the need for the information might have already passed. Thus, providing school staff access to the information residing in the SPAN data base became a priority aim of the Project. Specifically, the objective of this component became:

> "Using the telecommunications system (EMS), teachers and administrators have rapid access to repositories of information about a wide variety of instructional and research documentation and related materials for administrative decision-making and curriculum improvement."

# ALASKA KNOWLEDGE BASE SYSTEM IMPLEMENTATION

The System consists of two distinct parts; the Alaska Knowledge Base data files and the communications network that links the users to the data base. In its present form, the Knowledge Base is housed in a computer in Juneau that is accessed primarily via the EMS. Users may choose to request information by phone or the U.S. Postal Service if desired.

The Knowledge Base existed, prior to the ETA Project, as written files contained on cards. The Project worked to help computerize those files and make them accessible from EMS microcomputers located in the school district offices.

## THE ALASKA KNOWLEDGE BASE CONTENT

The Knowledge Base contains seven files:

- *Client Profiles* – contains information about each of the Alaskan school districts and efforts taken to meet their recognized educational needs.
- *Promising Practices* – contains information about validated model programs developed and in use in-State. Validation is obtained only after a comprehensive review by State educators. Persons whose programs are accepted as Promising Practices must be available to assist others in installing those Practices at other sites.
- *Nationally Validated Programs* – contains exemplary programs from inside or outside the State that have been shown to be appropriate for adaptation in Alaska.
- *Talent Bank* – a listing of in-State instructors and administrators with special expertise who are available to assist other schools in their skill areas.
- *Service Agencies* – agencies with areas of specialization available to provide on-site consultation and other technical assistance.
- *Alaska-Developed Materials* – abstracts of Alaska-Developed Materials especially created to meet Alaskan educational needs.

- *Commercial Resources* – bibliographic data about commercial resources that may be called upon to help educators.

## ACCESSING THE DATA BASE

Because the EMS micros are used to access the Knowledge Base, searches enter the system through an EMS operator/linker. These operators have been trained in search techniques, thus minimizing the amount of detail the user must provide to receive a satisfactory response from the computer. As a minimum, however, the following information is necessary:

- area of interest (narrowed as much as possible to limit the information to the specific subject of interest);
- the person/organization who will be using the information and the purpose;
- the specific type of information desired;
- a list of sources the requester has already obtained;
- other specific information useful in narrowing the search.

Abstracts can be retrieved by two techniques:

- ID numbers – results in printout of specific abstracts; and
- Descriptors – results in printout of all abstracts meeting the conditions established by the descriptors.

The procedure for contacting the Knowledge Base is similar to that discussed under the Administrative Communications Network since both use the EMS. District linkers access the data base in an on-line mode by dialing up the host computer and remaining connected while the search is performed and the abstracts returned. The linker interacts in real-time with the computer and receives the desired information immediately. The advantage of real-time interaction is that the linker can continually modify the search strategy, depending upon the information fed back by the computer.

## STATUS UPDATE

As previously stated, the Knowledge Base data files existed prior to the beginning of the ETA Project and were already accepted by the educational community. The network portion of the Alaska Knowledge Base System is the EMS. Therefore, most of the "user evaluation" and "status update" information contained in the Administrative Communications Network section is applicable here. There are, however, some additional pertinent facts:

- In the summer of 1979, when the data files were first entered into the computer, there were 450 abstracts; by the end of 1981, there were more than 1,000.
- During the 1980-1981 school year, approximately 1,300 searches were performed and 14,000 abstracts retrieved for requesters.

- Two new data files are being added:
  - Merits (Many Educational Resource Ideas to Share)

    The concept behind the development of this file is to encourage teachers to share successful ideas for classroom projects. Persons contributing to MERITS must be available to assist other schools.

  - Alaska In-Service

    The file will provide accurate and timely in-service coordination of information statewide, improve communication between the districts and DOE, centralize record keeping for in-service information and management data, and reduce unnecessary expenditures of time and money because no central source of information exists.

Constant upgrading of files and introduction of new services are key to the continued use of the System. This is well understood and the DOE has an ongoing effort aimed at making the Knowledge Base more useful to its constituents and at keeping them well informed of new entries as soon as they are available for access.

# INDIVIDUALIZED STUDY BY TELECOMMUNICATIONS (IST) (VOLUME IV)

## OBJECTIVE

Until recently, students of many rural communities had to accept the fact that a full curriculum of high school courses could not be made available to them. Numerous factors contributed to this situation: decentralized education under many agencies led to inconsistent policy on curriculum or effective support mechanisms (nor was there responsiveness to local needs); the small number of students did not warrant a full teaching staff; communities could not afford the facilities necessary to support a full curriculum; many students were away from the classroom for extended periods due to the seasonal nature of work or of subsistence hunting and fishing; and teacher turnover was high, further disrupting students' educational experience. The alternative for many students was boarding school, either in larger cities of the State or in the lower 48. The negative social impact, however, led to the abandonment of this approach in favor of localized education – by mandate of the State Legislature. How to provide a quality educational experience at the local level presented a tremendous dilemma. The planners of the ETA Project recognized this as one of the most pressing problems facing education. They saw, further, that proper application of telecommunications, computer, and other technologies offered the only hope of providing a solution at an affordable price. Thus, the following objective was added as an ETA priority:

> "Equal educational opportunity will be achieved in the pilot villages for Ninth and Tenth Grade students through a comprehensive telecommunications-mediated instructional program."

## THE IST MODEL

As originally conceived the IST model was the use of radio broadcasts as the mode for delivering course materials. Broadcasts were to be followed by class interaction with a master teacher using audio teleconferencing. Computer-assisted instruction was to be used for rote learning of materials. Student test papers and other written materials were to be electronically transmitted to the master teacher for correction and returned in the same manner. The supervising teacher's role was basically to be that of a facilitator of learning, focusing on providing students psychological and emotional support and on expediting the flow of communication between the student and the master teacher.

The intent was to take maximum advantage of the technology as well as the teaching expertise that existed anywhere in the State. However, before such a radical change was introduced as the operational model, a series of studies were performed, conferences held, and field trials run to examine critical elements concerning the use of technology, roles of the master and supervising teachers, IST course content and format, and student acceptance. As a result of two-and-one-half years of intensive effort, the IST model was dramatically changed to accommodate the limitations imposed by the Alaskan environment and the cultural realities of rural Alaska.

## NEW ROLES FOR KEY PARTICIPANTS

The extensive evaluations which were conducted resulted in a clear picture of the roles required by the IST model. It is a conservative design, allowing for variability of the geography and weather and for failure of one or more technological support systems, recognizing that such failure can mean weeks of downtime before repairs are completed. This philosophy ensures a highly reliable instructional model with a minimum of user frustration. The main responsibilities assumed by the principal participants are:

### PRINCIPAL

- ensures that materials and equipment are received and shipped in a timely manner;
- provides adequate staff and facilities to accommodate the IST model;
- coordinates selection and scheduling of courses and students;
- assists staff in solving problems associated with set-up.

## SUPERVISING TEACHER

- orients students to the goals and objectives of the course;
- familiarizes students with computer operation and use of software/hardware;
- establishes individualized student routines;
- provides guidance and encouragement to achieve at the individual student's pace;
- solves problems encountered by students with content or equipment;
- provides achievement evaluation methods for and in conjunction with the students;
- operates and provides minimal maintenance of the IST equipment;
- adapts courseware to the classroom situation; i.e., has the option to use the complete course as a new offering, substitute for an existing course, use parts and integrate into an existing course, or run individualized and conventional group courses simultaneously depending on evaluation of the individual student's needs;
- uses own discretion about periodically conducting group interactive sessions;
- corrects tests and worksheets;
- keeps inventory and orders course materials.

## MASTER TEACHER

(The Master Teacher was dropped from the IST as successive evaluations showed the limitations of this concept. Specifically, it limited the flexibility of the supervising teacher to cope with situations unique to the communities and cultures involved; it was difficult to cope with four time zones; the individualized pace of each student made it extremely difficult for total class interaction with the master teacher to be meaningful; and correcting tests created a time bottleneck.)

## TECHNICAL CONSULTANT

The consultant assists school staffs with hardware and software problems.

## TECHNOLOGY'S ROLE

The functions of the technological support systems were changed drastically in certain instances. The most radical is substitution of audio tapes for radio broadcasts. Although the role of audio has been reduced, it still provides some very important functions:

- motivation;
- reinforcement of important concepts;

- supplementing text;
- providing new information;
- further explaining potentially difficult information;
- adding variety (an important and sometimes overlooked feature of the use of technology in teaching);
- repeating in oral format material some students might have difficulty in reading.

The Computer-Assisted Instruction (CMI) component performs the following tasks:

- review of facts and concepts;
- drill on facts;
- presentation and drill on vocabulary;
- development of problem-solving skills;
- testing;
- providing "help" screens containing information directly related to specific questions, e.g., instructional text or problem-solving text;
- motivation.

Computer-Managed Instruction (CMI) provides access to student records to help guide the sequence of activities as individualized for each student by:

- providing access to the complete record of student computer activity progress;
- making available to teachers information on test scores, mastery of objectives, and lessons completed;
- managing student CAI sessions;
- ensuring that when a student returns at a subsequent time, he/she will restart at the proper place.

Printed materials still play a key role. They are usually constructed from the commercial texts or existing materials that form the basis for the IST courses as well as those which are specially developed to fill the gaps. Thus, printed materials:

- provide the core information for the IST courses around which computer, audio cassette, and worksheets are developed (texts);
- provide drill and practice skills emphasized in the course; they are adapted from text or workbook materials or are created to parallel computer drill and practice activities (application worksheets);
- provide extra practice on specific skills (review worksheets);
- provide stimulation and enrichment for students of high ability (challenge worksheets).

## COURSEWARE

Input by local educators and concerned citizens begins with the selection of courses to be developed and continues through production. Once the subject has been selected, and the preliminary design completed, a bias and content review is conducted by advisory groups that include local citizenry. As the courseware takes final shape, the units are mailed to several groups (to spread the workload) for comment on content and presentation. That which pertains to a particular ethnic or cultural group is further reviewed by appropriate representatives.

Eight full-year courses have been developed or were in the development process by December, 1981. The courses were selected based on a survey of educators, concerned citizens, and student-felt needs. They fill gaps in either full entry-level or elective courses in core areas. They are:

- English
- Alaska History
- General Math
- Developmental Reading
- General Science
- U.S. History

- Consumer Education
- Health Education

Courseware is based primarily on existing materials in use in Alaska and textbooks as written. The CAI/CMI, audio materials, and teachers' guides are built around them. The reading level is established as one to two years below the Ninth and Tenth Grade students at whom the courses are aimed – a decision, that experience has shown, was a good one. By completion of the fourth course, the cost of producing a full (two-semester) course, ready to be fielded, was only $120,000. This is considerably below the cost of producing the same course as a total CAI or television experience.

Each course is subjected to a strenuous acceptance program before it is offered to the schools as operational. The procedure is as follows:

- Select units are first tested for a short period of time at a small number of rural schools and modifications are incorporated. (Exploratory Test)
- A Pilot Test, lasting an entire school year, is then conducted with the fully developed course. Further modifications are incorporated if warranted.
- At Project management's discretion, a Field Test can be conducted in which all schools wishing to participate can do so by purchasing the courseware at a nominal price.

- After successful field testing, the course is sold to any schools having the need for that subject, rural or urban.

# IST PRE-OPERATIONAL EVALUATION

Because the evaluation of the Field Test conducted over the 1980-1981 school year was the precursor to operational service for the IST model and courseware, it was a very comprehensive one. The IST had been around sufficiently long that the results obtained were a good indication of its effectiveness and its potential for the future.

## COURSE EFFECTIVENESS

Overall student performance improved significantly in all four IST courses tested: English, Alaska History, General Mathematics, and Developmental Reading, albeit not in all units completed. Table I-3 gives a summary of results achieved, for the four courses, as measured by pre-course and post-course paper-and-pencil tests. Only Semester 1 is shown in Table I-3 for English and General Math because the majority of schools (approximately 23 of 30) were new and much time was taken in setting up, learning proper use of the computer, and getting courses underway. As a result, a large number of students were not able to complete Semester 2 work.

TABLE I - 3

PRE-COURSE AND POST-COURSE PAPER-AND-PENCIL TESTS SUMMARY STATISTICS

| | # of Items | # of Students | Pre-Course Mean% | Post-Course Mean % | Mean % Difference | % Gain | $t$-Value |
|---|---|---|---|---|---|---|---|
| **Alaska History Overall** | 24 | 43 | 36.3 | 53.4 | 17.1 | 26.4 | 8.03*** |
| **English Semester 1** | 22 | 43 | 60.1 | 70.6 | 10.5 | 26.2 | 5.01*** |
| **General Math Semester 1** | 35 | 74 | 51.7 | 59.3 | 7.6 | 15.7 | 4.27*** |
| **Developmental Reading** | | | | | | | |
| Word Identification | 55 | 10 | 77.8 | 85.5 | 7.7 | 34.2 | 3.17** |
| Comprehension | 55 | 40 | 46.4 | 55.6 | 9.2 | 17.2 | 4.66*** |
| Study & Research | 52 | 40 | 60.7 | 72.2 | 11.5 | 29.3 | 6.31*** |
| Literary Understanding & Appreciation | 52 | 10 | 41.0 | 57.3 | 16.3 | 27.6 | 4.53*** |
| Overall | 52 | 100 | 54.8 | 64.9 | 10.1 | 22.4 | 7.06*** |

% Gain = Mean % Difference/ (100 − Pre-Course Mean %)

** $p \leq .01$

*** $p \leq .001$

Table I-4 shows that, in all courses, the entry level of the students contributed significantly to post-course test performance – pre-course test scores correlated at least .600 with post-course test scores. Additionally, ASAT sub-test scores also correlated significantly with IST performance, indicating that educational diagnostic criteria for placement of students in IST courses are appropriate. In particular, "Math Application" and "Reading Comprehension" should be emphasized.

Table I - 4

CORRELATIONS OF PRE-COURSE TEST SCORES WITH POST-COURSE TEST SCORES, AND FIRST ORDER PARTIAL CORRELATIONS OF ASAT SUBTEST SCORES, AGE, AND GRADE LEVEL WITH POST-COURSE TEST SCORES WITH PRE-COURSE TEST SCORES PARTIALED OUT

| | Post-Course Test | | | |
|---|---|---|---|---|
| | History | English | Developmental Reading | General Math |
| Zero-Order Correlations With Pre-Course Tests | .698*** | .823*** | .797*** | .600*** |
| **First - Order Partial Correlations With Pre-Course Test Scores Partialed Out** | | | | |
| ASAT+ Subtests | | | | |
| Math Computation | .356* | .265 | .172 | .321* |
| Math Application | .472** | .567*** | .406** | .394** |
| Reading Comprehension | .446** | .574*** | .005 | .335* |
| Reading Word Identification | .312 | .425** | −.065 | .401** |
| Age | −.064 | .079 | −.206 | −.004 |
| Grade Level | −.047 | .022 | −.182 | −.058 |

+ASAT = Alaska Statewide Achievement Test
*$\underline{p} \leq .05$
**$\underline{p} \leq .01$
***$\underline{p} \leq .001$

## STUDENT ATTITUDES TOWARD INSTRUCTIONAL MODES

Seventy-four percent of the students preferred computer exercises. Workbooks/worksheets, teacher instruction, audio tapes, and other classmates as tutors were the further order of student preference. No students found the computer uninteresting or boring. However, 20 percent did label audio-tapes as uninteresting or boring; only 4 percent viewed reading and written components in that manner.

## TEACHER ATTITUDES TOWARD INSTRUCTIONAL MODES

Seventy-four percent considered the IST courses/program to be well-developed for their classrooms; 68 percent viewed the amount of work required of them as generally *less* than that required using traditional courses. The remaining 32 percent viewed the courses as requiring a reasonable amount of work. None considered the courses to be "too much work" or "not worth the bother."


Fifty-eight percent of the teachers preferred to use the courses intact. The remaining 42 percent preferred to use parts and everyone stated they would keep the computerized portions as well as the workbooks and exercises. The components most compatible with their teaching styles were the computer activities and textbooks; the least compatible were considered to be the audio tapes and projects. Audio tapes were considered important for the slower students, however.

## IST COST EFFECTIVENESS

To evaluate the costs involved in providing IST courses, a series of cost models were developed. The models showed that since the majority of DOE costs were associated with development, evaluation, and field testing, these would be widely spread out in a truly operational configuration involving hundreds or even thousands of students. Table I-5 compares the cost of providing the four Field Test courses (FY-81) with a hypothetical case involving 600 students at 100 sites. It should be noted that in FY-82 (July, 1981-June, 1982) the student numbers have indeed reached the levels shown in Table I-5 (approximately 600 students at 100 schools). Therefore, the cost savings indicated are already being realized.

Extrapolating one step further, cost for a student taking a full schedule of IST courses (6) would be $1,238 for DOE and $1,260 for a site. In FY-81, a site received $6,919 from the State per rural student. Should these figures bear up under actual operating conditions, $5,659 per student (average) would be available to upgrade the educational opportunities in the rural communities.

Costs of providing a course by the traditional method versus those of an IST course were compared. To arrive at the cost of a traditionally taught course, costs of the printed materials and teaching staff to deliver the courses were added. The cost of an IST course included

Table I - 5

COMPARATIVE COSTS OF PROVIDING FOUR IST COURSES IN FY-81 (25 sites) AND 600 STUDENTS AT 100 SITES

| Course | Cost to DOE | | Cost To Sites | | Total Cost | |
|---|---|---|---|---|---|---|
| | FY-81 | 600/100 | FY-81 | 600/100 | FY-81 | 600/100 |
| Alaska History | $1751 | $219 | $202 | $261 | $1953 | $480 |
| English | 2027 | 199 | 130 | 182 | 2157 | 381 |
| General Math | 1047 | 204 | 141 | 195 | 1188 | 399 |
| Developmental Reading | 1056 | 204 | 127 | 201 | 1083 | 405 |
| Total | $5881 | $826 | $600 | $839 | $6381 | $1665 |

computer and audio components, but no additional teacher costs. The teachers' costs associated with the traditionally delivered courses were estimated at approximately 0.8 of a teacher per site over and above the present staff. The resulting cost ratio (for 25 schools) was found to be 1.86 in favor of the IST model. This ratio will be even more favorable as the number of schools providing IST courses increases since the incremental cost of adding schools includes only the cost of additional course materials. A note of caution, however. At some point, additional computer and audio equipment will be required if the number of student-courses at a site increases significantly. This factor would have to be considered to gain a totally realistic cost picture. When this would occur would vary with each individual situation.

## REPRISE

Over the years of planning, experimenting, and testing, the IST has evolved into an "optimum" mix of technology and human intervention aimed at providing quality education for all students. Far from being an impersonal, mechanistic approach, IST is highly personal, involving supervising teachers to provide the deep individual commitment of dedicated adults so necessary for a satisfactory educational experience. It would be naive in the extreme to propose that the art of learning and maturing could be left to the interfacing of a student with a machine. The technology has released the classroom teacher from presenting subject matter for which, in many instances, he/she has not had specialized training. Thus, the teacher is able to devote more time to other subjects and to students who require individual attention. However, it has never been an either-or situation; students have always needed the presence of intelligent and sensitive adults in the classroom.

# THE FUTURE

Where do we go from here? The success of the ETA Project has only whet the appetite of Alaskan educators. It has proved that the large-scale introduction of technology into the field of education can be effective and affordable. However, in the four-and-one-half years since its inception, other technologies have matured and their potential is becoming recognized. Most importantly:

- The Alaska State Legislature authorized funds to develop and implement a statewide satellite-fed television network for life-long education.
- Authorization was given to implement an audio teleconferencing network for the State.
- The Department of Administration was given responsibility to develop an overall communication plan for Alaska.

In order to create an effective force for education, the DOE established the Office of Educational Technology and Telecommunications (OET&T) with responsibility for all applications of technology to education. The OET&T has joined with the University of Alaska, responsible for all higher education in the State; now, for the first time, the State's educational community speaks with a single voice. Considering the experience of the two partners, they will indeed play a major role in the development of the State's overall communication policy – a rare situation in our country's history. This will be one instance where the public sector will help chart the future course of the technology instead of following behind the commercial sector.

The ETA Project has indeed heralded the dawn of a new era!

# LIST OF ILLUSTRATIONS

# ABBREVIATIONS

| | |
|---|---|
| ASOSS | Alaska State-Operated School System |
| ATS | Advanced Technology Satellite |
| BIA | Bureau of Indian Affairs |
| CAI | Computer-Assisted Instruction |
| CMI | Computer-Managed Instruction |
| DHEW | Department of Health, Education and Welfare |
| D & I | Design and Implementation Contractor |
| DOE | Alaska Department of Education |
| EMS | Electronic Mail System |
| ESCD | Education Satellite Communication Demonstration |
| ETA | Educational Telecommunications for Alaska |
| IST | Individualized Study by Telecommunications |
| NASA | National Aeronautics and Space Administration |
| NIE | National Institute of Education |
| REAA | Regional Educational Attendance Area |
| RRC | Regional Resource Center |
| SPAN | Systematic Planning Around Needs |