ABSTRACT
        This paper documenting the development of the
Individualized Study by Telecommunications (IST) instructional model
describes both the design features of the model, and the current
status of procedures used for developing and adapting courses for
individualized study by telecommunications. A combination of audio
technology, computer technology and print materials, the IST model
was developed under contract by the Northwest Regional Educational
Laboratory to assist the Alaska Department of Education in its
efforts to support rural districts in providing a quality secondary
education. The report is divided into four parts: (1) statement of
the rationale for the instructional model, including history and
context; (2) statement of the role and purpose of each component of
the IST model; (3) statement of the general process for developing an
IST course, including adaptation of existing materials; and (4)
statement of potential enhancements to the IST model. The appendices
include an outline of the development/adaptation process, course
materials preview forms, course development planning forms, and
examples of teacher materials. A bibliography is also provided.
(LLS)

# INDIVIDUALIZED STUDY BY TELECOMMUNICATIONS

## MODEL AND PROCEDURES

## DOCUMENTATION REPORT

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## ABSTRACT

The purpose of this paper is to document the development of the
Individualized Study by Telecommunications (IST) instructional model.
Design features of the model and the current status of procedures used
for developing and adapting courses for Individualized Study by
Telecommunications are described.

The Individualized Study by Telecommunications model represents an
optimal combination of audio technology, computer technology and print
materials. The model, developed under contract by the Northwest Regional
Educational Laboratory, is designed specifically to assist the Alaska
Department of Education in its efforts to support rural districts in
providing a quality secondary education.

The report is divided into four parts:

1. Statement of the rationale for the instructional model,
   including history and context;

2. Statement of the role and purpose of each component of the IST
   model;

3. Statement of the general process for developing an IST course,
   including adaptation of existing materials;

4. Statement of potential enhancements to the IST model

SECTION I:

RATIONALE FOR

INDIVIDUALIZED STUDY BY TELECOMMUNICATIONS

The rationale for the instructional model Individualized Study by
Telecommunications is derived from the Educational Telecommunications for
Alaska (ETA) Program efforts to address the needs of secondary students
in rural schools in the state. The model has been shaped by identified
needs, by the context of the state of Alaska, and by the philosphy of the
Alaska Department of Education (DOE) and the Northwest Regional
Educational Laboratory ETA program staff. An understanding of the
background and context of the ETA Program is hence an essential part of
understanding the value of the IST model itself. The program narrative
which discusses the history and context of the ETA Program has been
adapted from the Educational Telecommunications for Alaska Project
Proposal, Alaska Department of Education (1977) and from the Operational
Plan Educational Telecommunications for Alaska Project,
Alaska Department of Education (1978).

## Demographic Context

Alaska remains the largest state with the smallest total population.
More than 280 communities are widely scattered over the state's 586,412
square mile (16 percent of the total area of the United States). The
population in 1977 was estimated to be 411,211 (less than 0.5 percent of
the population of the United States).

The population density statewide is less than one person per square
mile with 60 percent of the population living in or near three cities
(Anchorage, Fairbanks and Juneau) that are within boroughs totaling
2 percent of the state's total land. An adjusted density ratio indicates
that outside of these three urban areas the density approaches four
square miles per person.

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The most populated region of the state is Southcentral, which includes the largest community, Anchorage. Forty-four percent of all Alaskans live within the Anchorage Borough. The Interior region ranks second, with 85,068, or 21 percent. The population of this region is reduced to only 7 percent of the state's total when the second largest city, Fairbanks, is excluded.

The Aleutian Chain and Kodiak together contain 15 percent of the popultion. One-third of all Southeasterners (17,000) live in the state's third largest city, Juneau. The remaining 31 percent of the state's people live in 150 communities (ranging in size from 2 to over 5,000) distributed throughout the Southeast, Western coastal and Interior areas, and the Artic North.

About one-sixth of the population is Eskimo, Indian or Aleut. The major cultural groups are Inupiat Eskimo in the Arctic and Northwest; Yupik Eskimo in the Western and Bristol Bay region; Aleuts in the Aleutian Chain and Kodiak; the Interior Indians; and the Tlingits, Haidas, and Tsimshian Indians in the Southeast.

Alaska has six major languages other than English, with over fifty significantly different dialects.

The total population has grown 33.82 percent since the census count in 1970. It is estimated that 72 percent of this increase was a direct result of interstate migration heavily related to pipeline and construction industry activity, above and beyond the natural population growth patterns.

Since total school enrollment in Alaska during 1975-76 increased only 18.5 percent over the 1969-70 enrollment, it can be confirmed that the population growth in the last five years due to pipeline activity has not impacted on the vast majority of the schools in the state.

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<u>Geographic outline.</u>  Forty percent of all Alaskans, and 60 percent of all schools, are located in communities of less than 1,000 people. Isolation is often a fact of life, frequently by choice.  The major contributing factors to isolation are geography, weather and the distances between communities--factors that create consistent problems in providing educational services and support.

Alaska's terrain, essentially an extension of North America's major mountain ranges and plains, can be visually dazzling while posing formidable barriers.  The fjords of Southeast and the Alaska range in Southcentral are continuations of the coastal ranges in the Northwest United States.  The broad valleys and basins of the Interior are an extension of the desert plains between the Rockies and coastal mountains.  The Rockies extend into the Brooks Range in Northern Alaska. The Arctic coastal plain north of the Brooks is flat tundra with thousands of shallow lakes.

The state's mountains contain half the world's glaciers, with 19 peaks over 14,000 feet.  One-third of the state is north of the Arctic Circle.  Throughout Alaska there are over three million lakes larger than 20 acres, and ten rivers over 300 miles long.

Because of the diverse topography, the climate and subsequent environment varies considerably across the state.  Fierce, dark, long winters can turn to 24-hour 70 degree summer sun in the Arctic.  The 2,000 mile Aleutian Chain is wet, foggy, cold and frequently windy, year-round.  Temperatures in the Interior region vary drastically from winter to summer (-50° to +90°).  The most temperate region is Southeast, where the warming Japanese Current meets cool mountain air and results in over 200 inches of precipitation a year in some areas.

Distances in Alaska are much more extensive than a single map implies. From its west to east coasts, Alaska encompasses a distance equal to that from California to Flordia. The vast distances between towns in Alaska can contribute substantially to a sense of isolation and remoteness. The extremes of winter weather limit activity and contribute to Alaska's high alcoholism rate and its impact on daily life.

The effects of this isolation can be felt by Alaska's rural teachers, many of whom are not indigenous to Alaska. One teachers' group in a small, rural district negotiates into all contracts an annual trip to Anchorage for a teacher's conference and considers the expense a just investment in mental health and needed professional contacts not available in the village.

Economic outline. The environment and the variables in resources and industry make employment highly seasonal in virtually every area of the state. Many industries--construction, fishing, logging, tourism--are not active in the winter, when weather makes outdoor work and travel difficult, if not impossible. Depending on the time of year, region and industry, unemployment rates fluctuate between 5 percent and 13 percent. State and federal unemployment insurance payments for December, January, February and March may be double, even triple, the claims paid in June, July and August.

Many isolated, rural areas, with incomes rather depressed, still rely to some extent on subsistence hunting and fishing. While health, education and other services are more readily available in the larger native villages, subsistence hunters must compete for fewer available resources.

...In recent years it has become apparent that all rural Alaska
villages are in an economic trap because of the transition from
subsistence to cash. They are unable to return to a complete
subsistence life, nor are they able to earn enough cash to buy food,
supplies and services required to live comfortably in the larger
communities.

Despite this, subsistence hunting, fishing and gathering still
play a critical part in the lives of rural villagers. Of roughly 150
Native villages of less than 300 people, subsistence activity is
estimated to provide at least half of the daily calorie intake...

Temporary, seasonal employment may be available to provide some
income, but also takes men away from the villages at times when
subsistence foods can be most easily obtained...The available cash
usually goes for materials and equipment that are vital necessities
today in subsistence activities: rifles and ammunition, show
machines and outboard engines and gasoline...

As subsistence life becomes more expensive and difficult, people
must increasingly depend on store-bought groceries and goods. Young
people returning to the village from boarding schools who have not
learned the subsistence skills must live more and more in the cash
economy.[1]

The establishment of schools in some areas of the state has been a

major contributor to the growth of larger, stable, primarily Native

communities. The highly nomadic Eskimos in the Brooks Range established

the permanent village of Anaktuvuk Pass because of the requirement that

the children attend school nine months of the year. The establishment of

more permanent residences has generated the need for service suited to

community living.

As a result, electrical power became a necessity for the village

resident. Virtually all schools in the state have electricity, supplied

either by local utilities, school or federally-owned generators, or the

Alaskan Village Electric Co-op (AVEC). In some villages the construction

of a one or two room school was accompanied by the introduction of the

first generator.

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[1]"2(c) Report: Federal Programs and Alaska Natives"

The schools need for power was a factor in the establishment of AVEC in 1967, and village schools were the largest single electrical user. Since then, new housing projects and purchase of appliances have increased residential demand for power.

Transportation. Power, fuel, and other goods and services are quite costly because of the limited market and also because of transportation costs. Whether by road, water, rail or air, the cost of both travel and freight delivery is high.

In 1970, Alaska had 7,000 miles of road, only 3,000 of which were paved. There has been no significant increase in the building of roads which results in vast areas not being accessible by land. In this regard, it is interesting to compare Alaska to the following western states:

| State | Acres of Land Per Mile of Road |
|---|---|
| Alaska | 52,212 |
| Arizona | 2,203 |
| Montana | 1,295 |
| Wyoming | 891 |
| California | 824 |

Alaska, probably has more communities and schools not served by a road system than all the other states combined. The primary road network links Anchorage, Fairbanks, and Haines, with connections to the Kenai Peninsula, Valdez, and many of the smaller communities in between. But this land link is lost for many in the winter, especially in the Interior, when many of the arterial road are impassible. Over 160 rural schools are not on any connecting road system.

'Alaska's railroad network is even more limited. The 540-mile Alaska Railroad', which runs daily year-round, links Whittier, Anchorage, and Fairbanks. In Southeast Alaska, a 110 mile narrow gauge railroad links Skagway with Whitehourse, the Yukon Territory, and Canada.

Goods are delivered to Southeast, Southcentral and the Interior by a combination of sea, truck and rail. Commercial freighters and barges travel regularly between the lower 48 states, Anchorage, and some larger coastal communities.

The state operates and maintains a "marine highway" for both passengers and freight. Ferries travel regularly among principal communities in Southeast, and among communities on Prince Williams Sound, Cook Inlet, and Kodiak Island.

Villages on larger rivers have occasional service by commercial freight boat, with an entire winter's supply of goods (ordered six months previously) arriving in the fall. Because of the lack of docking facilities, unloading is done almost totally by hand.

A Bureau of Indian Affairs (BIA) freighter makes annual trips with supplies for BIA schools in coastal villages in western and northern Alaska. Freight is carried for villagers as well, and all goods are unloaded offshore by small shuttle boats. At Nome, the cost of lighterage for commercial operators can add as much as 100 percent to the cost of moving freight from Seattle to offshore Nome.

Travel by air in Alaska is disproportionately heavy; in many areas there is no other means of transportation. Alaska ranks first in the nation in number of private pilots and planes, and in passengers and cargo tonnage flown annually.

Anchorage and Fairbanks are served by several carriers. Five carriers serve most regions of the state on a regularly scheduled basis. There are numerous small lines, serving virtually every community on a charter basis.

Freight is commonly delivered by air in the winter in the bush, since twin-engine planes have become more common and can use short, rough air strips. The costs, however, are high. For example, in the Northwest region, residents pay as much as 29 cents per pound of freight flown from Anchorage.

Air travel, the most widely available means of passenger transportation, can be very expensive and even time consuming. Airline schedules preclude same-day travel between Juneau and Nome, for example. The 1,500-mile trip from Ketchikan to Barrow requires four stops and two changes of airlines, and takes nine hours, provided no connection is delayed. A comparable 1,500-mile journey between Boston and Miami is nonstop and takes less than three hours.

The difficulties and costs of travel affect Alaskan educators on an on-going basis. For example, Atka's representative on the regional school district board was chosen to represent the board at a statewide conference to be held in Juneau in June 1976. Atka was unable to receive a radio message, so a written message was delivered aboard a Navy tug which serves the island once a month. The school board member left on a tug for the 100-mile, six-hour trip to Adak, then chartered an eight-seat, twin-engine aircraft for the 600-mile flight from Adak to Cold Bay, at a cost of $2,400. From Cold Bay, she then flew to Anchorage by commercial prop-jet, spent the night in Anchorage, and made

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connections with a commercial jet flight to Juneau the following morning. The 1760-mile trip to Juneau took 200 hours and cost $2,600, one-way.

## Communications Context

The geographic barriers, environment and vast distances that contribute to isolation and high costs of goods and transportation, have also contributed to Alaska's lack of extensive communications networks, especially in rural areas. Where services do exist, they are often vulnerable to the uncertainties of weather conditions.

Mail service. Virtually every community with a stable, year-round population (and every community with a school) has a post office and mail service. In smaller communities, delivery may be only weekly or even monthly, almost always by small plane and barge.

Mail service has recently been the most relied upon means of statewide communication among educators. But weather is a major cause of unreliable bush service; if the river is freezing, or a storm hits, the mail plane cannot land. It has not been uncommon for a rural administrator or teacher to receive a request for information or notice of a meeting requesting a response, with the response due two days before the notice was received and three weeks after the notice was mailed.

Telephone. The state's basic communications system was first developed by the United States Department of Defense, the Federal Aviation Association and the United States Coast Guard, with civilian traffic carried on a "time available" basis. In 1971, the Radio Corporation of America (RCA) purchased the Department of Defense operated Alaska Communication System (ACS), consisting of terrestial links in the Interior and Southcentral regions. The subsidiary corporation, RCA Alaska

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Communications (RCA ALASCOM), was established as Alaska's commercial long-lines carrier. RCA ALASCOM also began leasing portions of the U. S. Air Force operated White Alice Communications System (WACS), using the combination of microwave troposcatter, land line and marine cable links to provide long-line communication to some areas of the state not otherwise served.

As early as 1971, RCA proposed to construct and operate a series of communication satellites to serve the lower 48, and Alaska. In 1973, RCA ALASCOM provided the first interim satellite links with land-lines and microwave circuits through leased channels on the Canadian satellite Anik II, with a transfer to Western Union's Westar II two years later.

Also, in 1973, the Governor's Office of Telecommunications (GOT) was established by executive order, to provide impetus toward reaching the state's goal of insuring commercial communications service to all Alaskan communities with more than 25 people.

Commercial and public radio and television. An estimated 95 percent of all Alaskans can receive at least one broadcasting radio station regularly. A number of stations broadcast out of Anchorage, Fairbanks, and Juneau, with others scattered from Pt. Barrow to Ketchikan. Of these broadcast stations, nearly a dozen are publicly owned operating under the auspices of the Alaska Public Broadcasting Commission (APBC) within the Department of Education (DOE). These other stations serve Pt. Barrow, Bethel, Dillingham, Fairbanks, Juneau, Ketchikan, Kodiak, Kotzebue, Nome, Petersburg, Sitka and Wrangell. In addition, public stations are in various stages of development for Anchorage and Homer.

A private nonprofit corporation was established in 1978 to interconnect all existing public stations in sharing local and national programming, legislative news, and other public affairs programming.

The Armed Forces Radio and Television Network (AFRNTN) operates AM and FM radio stations with repeater transmitters. This network is designed to serve military personnel serving one-year tours of duty at remote locations, but can be received in many non-military communities.

Some type of television service is available to approximately 95 percent of the state's population. The stations in Bethel, Anchorage and Juneau carry out some production work, primarily for their own news weekly feature programs.

The Department of Education, through its Instructional TV Project, has used satellite time not used for station affiliate and bush entertainment feeds to provide instructional television to a number of village sites.

A complete inventory of video playback equipment in the state's schools is not available, but it appears that such equipment may be available in virtually all schools. Most of the rural schools were supplied with this equipment several years ago. Many schools currently use videotape programs on a fairly regular basis; primarily using tapes supplied by the Alaska State Film Library.

Alaska has seven commercial broadcast television stations serving Anchorage, Fairbanks, Juneau and Sitka and providing direct or translator reception to approximately 60 other communities. Some programming (particularly news and special sports events) is transmitted live (or same-day) via satellite to Anchorage, Fairbanks and Juneau. Some other network programming is delayed at least one week.

Public TV stations, under APBC, serve Anchorage, Bethel, Fairbanks, and Juneau. The public radio station in Juneau operates a television production studio originally established by the Governor's Office of

Telecommunications for use during the ATS-6 satellite demonstration. This facility has been used to provide live coverage of legislative sessions and has been made available for other closed-circuit productions.

The state has leased a full transponder on RCA's F-II satellite to meet commercial broadcasting needs in Alaska. Satellite transmissions originating in Pennsylvania and California are received in Anchorage and Juneau for real time broadcasting or for taping and delayed broadcast. Real-time broadcasting needs in other Alaskan cities are met through a terrestial translator system connected to Anchorage or Juneau. The Alaska Public Broadcasting Commission receiving ground station in Anchorage tapes the inter-state satellite transmissions, edits them for Alaskan consumers and rebroadcasts to noncommercial stations in the state. APBC then submits a video cassette of its programming to a state contracted facility which dubs the cassettes and distributes them through the mail to mini-TV stations throughout Alaska.

As a result of modifications to selected small earth stations through the Satellite Demonstration Project sponsored by the Governor's Office of Telecommunications, ITV has become available to a larger number of sites. This is made possible through the use of a 10-watt transmitter which serves each village in small earth station satellite receiving capability.

Once final scheduling has been determined, unused transponder time is made available for educational or other state agency program transmission, or other use in the public interest.

The Armed Forces Radio and Television operates broadcast outlets in King Salmon, Tatalina, Galena and Adak. These provide direct or translator reception to nearby communities.

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In addition, a number of communities have cable television offering programs taped in Seattle and circulated throughout the state in distinct separate distribution loops. Programs are delayed from one to five weeks, and the cost of cable services ranges from $18.00 to $50.00 per month.

Office of, Telecommuniations. The Governor's Office of Telecommuniations (GOT) role has been one of policy development and liaison between state users and Alaska's communications vendors. To ensure the adequate development of cost-effective communications techniques to serve all state residents, GOT has been active in ascertaining user needs, and has worked extensively with the Department of Education in developing telecommunications application to meet statewide educational needs.

The office has staff located in Anchorage and Juneau. The Director and Deputy Director supervise liaison with the state's commercial carriers, the Federal Communications Commission (FCC), the Rural Telecommunications Committee, other state agencies, the Legislature, and the Governor. An engineer works closely with satellite engineering personnel and national equipment suppliers on technical aspects of the small earth station program. The agency applications manager deals with state agencies, particularly the Department of Education, in disseminating information and helping to coordinate communications planning.

In addition, consultants are hired on an as-needed basis, for legal representation before the FCC, and for indepth research or project development.

The Office of Telecommunications has long been an active participant in the development of telecommunications applications in education. School location has been a consistent criterion factor in selection of small earth station sites.

## Educational Context

The educational picture in Alaska is both diverse and complex. A variety of agencies serve the educational needs of the state, but delivery of services is impacted by geographical constraints. In addition, the recent decentralization of the educational system has increased the responsibilities of the State Department of Education.

Elementary and secondary public schools. Two-hundred forty-one Alaskan communities had at least one school. According to the 1978 Operational Plan: Educational Telecommunications for Alaska Program, thirty-five percent of all schools were located within the Southcentral region; these schools served 57 percent of all enrolled students.

The Interior region, with a major urban center, contained 18 percent of all schools and students. Southeast had a substantial number of smaller "urban" communities in addition to scattered rural communities. This region contained 15 percent of the schools and 13.5 percent of the state's enrolled students.

The remaining regions were primarily rural, with small school enrollments. The western region enrolled 4.5 percent of total enrollment and had 11 percent of the schools, followed by Northwest with 3 percent of the students and 8 percent of the schools, and Bristol Bay 2 percent of total enrollment and 7 percent of the schools.

Fifty-nine percent of all elementary and 60 percent of all secondary schools in the state had enrollments of fewer than 100. Of these, secondary schools, 36 percent had fewer than 50 students; many had fewer than 10 students and offered courses (but not graduation) as an extension of the local elementary school curriculum.

There were 11 borough-wide school districts and 20 city school districts in Alaska, each operating with an administrative superintendent and locally-elected school boards.

The 21 regional districts enrolled 9 percent of all students. The Bureau of Indian Affairs operated 42 elementary rural schools and one regional secondary boarding school.

Correspondence study. Correspondence study is available through more than two dozen school districts in the state, as well as through the Department of Education. Approximately 2,500 students are served by Correspondence Study programs during the year. While the majority of course offerings are secured from the University of Nebraska, Lincoln, several of the courses have been developed by the correspondence staff. Also, Adult Basic Education programs are offered to nearly 100 communities by a variety of agencies.

Libraries. There are approximately 300 public, school, university and special libraries in Alaska. The State Library, within the Department of Education, has facilities in Juneau and Anchorage and a regional coordinator in Fairbanks. It coordinates statewide library services and assists individuals who lack access to a local library.

Mail service is the standard means of materials distribution and interlibrary communication. The State Library gives direct assistance and/or training to libraries, and circulates close to 100,000 items by mail to community libraries, schools, other institutions and

individuals. The Anchorage Alaska Health Sciences Information Center handles requests for information by health sciences personnel statewide. The Center operates from the Alaska Native Hospital in Anchorage and provides Med-line computer searches of the National Library of Medicine holdings.

Materials searches are facilitated by an extensive inter-library loan network with Telex links between the Juneau facility, the University of Alaska/Fairbanks Library, the public library in Anchorage, and the Pacific Northwest Bibliographic Center at the University of Washington, Seattle. Service requests into Juneau, Anchorage or Fairbanks are made by mail.

The Juneau State Library facility also houses the ERIC microfiche data bank (ED series). Fiche copies and readers are distributed by mail.

The State Library's two film centers in Anchorage and Juneau are a major source of 16mm films and video materials for Alaska's schools. Over 35,000 films and tapes are circulated annually from approximately the 75,000 titles held.

Historical perspective. Isolation between school and school districts in the state, added to the multiple agencies that have historically managed the state's schools, has long precluded the delivery of comprehensive and equitable support of all Alaskan schools.

Until June 1975, the delivery of education in the state was divided into three separate systems with different governance and financing processes: city and borough school districts governed by locally elected school boards; schools outside city and borough school district boundaries (rural schools and schools on military reservations), placed under state jurisdiction in the Alaska State-Operated School System

(ASOSS); and schools operated by the U. S. Department of Interior through the Bureau of Indian Affairs.

In June 1975, the Alaska legislature devised a means to decentralize the ASOSS. A series of informal and formal public hearings to implement the legislation resulted in the creation of 21 new Regional Educational Attendance Areas (REAAs). The boundaries of the 21 new school districts were created on the basis of public input, taking into consideration soci-economic, linguistic and cultural similarities, transportation, communications networks, and natural geographic features.

Elected in February 1976, the REAA school boards became responsible for guiding the schools effective on July 1, 1976. This transition from a centralized administration of geographically and culturally diverse areas to local control of smaller regions reflected the strong commitment of the DOE to placing as much control of education in local hands as possible.

At the same time, however, decentralization increased the demands upon the department to provide adequate technical assistance; it must now aid 51, and not 31, school districts.

Community school communities. The establishment of the new REAAs called for each community served by a school operated by an REAA to have a community school committee. Elected by the voters in each community, this committee has the duty of reviewing and making recommendations to the board in regard to the curriculum, programs and general operation of the local school, thus creating a unique opportunity for community input in educational decision-making.

<u>Bureau of Indian Affairs</u>. Accompanying the creation of the new school districts was the increased likelihood of transfers of BIA schools inside an REAA to the REAA districts. With these transfers, the state continued to move toward a single system of education governed by locally elected school boards.

The Alaska Public School Foundation Formula, which provides a high level of state funding for education, eased the accomplishment of this task. The state support for the newly created school districts virtually eliminated the problems which could have occurred due to the lack of a local or municipal tax base.

<u>Local school mandate</u>. Strong support and increased local control indicate the state's interest in providing educational opportunities to the many scattered rural communities. However, it had long been of concern to many Alaskans that they must send their children away from their home communities for schooling beyond the elementary level.

The 1976 passage of legislation localizing control through the 21 new districts was one major step toward a solution to this problem. In May 1976, the State Board of Education adopted new regulations to further meet this need. The new regulations insured that "consistent with the desires of parents and of local communities, the school-age children in the State of Alaska have the opportunity to attend an elementary or secondary school in the local communities in which they reside."

The governing body in each of the state's school districts must provide an elementary school in each community with eight or more children available to attend, and unless the local school committee in the community requests otherwise, must establish a secondary school in every community with one or more available students.

The Department of Education has been involved in an effort to provide suitable facilities for secondary instructional programs in 126 sites in rural Alaska. By 1979, over 150 million dollars had been dedicated to this effort with construction of new facilities and renovation of existing facilities continuing.

Each district is responsible for developing an educational plan for each school, and the local community must be included in its preparation. Each district, with community participation, must prepare an evaluation of each new district school.

Delivery of services. Thus, in the past several years, the Department of Education's initiated decentralization has increased local control of a range of programs available in schools, especially in the rural areas. It has also increased the department's responsibilities for providing support services and resources addressing the very specific needs of rural students.

The Department's Development and Dissemination Unit embarked on a project entitled Systematic Planning Around Needs (SPAN). This project was designed to provide local districts with the necessary resources with which to solve educational problems at the local level. SPAN has made available, through telecommuniations, a variety of human and information resources such as a statewide talent bank of resource persons, national and in-state validated best practices, bibliographical data, and abstracts of agencies which offer services to school age populations. These resources are available in computerized format.

Telecommunications, and its potential application to education in Alaska, emerges as a tool to create both management and communications channels to allow these new programs to reach their full potential.

Regional Resource Centers. Legislation in 1976 directly addressed the resource needs of all districts in the state, calling for creation of seven Regional Resource Centers. Designed as regional educational service agencies, these centers operate at constituent district option through the coordination and administration of cooperative programs and funding.

The concept of this center network was to provide locally-chosen means to fill locally-identified gaps in essential support services and to increase the ability of each district to provide equal educational opportunities for all students. Additionally, the legislation permitted school districts to join together to provide cooperative services which otherwise would not be available because of the high cost of establishing educational services in a single district.

Another goal of this cooperative venture was to reduce the difficulties encountered by the very small districts having limited finances and specialized professional personnel as they attempted to provide adequate programs and services.

Alaska Department of Education. The Alaska Department of Education exists to provide educational services to the citizens of Alaska. By statute, the Department is charged with the responsibilities to:

o    Exercise general supervision over the public schools of the state except the University of Alaska;

o    Study the conditions and needs of the public schools of the state and adopt or recommend plans for the improvement of the public schools;

o    Provide advisory and consultative services to all public schools governing bodies and personnel; and

o    Establish, maintain, govern, operate, discontinue, and combine area, regional and special schools.

The executive head of the Department is the State Board of Education, a seven-member body appointed by the Governor confirmed by the Legislature. One student is selected as an eighth non-voting member. The Commissioner is appointed by the Board, subject to approval by the Governor.

The Department's main facilities are in Juneau. Housed there are the executive administration, including the Commissioner and his Deputy and special assistants, Planning and Research Office members who concentrate on research, systems development and student assessment, and staff members who provide information and distribution assistance for pulications prepared for virtually every section of the department.

Three Commissions have been established by state statute, regulation or federal law, all with operating programs and staffs, and separate annual budgets. The Alaska Public Broadcast Commission, with staff in Anchorage, regulates public radio and television stations; the Alaska Rural Teachers Training Corp, also supported by staff in Anchorage, administers a post-secondary degree program designed to prepare Native teachers living in rural Alaska who are remote from existing campuses; the Post-Secondary Commission, with staff in Juneau and in Anchorage, reviews all post-secondary institutions, program offerings and budgets, making funding and legislative recommendations. This Commission also administers the student scholarship financial aid program.

In addition to the Commissions noted above, the Alaska Department of Education functions through four major divisions. Each of these contains a number of subgroupings and programs: (1) Management, Law and Finance Division, (2) The Division of Education Program Support, (3) The Division of Vocational Rehabilitation, and (4) The State Libary, its branch units and State Museum.

The desirability of having a maximally responsive decision process has been recognized by Educational Telecommunications for Alaska project management. The components and content of the Educational Telecommunications for Alaska development strategy were selected and designed to be responsive to several of the general educational needs which have been identified in Alaska. These needs and departmental priorities were documented in the Results of the Department of Education Planning and Evaluation Survey (1976). The results of the study supported the general conclusions that the department should:

o    Provide leadership in establishing and maintaining statewide goals, needs and priorities;

o    Identify and disseminate educational information, media resources, and promising practices;

o    Examine and improve certification procedures;

o    Provide inservice training, especially through regional sessions;

o    Investigate alternate means of funding schools;

o    Improve communications (with local schools, both formal and informal);

o    Maintain support and emphasis on the basic skill areas, especially reading;

o    Develop new programs and curriculum and disseminate information about them (especially programs in careers, thinking skills and special education for the gifted)

Department of Education Planning and Evaluation Survey

The Planning and Evaluation Survey evaluated the services offered by the Department and identified those areas where additional support was required.

Since 78 percent of the respondents were teachers, teachers' opinions were dominant in the results.  These broad conclusions, however, are also generally supported by the responses of the educators in the other categories surveyed.  One of the recommendations of the report mentioned above was that the Department should:  "improve communications (with local schools, both formal and informal)."

Basic communication.  The problems of administrative and instructional support among and between (1) Department of Education (DOE), (2) fifty-one school district offices, (3) five Regional Resource Centers (RRCs), and (4) local schools are exacerbated by the geography, spareseness of population, and time zone differences described in the preceding section of this report.  Polling all superintendents on a given day by conventional phone calls is only barely feasible and--from a practical standpoint--almost impossible.

The four-hour time difference across the state severely limits the number of business hours during which phone calls can be made.  Mail service delays compound the problems of day-to-day interactions between DOE and local schools.  Mail delivery ranges from two days to two months.  It is not uncommon for sacks of mail to be completely lost for months at a time.  The matter of communications on basic recordkeeping, forms transmittal, and information transmission can, and does, become hopelessly bogged down.

Telephone communications to DOE originating in the rural school districts are often surprisingly difficult even where school phones exist.  For examples, in Naknek, the site of two school district offices there is a shortage of long distance lines and calls to DOE often take several days to complete.  Such calls must often be made during early morning hours before the workday commences.

The inadequacy of satellite trunking facilities for long distance calls makes it nearly impossible to communicate by phone with some village schools. Noorvik, a site of the ETA pilot test for audio instruction, has 70 telephones--but only two long distance lines. These trunks are saturated not only during peak hours but generally through the day. Students were unable to get a long distance line during one test of facsimile transmittal and tele-conferencing, and 47 attempts to phone the school from outside the village were unsuccessful. Even when long distance lines are available, the costs make conducting business by telephone impractical.

In the rural areas, intra-district management communications suffers from its own unique (and perhaps more severe) set of problems. In one district without a highway system, local schools lie approximately 200 miles in either direction from the central office. In another, the district superintendent must charter an airplane at a cost of several hundred dollars to be able to talk with the chairman of his school board. Transmission of written documents has been at best a lengthy undertaking.

The management of direct instructional support is reduced to a few expensive aircraft charters to crisis locations. Many of the schools having telephone service of any type depend upon a form of communication heavily affected by atmospheric conditions in a region where adverse conditions are prevalent. The radio phones do not provide a dependable system for administrative or instructional support. "Thus," according to the 1976 Department of Education Planning and Evaluation Survey, "there is a need to establish an administrative and instructional support communications network characterized by interactive capacity, minimal onsite support personnel, and cost effectiveness."

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Resource identification and linkage. A recommendation of the 1976 Department of Education Planning and Evaluation Survey was that "emphasis should be placed on a coordinated plan to disseminate information, promising practices, and talent bank (data)."

An initial answer to this need was Project A-TIP (Alaska Talent Information and Promising Practices), an NIE funded project housed in DOE. Through the A-TIP project, educators have had access to state and local resources and to an information retrieval and dissemination service provided by the San Mateo Educational Resource Center (SMERC).

The primary product from activities of the A-TIP project has been a statewide system for continuous exchange of information and sharing of products between educational agencies within the state and several agencies from outside the state. The project was conceptualized and developed around six primary dissemination functions:

o       Identification of user characteristics and information needs

o       Promotion and development of user awareness

o       User access to the information and materials repository

o       Identification and description of instructional resources

o       Acquisition and process of instructional resources

o       Instructional resources and information distribution

The general goal for the A-TIP project was to design and test a statewide dissemination system which:

o       Was based upon user information needs

o·      Employed various forms of technology, including telecommunications, for distribution of materials and information

o       Functionally integrated all instructional resources available for use within the state

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[2]Results of the Department of Education Planning and Evaluation Survey (1976)

Several A-TIP workshops were held in the state to explain the services provided by the project and the methods for requesting information; requests for information resulting from the workshops were substantial. However, a problem encountered in the project was slowness and/or unavailability of a vital telecommunications link. Thus, a second need addressed by the ETA Program was stated as follows: "There is a need to establish a method for rapidly accessing repositories of a wide variety of instructional materials, resources, and related information."[2]

To partially fulfill the above stated general need, a comprehensive statewide plan for the coordination and delivery of services and resources available to schools to improve education was developed. This plan was entitled "Systematic Planning Around Needs" (SPAN).

Through the SPAN project, the Program Development and Dissemination Unit developed abstracts of information about seven types of resouces for Alaska schools:

- o   Service Agencies
- o   Talent Bank
- o   Promising Practices
- o   Nationally Validated Programs
- o   Alaska-Developed Materials
- o   Client Profiles
- o   Commercial Resources

These have been organized into a "Knowledge Base" of information about resources for Alaska schools. In addition to this Knowledge Base, schools have access to other sources of information such as state libraries, ERIC and FIDO. Four particular needs remained:

- o   The need for an efficient method through which schools can request information from the DOE, the RRCs and other agencies

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[2]Department of Education Planning and Evaluatuon Survey, (1976)

o   The need for an efficient method for relaying information to
    schools in response to requests

o   The need for an efficient method for continuing updating the
    Knowledge Base

o   The need for an efficient method for selectively retrieving
    information from the Knowledge Base

The first two needs listed above could be satisified through an

electronic message system and through facsimile transmission.  Needs 3

and 4 could be satisfied through a computer system for storing, updating

and retrieving Knowledge Base information.

The Electronic Mail System (EMS) was initiated by the educational

Telecommunications for Alaska program to satisfy these needs.  By June

1979, ETA computer network was operational and educators began making

immediate use of the system to send and receive messages and to access

resources available through SPAN.  The EMS network is successfully

bridging the isolation of state educators.

Telecommunications Alternatives Survey

The Department of Education began intensive work with the Governor's

Office of Telecommunications (GOT) in 1976 with the formation of a

telecom task force.  This task force was organized to determine the

applicability of improved communications systems to identified

educational needs.  Personnel from a cross section of the DOE, led by the

Office of Planning and Research, met frequently with GOT staff.  The

direct goal of this joint effort was to prepare information for educators

exploring the potential application of telecommunications to education.

Through the summer of 1976, DOE personnel, along with the GOT, produced

two informational packages under a National Institute of Education (NIE)

grant.  One of these packages, titled "Educational Telecommunications

Alternatives for Alaska," was printed by the DOE and made available to

all staff and district superintendents. The second package, in the form of a video tape, was also produced by the GOT. This material was designed for an audience of Alaskan educators, from superintendents and local boards to individual teachers. The material included simulations of day-to-day problems caused by inadequate or nonexistent communication channels, and the telecommunication application that might meet this need.

Four specific categories of Alaska educational needs that could be enhanced and improved by better communications systems were identified;

o   Instructional resources and programming

o   Staff development

o   Information exchange

o   Management

Using the basic communications systems capabilities outlined in the first informational package, DOE personnel helped define applications within the above four categories. Suggested applications ranged from computer-assisted instruction for basic skills development, to expanded training programs for adult basic education in rural areas, to computerized recordkeeping systems.

In August 1976, 5,000 copies of the materials were mailed to all schools for distribution to all public school teachers, both rural and urban. The form included for response was self-contained and included return postage.

In addition to this report, an onsite visitation was made by project staff to 26 representative districts. These presentations and work sessions with school boards, teachers and community members were conducted to inform participants of the improved communications network

underway statewide and its specific relevance to improving communications to each school. Reactions were sought, using the second informational package to allow participants to determine and prioritize communications needs in their districts.

During late September and October 1976, presentations were made to a sample of rural and urban superintendents and school boards to explore the specifics of educational needs and communications applications. The effort culminated in a major presentation by DOE project staff at the Alaska School Administration Association meeting in Kodiak in late October 1976, a meeting attended by virtually all public school superintendents in the state.

The combined responses from the field input effort and the study of alternatives indicated that instructional resources, individually initiated (as opposed to required) staff development-services, information exchange, increased input and information on state guidelines and forms, and the computerization of reporting methods rated highly.

Comments and suggestions were solicited from participants at the meetings held throughout the state. These comments were carefully recorded. A representative sample of comments within several areas of concern follows:

> As a board member in Valdez stated, anticipating the project's applicability to expanding Valdez's contact with the rest of the state, and consequent expansion of learning experiences for students: "The real question is not how much will it cost us, but how much will it save us?"

> From a teacher in Sitka: "My biggest problem is lack of instructional resource materials or their availability. Perhaps some are available and I just haven't heard. We need current listings of materials and their location available to each school and speedier delivery."

> "My biggest frustration? Lack of access to information and lack of communications." (Yukon Koyukuk Rural Teacher)

"We need some means of offering courses we may not have a staff member qualified to teach." (Southeast Islands Teacher)

"Sometimes I feel so isolated. One day I know I'm the worst teacher, and maybe the next week I feel I'm the best in the world. But there's no faculty lounge for me to go to, no way to compare my ideas or methods with anyone. You really need that."

"Management needs this too. Board members and administrators might have a look at innovative and exemplary programs from across the nation. And we could share a few ideas on tape with others, too. We have a rare mix of excellent staff/programs here." (Ketchikan Teacher)

Administrators reacted positively to the concept of the Electronic Mail System and the use of facsimile and teleconferencing to expedite administrative communications with the Department of Education as well as with other districts. Many expressed the desire that training and operator language be as simple and direct as possible.

Local administrative support. The Alaska State Legislature, the Board of Education and Alaska's local education agencies have exhibited strong support for ETA's goals and objectives. The Tenth Alaska State Legislature referred to ETA as a multi-year federal/state/local program, and appropriated $450,000 for FY 79 ETA activities with an ongoing commitment to the four-year life of the project. The State Board of Education, in its policy statements adopted February 10, 1978, "supports the Department of Education's efforts toward the establishment of an alternative system of educational program delivery based upon a cost effective system of telecommunications and educational technology." Local educational agencies, exhibiting their commitment to ETA's goals and objectives are provided, as a part of this appropriation, a minimum of 10 percent matching of FY 79 state monies appropriated to the ETA project. ,

School districts and regional resource centers involved in the Electronic Mail System (EMS) pilot project during March and April of 1978 expressed strong support for the statewide Administrative Communications Network. Evaluation of the pilot project resulted in school administrators' endorsement of the network as being able to replace a vast majority of long-distance telephone calls between districts, regional resource centers, and the State Department of Education. In a state where personal contact and telephone communications have historically been viewed as meaningful modes of communication, EMS users found use of the electronic communications did not depersonalize communications nor detract from the effectiveness of the intended communications.

The pilot test of the EMS system demonstrated the capacity to insure confidentiality of information as required by the users. Users found the equipment easy to use and were pleasantly surprised to realize the multitude of current and potential applications. Local and regional educators have voiced support for ETA on a number of other occasions. For example, at the Southeast Regional Resource Center Board of Directors meeting, school administrators wanted to know the procedure for obtaining additional communications terminals in order to have a unit in each principal's office. School administrators at the Western Regional Resource Center Board of Directors meeting wanted to set up a regional pupil personnel service on the EMS. At the Alaska Association of School Administrators annual conference, the ETA presentation drew the largest number of participants of any of the conference sections. For those administrators not involved in the EMS pilot, many appeared to be impressed by the cost efficient off-line store and forwarded features of the EMS hardware. ETA presentations at the annual meeting of Alaska

State School Boards in Fairbanks resulted in several board members volunteering their districts as sites for ETA pilot tests and school board members to serve on curriculum advisory boards for ETA instructional components. Cost-efficiency of the EMS elicited a generally favorable response from school board members. School board members from smaller rural districts were very interested in school finance and instructional program assistance components of ETA.

Historically, education is the largest single legislative appropriation in Alaska. Because of a prevailing philosophy of local control, coupled with cost-efficient and user-driven characteristics, ETA proved to be readily acceptable to local education agencies.

Rural secondary education. A recent NIE publication entitled "Economy, Efficiency and Equality: The Myths of Rural School and District Consolidation" by Sher and Tompkins discusses the issue of rural school consolidation. The authors state that:

> The most successful implemented educational policy of the past fifty years has been the consolidation of rural schools and rural school districts. One room, multi-graded elementary schools have been eliminated in favor of larger, many-roomed, age-graded schools. Small rural high schools have been closed down and new, centrally-located schools built to which most students are bussed. Small school districts have been merged with neighboring ones and larger schools have been built within the new district. (p.1)

The authors note that school consolidation was based on the notions that "bigger is better," and that economy of scale provides the possibility for "a reform of unlimited potential for solving most of the problems long considered the hallmark of rural education." The only objections to consolidation historically came from parents who did not want their children to travel to distant communities or feared the effects of the consolidation on the life and vitality of their individual communities. However, these individuals had to concede that

consolidation would save money through a combination of scale economics and increased operating efficiency. Everyone asumed that the better qualified administrators and teachers attracted to consolidated schools would provide a higher quality education than their less credentialed rural counterpart.

The authors note that:

Given the enthusiasm with which professional educators encouraged consolidation, one would expect the empirical evidence supporting their assertions (about the advantages of consolidated schools) to be overwhelming. It is not. The supporting evidence is incomplete—many critical questions and potential liabilities are simply ignored. It is methodologically unsound, with almost every study open to criticisms severe and significant enough to make their findings extremely suspect. The conclusions are, at best, inconclusive; and at worst, simply incorrect. In short, there is no strong empirical base to support the assumptions and assertions of school and district consolidation advocates. Thus, while consolidation has become the conventional wisdom in rural education, careful scrutiny of the available evidence makes the adoption of this particular policy appear to be more conventional than wise. (pp. 3-4)

Consolidation of rural schools in Alaska had, at one time, taken the form of the boarding school at the secondary level. With the sparseness of population, distances involved, and difficulties of transportation, the bussing model has not been appropriate for the state. The negative social and personal consequences of the separation of secondary students from their families and communities through attendance at such boarding schools were tremendous. Based on the evidence and the desire of Alaskans for equality and local control in education, legislation was passed which decentralized the state-operated system of rural schools. Despite the absence of local government, the state created 21 new regional school districts. In addition, the legislation was sensitive to an issue raised by a major Alaskan court case (Tobeluk vs. Lind) which focused on the need to provide education at or near the student's place of residence.

One of the provision in the legislation requires that secondary education be provided regardless of the number of students. In the Bristol Bay area (Region #4) the operational definition of this provision is to initially provide a ninth and/or tenth grade program in each village where there is an eligible secondary student or students. Though the implementation of rural secondary programs varies across the parts of the system, the problems of providing a comprehensive secondary program with limited staff and facilities and under isolated conditions are similar. Thus in rural secondary education:

> There is a need to provide direct instructional and teacher support
> to rural secondary schools in those situations where limited staff
> requires the teacher to serve in the role of facilitator of learning
> rather than providing direct instruction in the conventional sense.

## Instructional Needs Survey

In June 1978, the Alaska Department of Education conducted a statewide survey to determine the needs for assistance and services that Alaskan schools had identified in their efforts to improve education for children in Alaska.[3] The areas of reading, math, and communication skills ranked high among school district choices of areas in which they desired training or assistance in program planning and development. Eighty-one percent (81%) of the districts involved in the survey identified secondary level reading as a critical or important area for assistance; 65 percent identified secondary level mathematics, and 75 percent identified secondary level communication skills as critical or important areas meriting assistance. In a needs survey conducted by the ETA Project in February 1978,[4] English and Math were cited by both

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[3]Needs Survey, Alaska Department of Education, Program Development and
  Dissemintion Unit, June 15, 1978

[4]Needs Assessment Regarding Instruction via Audio Telecommunications,
  Northwest Regional Educational Laboratory, 1978

school staff and community representatives as courses currently not well covered in high schools. Students in this survey identified English, math and science as candidates for upgrading. English and math ranked highest among community representatives as top choices to further program development.

In line with the Alaska State Board of Education policy that "clearly stated goals, with regularly reported progress toward specific objectives are essential at each educational level," student diagnosis and record keeping became a vital component of ETA's scope of work. With increasing emphasis being placed on individual educational plans and educational management by objectives, greater demands are being placed on the time and resources of the classroom teacher and pupil personnel staff in the areas of student diagnosis and record keeping. This increased demand is accented in the small rural school settings where a limited staff must be responsible for a variety of subject matter areas and varying individual needs.

Generally, the emphasis on preservice training for secondary teachers is focused on group instruction. This often leaves the rural teacher unprepared for individualized instruction in a number of academic areas. Assistance in student diagnosis and individualized instruction then becomes critical. Poor communications, distances, and lack of readily available resource hinder teacher attempts to acquire assistance in these critical areas.

ETA's use of telecommunications and educational technology in the area of student diagnosis and instruction is designed to meet a vital need in Alaskan schools. This model is in accordance with the policies of the Alaska State Board of Education which support efforts to establish alternative systems of educational program delivery, particularly those

based on a cost effective use of technological developments in education and communication. The specific component of ETA designed to fulfill this need at the classroom level is the Individualized Study by Telecommunications (IST).

## INDIVIDUALIZED STUDY BY TELECOMMUNICATIONS

Flexibility and responsiveness to individual needs of teachers and students in remote locations were key requirements in designing an instructional model for use in Alaska's secondary schools. An intensive study of a range of instructional alternatives was conducted by the Educational Telecommunications for Alaska Project. The resulting model, representing an optimal combination of audio and computer technology, printed materials, and potential use of a telecommunications network, was designed and developed under contract by the Northwest Regional Educational Laboratory (NWREL). This model, known as Individualized Study by Telecommunications (IST) has been designed specifically to assist the Alaska Department of Education in its efforts to support rural districts in providing a quality secondary education.

The IST model focuses on the full range of teaching resources available in the state of Alaska to provide a comprehensive curriculum for even the smallest and most remote village that is served by a reliable telephone link. The model is designed particularly to meet the needs of teachers faced with the task of teaching a number of courses to a variety of age groups. The IST model uses selected features of instructional technology to provide the many detailed and repetitive features of well-designed individualized instruction, thus allowing the

teacher to concentrate on instructional areas in which personal interaction is most essential and productive.

Each Individualized Study by Telecommunications course constitutes a full year of instruction in a core area. The courses are designed primarily for use with ninth and tenth grade students in rural schools. Each course can be used in its entirety as a full course of instruction or serve as enhancement to regular classroom instruction through the use of selected IST components. The division of the courses into semesters, and the further division of those semesters into units which address specifically-defined skills and concepts, allows for flexible student entry and individualized progress.

Individualized Study by Telecommunications consists of four major components:

a. Basic Course Materials

b. Audiotapes

c. CAI/CMI

d. Human Component

Various patterns of interaction among the four components is made feasible by telecommunications. Different combinations of components can be used according to the needs of teachers and students.

Basic Course Materials. Basic course materials have been drawn from commercially published textbooks and/or Alaska State Department of Education Centralized Correspondence Study courses. IST Teacher Guides and Student Manuals are designed to expand on the core materials. The guides, manuals, worksheets, and other written materials are developed by Northwest Regional Educational Laboratory/Educational Telecommunications for Alaska Staff and serve to coordinate all components of the IST model for each course.

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Audiotapes. The audio component of the IST model consists of audiotapes developed and produced by NWREL/ETA staff. Audio tapes are used for various purposes and are in various formats—lecture, guided reading, or dramatization. Many tapes have accompanying Listening Guides (tape-interactive worksheets).

CAI/CMI. The computer-assisted instructional component consists of activities developed by NWREL to provide drill and practice of skills and vocabulary; review of skills and concepts; skills testing; and simulation and problem solving activities.

Additionally, a computer-managed recording and reporting system is provided which maintains information in regard to test results and student progress. A list of keyed objectives is provided for the tests which makes it possible to monitor student mastery. The test results and student progress records are available onsite and to the Department of Education.

Human Component. The fourth component, the human component, consists of onsite personnel and support personnel. The onsite person, the supervising teacher, is hired by the participating local school. The supervising teacher is the classroom teacher who is directly responsible for the daily instruction of participating students.

In the IST model, the role of the supervising teacher is a combination of instructional manager and traditional teacher. IST courses provide student instructions, materials, information, activities and tests in such a way that teachers can focus on supporting interactions among students and/or between teacher/student when desired and on providing students with psychological and emotional support.

Beginning with the 1980-81 school year, the Department of Education added three (3) full-time positions to the ETA project. The IST Trainer positions were developed from the original "course coordinator" concept with modifications based upon the needs that were identified during the first year of pilot testing.

There are three IST Trainers: one to serve the schools of the southeast area, one to service the students and teachers of the central area and one to service the students and teachers of the northern and interior areas. Each trainer serves as a communication link between and among the pilot test sites. Assistance to supervisory teachers covers a wide range of needs:

- o  **Materials**: IST Trainers check to see that each site has received all of the IST materials necessary to proceed with the site-selected courses. Locating and forwarding missing or lost materials falls within this responsibility.

- o  **Utilization**: IST Trainers provided regional training workshops for all participating schools at which time the materials, their content, the design of IST, the equipment and its set-up and operation were reviewed. This type of assistance will continue throughout the year as there are a minimum of three visits per site planned.

- o  **Evaluation**: IST Trainers will collect evaluation data and assist with CAI evaluation as directed.

- o  **Information and Referral**: IST Trainers will provide information directly to supervisory teachers or will serve as referral agents--locating the necessary information or directing the teacher to the appropriate source. IST Trainers are reviewing course content to enable them to provide content assistance when needed.

- o  **Equipment Assistance**: The IST Trainers are the contact person for questions about hardware and software problems. They will attempt to narrow the focus to either a specific hardware or software problem and then refer the problem to the appropriate source for assistance. (The original sites still have their equipment maintained and repaired by the project. New sites are responsible for their own arrangements.)

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o    <u>Contact/Communication Between Sites:</u>  The IST Trainer's role
     includes facilitating the flow of information between and among
     the 30 schools participating in the 1980-81 pilot test sites, as
     well as providing directly to all sites information regarding
     effective techniques and methods for implementing the IST
     model.  One potential strategy is to make use of a project
     newsletter.  Another planned approach is to contact each site at
     least twice monthly either by telephone or by an actual visit.
     (At least three such site visits are to occur during the school
     year.)

<u>Needs Addressed by Individualized Study by Telecommunications</u>.  The

Individualized Study by Telecommunications (IST) model addresses some of

the most serious problems faced by the Educational Telecommunications for

Alaska Project (ETA) in providing a comprehensive secondary curriculum

for rural Alaska schools.

First, by utilizing existing correspondence study courses and

commercially published text materials, it becomes possible to

significantly expand the course offerings in rural schools within the

lifetime of the project.  The adaptation of existing materials to the IST

model makes it possible to produce a greater number of high quality

courses than would be feasible within the limitations of project time and

resources if such courses had to be designed and developed <u>in toto</u>.

Second, the participation of Alaska educators in determining

priorities for developing IST programs, making selections from among

existing materials, and recommending modes of delivery assures that

courses developed will be appropriate for the target population.  In

addition, the participation of Alaska teachers from target schools on

course review committees that assist with and monitor the development

process, aids acceptance and institutionalization of IST products.  This

multi-phased involvement of potential users ensures the responsiveness of

the model to the needs of students and teachers in Alaska's secondary

schools.

Third, the IST model produces highly reliable courseware. Temporary equipment failure in the audio, CAI/CMI, or Electronic Mail System components does not have a catastrophic effect on student progress. It is possible for a student to complete a course even if all technological components fail completely. This fail-safe design is essential in rural Alaska. Because of the extreme climate and vast distances that preclude normal repair procedures, equipment failures are common and are occasionally of extended periods of time.

Fourth, IST courses are designed in such a way that they can be implemented effectively by teachers who may not have expertise in the particular subject area. Comprehensive teacher materials, suggestions and references assure responsiveness to the needs of teachers in remote locations who are faced with teaching a variety of courses.

Finally, the IST course development process provides a potential model for further course development which can be carried out by the state and by local districts. The involvement of Alaska educators throughout the development of IST courses thus far has served to build capacity within the state for continuation of the effort. Once development and delivery systems for IST have been designed, tested and refined by ETA, their application by the state and by local districts can most likely be continued.

SECTION II:

ROLE AND PURPOSE OF

INDIVIDUALIZED STUDY BY TELECOMMUNICATIONS

# INSTRUCTIONAL USES OF COMPONENTS FOR
# INDIVIDUALIZED STUDY BY TELECOMMUNICATIONS

Individualized Study by Telecommunications courses are designed to accommodate secondary students of various ability and interest levels. The structure of the courses permits responsiveness to individual teaching and learning styles. Factors relevant to Alaska rural education situations, such as inconsistent local attendance patterns, are accommodated in the model. All materials are designed in a manner which allows for effective implementation by a teacher who does not have expertise in the particular content area. Course development is consistent with the user-driven and user-oriented approach of the Educational Telecommunications for Alaska Project.

All components of an IST course are designed to fit together as an integrated package which constitutes a full year of instruction in a core curriculum area. The courses are designed specifically for secondary students in rural Alaska environments. In order that isolated students might fully accomplish the purposes of a course within the constraints of their educational setting, broadening experiences are provided by IST-developed materials.

The Individualized Study by Telecommunications model has four major components: an audio component, a computer-assisted/computer-managed instruction component, a written component, and a human component. The instructional uses and purposes of each component are discussed in the narrative which follows.

## Audio Component

The audio component of the IST model consists of cassette tapes developed to fulfill particular instructional needs for specific lessons within each course. The audio portion of an IST course utilizes tapes for the following purposes:

o   Providing motivation and background information

o   Introducing vocabulary and terminology

o   Indicating key questions which serve as advance organizers which guide the reading of written materials

o   Introducing and providing primary instruction on concepts and skills

o   Giving directions for activities

o   Providing answers and explanations for activities

o   Providing enrichment and extension of concepts

A variety of formats are used for delivery of information via the audiotapes. Tapes may be presented as lectures, dramatic episodes, teacher-student dialogues, small group discussions, narrations or interviews. The format used is that determined to be most appropriate for the instructional purpose.

The audio component often has much the same function for IST courses as does the classroom teacher in other courses--provision of major instructional information. Hence, scripts are written to introduce and reinforce important skills and concepts, to supplement information presented in written form, to provide new information or further explain potentially confusing information, to add variety or to repeat in aural form information which students might have difficulty reading.

Some tapes are developed in a read-along format. On such tapes, written material essential to the course content is narrated verbatim so that students can follow the tape as they read the material. These tapes serve to remove barriers generated by deficits in reading skills and thus enable students to focus on the essential concepts within the printed material.

Many of the tapes in IST courses are accompanied by tape-interactive worksheets known as Listening Guides. This format makes it possible for students to confirm in writing their understanding of the concept being taught and to receive immediate feedback on, and explanation of, correct responses. Again, this approximates teacher-student interaction found in traditional classroom settings.

## Computer-Assisted/Computer-Managed Instruction Component

The Computer-Assisted Instruction (CAI) component of each IST course contains activities developed for the following instructional purposes:

o   Drill of facts

o   Application of concepts

o   Presentation and drill of vocabulary

o   Development of problem-solving skills

o   Review of facts and concepts

o   Testing

One major advantage of the computer component is its capability for providing immediate feedback to student responses. Not only can the computer indicate instantly to the student whether a response is correct or incorrect, but the student can call up a "help screen" designed to provide information directly related to the specific question. Help

screens, a student-controlled option, summarize the relevant information or direct the student to other appropriate material for additional assistance. In addition, instructional text screens which display brief reviews of essential skills, concepts and problem-solving steps are provided. These text screens are displayed automatically and may also be recalled by the student as needed.

The motivational properties of computer-assisted instruction are an important aspect of this component of the IST model. The favorable responses of students thus far to the computer component have enhanced learning and have ensured mastery of skills and concepts with greater precision than is possible with more traditional approaches to drill and practice.

Several types of computer activities are included in IST courses. Each is designed for a particular instructional purpose.

Drill of facts. These computer activities are designed to provide drill and repetitive practice on a small group of facts—for specific sections of a course.

Application of concepts. A number of activities for the computer are designed to emphasize application of facts and concepts presented in an IST course. The exercises in these activities provide opportunities for students to confirm their understanding of the concept which had been presented in instruction preceding the computer activity.

Presentation and drill of vocabulary. Essential vocabulary for specific lessons or topics are introduced in vocabulary computer activities. Illustrative sentences are presented for each term; these sentences can be called up by the student as a "help screen." Exercises which provide for matching of each term with its definition follow the

presentation of the illustrative sentences. Vocabulary computer activities are designed to aid student mastery of key terms essential for understanding of concepts and to enhance the ability of the student to comprehend printed information dealing with the concept.

Development of problem-solving skills. Problem-solving and simulation computer activities are designed to enhance instruction of concepts and to provide creative opportunities for students to apply critical thinking and problem-solving skills.

Review of facts and concepts. IST courses may contain computer activities which provide systematic review of facts, concepts and skill presented in a lesson. These activities serve to identify for students those areas in which they need additional instruction and practice.

Testing. Pretests, generally presented at the start of lessons in some IST courses, are designed to test student understanding of skills or concepts developed in a lesson. Students demonstrating mastery of lesson content prior to instruction are moved on to the next set of activities. Pretests serve a diagnostic function consistent with the concept of mastery learning.

Lesson and chapter tests are used to assess student mastery of major concepts and skills presented. These posttests, keyed to objectives, continue the diagnostic process and identify those students needing additional instruction and practice.

Summary tests are used to conclude units and/or semesters. These tests assess student mastery of major concepts and skills across lessons.

Computer-Managed Instruction. The IST system uses student records to control the sequence of computer activities for each student. The IST

terminal provides a number of computer-managed instructional functions through the use of curriculum drivers.

The Student Management System designed for IST courses allows for easy access to a complete record of student computer activity progress. Information on test scores, mastery of objectives and location in the course can be retrieved by the supervising teacher for each student at any time.

Student sessions at the IST terminal are managed automatically by the system. Duration of sessions is established and monitored by the system; when the time of an individual student session has been used up, the system saves the student status information and restarts the student at the same place for the next session.

The two primary functions of the IST system are expressed in modes: instructional mode and supervisory mode. In the instructional mode, the IST terminal is used to provide computer-assisted and computer-managed instruction to individual students. In the supervisory mode, the IST terminal is used to provide the teacher with a means of observing and modifying student progress through course materials.

## Written Component

The written component of the IST model is comprised of printed materials from revised correspondence study courses and/or, commercially-published course materials and IST-developed student and teacher materials.

Print materials. Already developed print materials, in the form of commercial text or revised correspondence study course materials, serve as the core of IST courses. These materials, adapted or used as is,

provide basic course content information: concept presentation and development, skill introduction and instruction, and enrichment. The body of information contained in the print materials selected for use with an IST course constitutes the primary reading portion of the course. Where needed, supplemental print materials are incorporated to provide enrichment and concept extension.

IST student and teacher materials. Student materials developed specifically for IST courses include worksheets, Listening Guides, Lab Guides, written introductions, instruction sheets, direction sheets and readings to accompany computer activities.

Worksheets are developed for the purpose of providing students with experience in formulating their own thoughts and expressing themselves in writing and for the purpose of recall and written application of skills and concepts.

Many worksheets are objective in nature; this allows for easy scoring. Such worksheets serve an instructional function similar to that of drill and practice computer activities. Other worksheets contain essay or open-ended exercises and approximate in written form opportunities for critical thinking and expression of thought provided in traditional classrooms through discussion experiences.

Supplementary worksheets are also developed for IST courses. These worksheets are keyed to specific skills or concepts and are for optional use with students needing additional drill and practice.

Listening guides and lab guides are alternate forms of worksheets developed for IST courses. Listening guides are audiotape-interactive worksheets which call for specific actions on the part of the student while listening--answering questions, filling in blanks, underlining,

circling locations on a map, and so on. The Listening guide provides written opportunity for students to confirm their comprehension of concepts. Lab guides are designed to accompany hands-on activities. These guides provide step-by-step directions for carrying out application activities and serve as the mechanism for recording observations and findings from the activity.

IST student materials may also include written information which serves to introduce a selection in a text. These introductions are used to prepare students for the reading assignment by providing background information and setting a context for the selection to be read.

Student instruction sheets are developed for IST courses to delineate requirements for completing projects and written assignments. Projects are included in IST courses in order to provide for application and expansion of skills and concepts, particularly in the higher levels of thinking. Several choices are given for each project; this permits greater individualization through teacher guidance.

Some computer activities in IST courses are accompanied by one or two-page reading selections. These selections, which provide narrative essential for the exercises in the activity, are included in student materials so that they can be read before the student begins the activity. This minimizes the time spent at the terminal.

Teacher materials developed for IST courses include a detailed course explanation and rationale, instructions for use of the course, teaching strategies, optional activities and copies of all student materials. These materials are designed to make effective implementation of the IST course possible.

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## Human Component

The IST model is sufficiently flexible to accommodate a variety of teaching situations and teaching styles. Hence, the instructional function of the human component at the local school level--a supervising teacher--is determined at that level. The supervising teacher for an IST course may therefore choose to take a traditional role, may serve as an instructional manager, or may alternate roles as needed. At the discretion of local sites, teacher aides and peer tutors may also be used to assist students enrolled in IST courses.

Back-up support to teachers implementing IST courses is provided by three full-time IST trainers hired by the Department of Education. These trainers serve as a communication link between and among IST pilot test sites and provide assistance to supervisory teachers on all facets of the model.

SECTION III:

COURSE DEVELOPMENT PROCESS FOR

INDIVIDUALIZED STUDY BY TELECOMMUNICATIONS

# SELECTION OF COURSE AREAS

In 1978, an extensive study[5] was conducted under contract by NWREL for the ETA Project in order to identify instructional needs of rural Alaska schools at the ninth and tenth grade levels. The study focused on the identification of those aspects of the school program perceived as requiring strengthening or reinforcement--particularly if such strengthening or reinforcement could be effected by means of audio telecommunications. Data derived from existing records and data derived from perceptions of principals, curriculum directors, teachers, students and community members were analyzed. Sites studied were representative of Alaska's ethnic and geographic diversity.

Conclusions of the study were as follows:[6]

1. In regard to actual courses offered:

   o   Math courses were not uniformly available to students at all sites

   o   Great disparity across sites existed in the range of language arts offerings available to 9th and 10th grade students

   o   Great disparity existed in the number of science offerings and the availability of such offerings to 9th and 10th grade students

   o   Over half of the schools surveyed found it necessary to restrict 9th and 10th grade offerings in physical education to less than a full course

   o   The breadth and depth of offerings in the social sciences was influenced by community and school population size, number of staff members, and remoteness of the school. Students attending a large metropolitan school were at a distinct advantage with regard to selection of social science units

[5] Forbes, Emberlin, Greene, Edwards. _Needs Assessment Regarding Instruction via Audio Telecommunications_, Northwest Regional Educational Laboratory, March 1978

[6] Richardson, Hansford, Greene. _A Summary of Perceived Curriculum Needs Pertinent to the Educational Telecommunications for Alaska_, Northwest Regional Educational Laboratory, March 1978

2. In regard to adequacy of subject coverage:

   o School staff members most frequently indicated that English and Vocational Education were courses not covered well in high school.

   o Students indicated that English, History, Science, Physical Education/Health and Mathematics were not well covered.

   o Community representatives most frequently indicated English and Mathematics as the subjects not covered well by high schools.

   o English is the one subject indicated as not being well-covered by all three respondent groups.

3. In regard to courses needing improvement:

   o School staff members most frequently chose Science, English and Vocational/Career Education as courses needing upgrading.

   o Courses most frequently chosen by community representatives for upgrading were English and Mathematics.

   o English was a course perceived by all three respondent groups as needing upgrading.

A summary of the overall study data led to the major conclusion that Alaska schools varied considerably in their coverage of basic subjects. For some schools, therefore, almost any addition to the curriculum would be welcomed; for others almost any addition would be superfluous. In light of these findings, the decision to select and provide curricular offerings was identified as a policy question: Should the focus of the ETA Project be on bringing those schools which have an impoverished curriculum up to a minimal standard, or should the ETA Project address both purposes by providing a full entry level course in one core area, an elective course in another core area and, perhaps, a course in a non-core area? A combined approach was utilized.

Initially, Alaska History and science were selected as the first two courses to be developed for Individualized Study by Telecommunications. Adapting science correspondence study materials to the IST model proved, however, to be so difficult and costly that science was dropped and an alternate course sought.

The needs assessment had earlier afforded a clear indication that the ETA Project would be strongly supported in focusing its first efforts on the area of English, as this subject was frequently chosen as a subject not well covered, as a course to update, and as an appropriate subject for audio instruction. Thus, English was selected to be developed as a full entry level course in a core area in place of Science.

An Alaska History course was chosen as the second of the first series of courses to be developed through the ETA Project on the basis of recommendations of an advisory committee composed of teachers and administrators from throughout Alaska. The Alaska History course would constitute an elective course in a core area.

## THE DEVELOPMENT AND ADAPTATION PROCESS

The Individualized Study by Telecommunications (IST) English course was developed from the Alaska Department of Education Centralized Correspondence Study course entitled A Course in Beginning English. The IST Alaska History course was based on an Alaska History course also developed by the Department of Education Centralized Correspondence Study division.

Both of these correspondence courses were assumed to be appropriate for the IST population--rural ninth and tenth graders who often have a

reading level approximately two years below grade level.[7] As initially envisioned, therefore, adaptation of the courses to IST format would involve the creation of computer activities for drill and practice, audiotapes to reinforce essential concepts and enhance student involvement in the course materials, and an IST teacher guide. Within this framework, procedures were to be developed to provide interaction via telecommunications with a content specialist. No changes in the written text of the courses were anticipated.

Early in the development process, however, it became evident that revisions and modifications of the correspondence course materials would be necessary. Differences in the audience and the method of presentation had become obvious; that is, the IST students and the IST course format were different from the audience and format for the correspondence courses.

As work progressed on the IST courses, a gradual evolution of the development and adaptation process occurred. The flowchart shown in Figure 1 represents the process used for development of the IST English and Alaska History Courses in 1979.

Two additional courses were selected for development for Individualized Study by Telecommunications during 1980. Based on the findings of the earlier assessment and the recommendations of the advisory committee, the Department of Education indicated that General Mathematics and Reading were the core areas to be developed under the IST model.

On the basis of formative evaluation data compiled during the development of the first two IST courses, the Department of Education

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[7]As indicated by statewide assessment.

# INDIVIDUALIZED STUDY BY TELECOMMUNICATIONS

## ENGLISH AND ALASKA HISTORY COURSE DEVELOPMENT

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1 [Indepth      2 [Development   3 [Computer     4 [Draft of        8 [Committee    10 [Signoff by      13 [Production &    16 [Delivery
  Preview]         of              Systems          Student            Review]          Committee           Editing of          to DOE]
                   IST]            Review]          Manual]                             Heads]              Audio Tapes]

                                                  6 [Internal                        12 [Revision]                        15 [Duplication]
                                                    Review]

                                                  5 [Draft of       9 [Revision]                           14 [Curriculum   17 [Distribution
                                                    Teacher                                                    Entry]           to Sites]
                                                    Guide]
                                                                   11 [DOE
                                                                      Review]

                                                  7 [Revision]
```
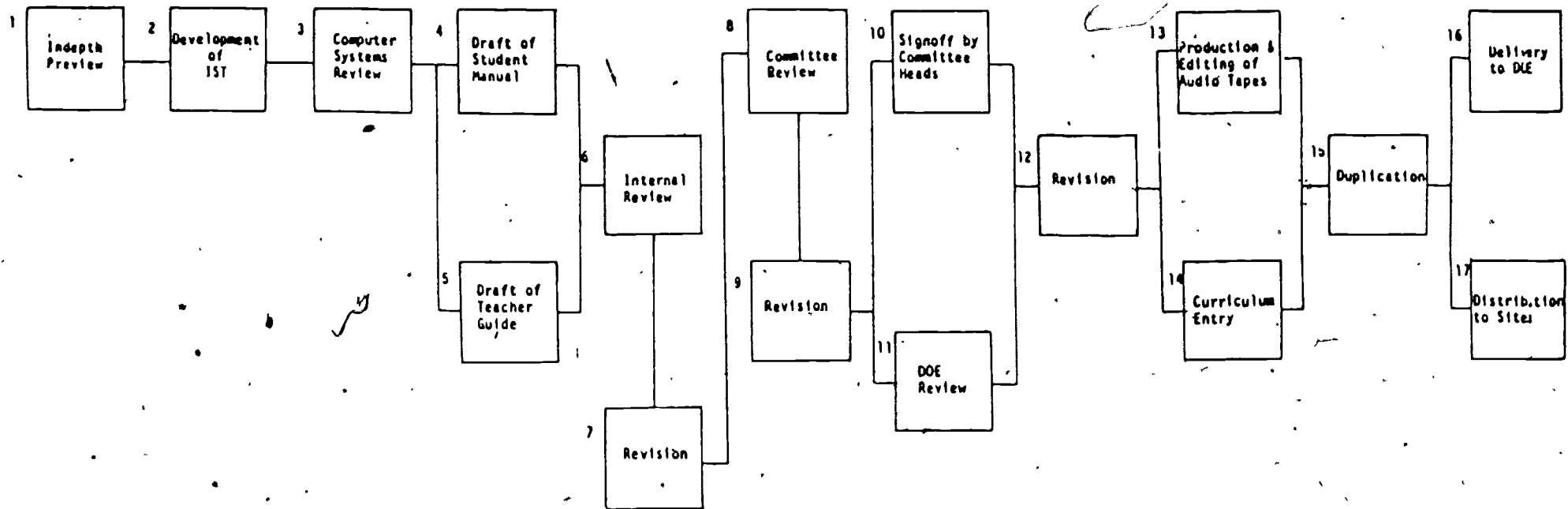
recommended that course materials to be adapted for future courses be
screened prior to development for appropriateness for the target
population, readability and adaptability to the IST model.  Materials to
be examined were drawn from the commercially-published textbook series as
well as from correspondence study courses and an additional step was
added to the development process, the previewing of candidate course
materials.  The flowchart in Figure 2 represents the current process
determined at this time to be most appropriate for development of
Individualized Study by Telecommunications courses.

## Screening and Selection of Courses

The initial step consists of intensive screening of commercially
published materials, correspondence study materials and suggested
locally-developed courses by a Review and Nomination committee comprised
of NWREL Alaska Telecommunications Program staff and subject area
consultants.  Subject area consultants are selected for both their
familiarity with the target population and their knowledge of the content
field.

All course materials are screened initially to verify their
eligibility for consideration.  The following preliminary criteria must
be met:

o   The course must be a standard course offering in secondary
    schools in the U.S.A.

o   The course must cover two complete semesters.

o   The course must contain textual materials, an identifiable scope
    and sequence, a student workbook (or equivalent materials) and a
    teacher guide.

o   The course materials must be available in large quantities from
    a commercial publisher or other 'curriculum development project.

o   The copyright date of the course must be current.

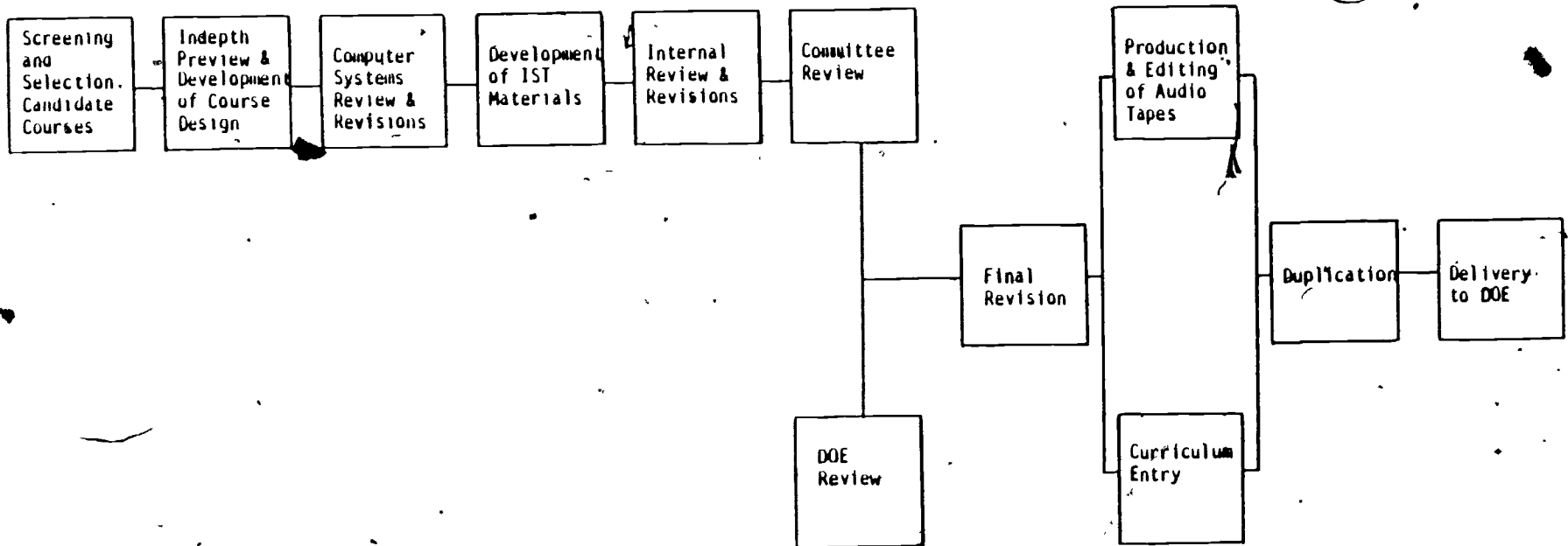INDIVIDUALIZED STUDY BY TELECOMMUNICATIONS

COURSE DEVELOPMENT PROCESS



Figure 2

Eligible course materials are then reviewed in detail by the committee. A course summary which addresses the following criteria is generated for each set of course materials:

o Reading level of materials is at or below 8th grade.

o Sufficient quantities of supplementary materials are readily available.

o Defined scope and sequence and a complete teacher's guide containing suggested class/student activities and projects are available.

o Copyright release license requirements are assured.

o Course is organized and complete.

o Course is adaptable for unique requirements of Alaska (within project constraints).

o Course exhibits usability and flexibility.

o Course content is complete and of high quality.

o Course avoids stereotyping or bias.

o Course is compatible with IST software.

After the reviews are complete, a summary across sets of course materials is generated for each subject area under consideration. The ratings for each set of materials are compiled and candidate courses are ranked in order of recommendation within subject area.

All ratings and descriptions of candidate courses are compiled into a report which is delivered to the Alaska Department of Education along with copies of the course materials listed in the document as potential candidate courses. On the basis of this report, the Department of Education selects course materials to be adapted for Individualized Study by Telecommunications.

## Indepth Review and Development of Course Design

The preliminary course design for each IST course is developed by a committee comprised of Northwest Regional Educational Laboratory-Educational Telecommunications for Alaska staff and two subject area consultants. The committee analyzes the selected course materials in detail, lesson-by-lesson. During this process, essential concepts and objectives are determined and potential problems and solutions are identified. Suggestions are made for the appropriate use of audiotapes, computer activities, worksheets and projects; effective teaching strategies are also recommended. Areas in which supplementary materials would be appropriate are identified and, when possible, specific materials are suggested. A bias review is conducted as the committee proceeds through the materials. All decisions and recommendations made by the committee are recorded in Chart format; these detailed charts and an accompanying narrative serve as the development plan for the IST course.

## Computer Systems Review and Revision

Working from the preliminary course design, the instructional development team identifies the types of computer activities most appropriate to meet lesson objectives. As a result of periodic enhancement and modification of the IST system software, the development of computer activities has gradually been refined. An essential step in the development process is the review of proposed activities, screens and formats by the computer system specialist.

Sample computer activities are drafted by the instructional development staff incorporating any recent software enhancements. The sample activities are checked by the system specialist for appropriateness and feasibility. It is at this point that the most

effective uses of the computer for a particular course are determined in
terms of available time, fiscal and human resources.  In addition,
unrealistic uses are identified and deleted from the development plan.

## Development of IST Materials

During this phase, decisions are made as to how best to implement the
recommendations delineated in the course development plan.

Secure copyright releases.  Copyright permission is obtained as
needed for use of published materials in alternate format (such as
audiotape or computer activity).  In some cases a fee is charged for use
of materials; usually permission is granted without charge because of the
educational use of the material within a specific state.

Course goals and objectives.  Course goals and objectives ae examined
closely during the Indepth Review phase and those identified as essential
to the course are emphasized in the IST version.  During development,
objectives are put into a form requiring specific student behaviors so
that mastery can be determined.  The objectives also identify for the
student the information which will serve as the basis for each skills
test.  Tests and supplementary materials are tied to these objectives.

Draft of student and teacher materials.  The drafting of student and
teacher materials occurs simultaneously.  Much of the emphasis in IST
materials is on filling gaps identified in the commercial materials in
skill and concept instruction.  In addition, materials are adapted in
such a way that they have relevance to the target student population.

o    Computer activities and tests

Many computer activities, particularly those which provide
drill and practice of skills, are adapted from exercises in the

student text or workbook. Others are created from suggestions in the teacher guide; a number are created outright. Questions on the computer generally take the form of multiple choice or fill-in; some include the use of graphics such as maps or timelines. Modification of exercises or activities in the commercial or correspondence course materials is generally needed to accomplish a match with the computer format.

Instructional computer activities contain synopsis screens which summarize the skill or content area covered in the activity, directions screens, and "help" screens. These must be adapted from the text to computer format or developed to meet the requirements of the particular activity.

Tests on the computer are created or adapted from existing materials in the same manner, except that tests have no help screens or examples. Objective screens are developed for each test; these identify skills not mastered and direct the student to appropriate supplementary materials. The objectives are those identified earlier as being essential to the course; the supplementary materials referenced are identified or created by the IST instructional development staff.

A system was developed for the computer which permits the teacher/supervisor to check both test scores and specific objectives missed by each student. Individual student progress information is stored on the computer in such a way that easy access to a complete record of student computer-activity progress is possible. This "Student Management System" is consistent across all IST courses.

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o   Audio Scripts

Tape scripts are written in order to accomplish specific purposes identified during the course development planning process. General purposes of the tapes are to: provide initial instruction, review information, guide reading of selections, add variety and stimulate interest, and repeat in aural form information which students might have difficulty in reading. Various formats are used in developing audioscripts; lecture, narrative of a reading selection, dramatization, and so on. The suggested format and purpose for each tape is recommended during the course development planning process. The majority of tapescripts for IST courses are created to meet a specific need. Occasionally, copyright permission is obtained when appropriate published selections are used. In a few instances, commercially-developed cassette tapes have been identified and supplied.

As tapescripts are written, listening guides are developed as needed. Listening guides are interactive worksheets which require student response to the taped material. Some listening guides are adapted from existing course materials, others are created to fulfill a specific purpose for the particular lesson.

o   Worksheets

Six major types of worksheets are developed for use with IST course materials: listening guides, lab guides, challenge worksheets, application worksheets, written reviews and written tests. Decisions regarding inclusion of worksheets in lessons and the type of worksheet appropriate for a particular lesson

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are made by the review committee during the course development planning process. Each worksheet is designed to provide students with written application and/or practice in a particular set of skills or concepts. Format decisions are therefore influenced by the most appropriate presentation of the skill or concept.

Listening guides, as described earlier, are generally created specifically for use with an audiotape. Answers to all items in the listening guide are given on the tape; a key for each listening guide is also created for inclusion in the IST Teacher Guide.

Lab guides are generally created in such a way that they provide enrichment and application experiences which parallel regular course activities. Occasionally an audio tape is developed to accompany a lab guide. Lab guides usually provide opportunity for hands-on experiences; materials needed are either listed (if readily available on site) or provided through the IST course.

Challenge worksheets are optional worksheets which are designed to provide stimulation and enrichment for students of high ability. These worksheets are designed and developed to fit particular lessons within the course or selected from existing materials; keys are also-developed.

Application worksheets, designed to provide drill and practice for skills emphasized in the IST course, are frequently adapted from text or workbook materials. Others are created to parallel computer drill and practice activities. Worksheets

which are text or course materials-specific often include page

numbers for student reference. Keys are developed for each

worksheet; on-site teachers are given the option of correcting

worksheets themselves or of providing students with a key for

self-checking purposes. Because most worksheets contain at

least one essay or open-ended question, IST teacher materials

include a suggestion that teachers keep informal track of

student activities and self-checked worksheets so that any

needed assistance or clarification can be readily provided.

Review worksheets are intended for use by students who need

extra practice on specific skills. For some skills, worksheets

are created specifically. For other skills, worksheets are

identified from various sources and either reproduced (after

copyright release is obtained) or supplied as a supplement to

major IST course materials. Keys are supplied or developed as

needed. Most IST worksheets are printed on 2-copy NCR paper;

some are supplied as duplicating masters.

Several IST courses include written tests in addition to

the computer tests. These written tests are developed to match

the instructional format of the course; keys are provided.

o   Projects and teaching suggestions

Projects are recommended for inclusion in IST courses by

the course development plan committee for the purpose of

providing opportunities for application of high level thinking

and writing skills. Projects suggested in existing text or

correspondence study materials may be designated in IST

teacher/student instructions as optional, recommended for omission, or rewritten as needed. Additional projects are created when essential concepts are not covered in other materials. Each project is identified in the IST Teacher Guide as to level of difficulty. On-site teachers are advised to use the stated levels of difficulty in guiding their students in project selection. Standards for written work, which apply to all projects, are delineated in both student and teacher materials for IST courses. Specific criteria for projects and related suggestions for individualizing projects are included in IST teacher materials, but grading and weight of projects is at teacher discretion.

o   Supplementary materials

Two types of supplementary materials can be used with IST courses. The first type is created and/or supplied to accompany the courses (as described earlier). Most of these supplementary materials are skill-specific.

Other supplementary materials are identified and listed in the IST Teacher Guide for site purchase or optional use (such as films and videotapes available from the Alaska State Film Library). These materials generally have a content focus.

o.  Progress charts and direction sheets

Each IST course differs somewhat in the manner in which it is divided into lessons and chapters or units, but each is intended as a full-year, two semester course.

Progress charts are developed for each unit or section of the IST course. These charts, which are consumable, list

activities lesson by lesson and include a space for students to record the date each activity was begun and completed. These Progress Charts can serve as an informal monitoring system of student progress.

The physical partitioning of each course into lessons follows an established format; each is separated in the Student Manual and Teacher Guide by a blue direction sheet which lists the activities for that lesson. Activities are balanced by the instructional developers within and across lessons to assure variety. A lesson, for example, may consist of a vocabulary computer activity preparing students for a reading assignment, a tape to reinforce important concepts and add information, a worksheet for application of skills covered and a final computer activity drill on important facts from the reading and tape. Computer activities are never presented consecutively within the same lesson. This ensures adequate access to the computer and provides variation in instruction.

Teaching strategies

Effective teaching strategies for each course are recommended by the content specialists during the Indepth Review process and by the instructional development team throughout the course development process. These suggestions, included throughout the IST Teacher Guide on color-coded pages, are provided for specific activities and specific topics and are also cited as general recommendations for the subject area. Where appropriate, sources of additional ideas are listed for teacher reference.

o   Optional activities

During course development, activities which will provide stimulation and enrichment for students of high ability are developed or identified for inclusion at appropriate points in IST courses.  In addition, activities which allow for extra drill and practice on skills and concepts are identified for students requiring additional assistance.

Both enrichment and extra practice activities come in a variety of formats:  supplemental reading selections, written projects, worksheets, even tapes.  Each optional activity is clearly identified as to purpose in the IST Teacher Guide and assignment of the activity is at teacher discretion.  Where needed, suggestions on grading, instructional strategies, and level of difficulty are stated in a Teacher Note accompanying the optional activity.

o   Teacher Guide, Student Manual, Computer Readings Booklet, other materials

Teacher Guides developed for IST courses contain an explanation of the format of the course, copies of all student materials (readings, projects, direction sheets), scripts of audio tapes, printed copies of computer activities, tests, worksheets, listening guides, and lab guides.  A full set of answer keys for all IST printed materials is included.

For many activities, special notes are provided for the teacher.  A reduced copy of the student page is made and notes on grading, level of difficulty, purpose of the activity and/or teaching suggestions are typed in the margin.  These pages are

placed immediately before the full-sized student page and are color-coded (green) for easy identification by the teacher.

When an IST course has as its basis a commercial text, the Teacher Guide is intended for use with the teacher edition of that text and includes detailed instructions for use of the IST course as well as additional guidelines for use of the published text.

A Teacher Folder, containing copies of consumable printed materials required by only some students, accompanies the Teacher Guide. This folder also includes a copy of the Student Progress Charts, an extra set of Answer Keys, and any other teacher materials for the particular course which will be more easily accessible if contained in the folder rather than in the Teacher Guide.

The Student Manual for each course contains all printed non-consumable IST material. The manual, designed to be used with the published text or with informational booklets which contain reading selections, includes the course rationale, objectives, detailed course direction sheets (color-coded blue), instructions for using the textual materials, written introductions to reading selections, and instructions for completing course projects.

A Student Folder accompanies the Student Manual. This folder contains consumable printed materials required by each student. Students may use the folder to store completed work.

Some IST courses utilize computer activities which are accompanied by readings too long to fit reasonably on the

Apple II. In these cases, the readings are printed and bound in a non-consumable Computer Readings Booklet.

Worksheets, listening guides and tests for IST courses are padded or boxed separately. These are distributed as needed by the on-site teacher.

## Internal Review and Revisions

IST development staff review all drafts of materials for accuracy, thoroughness and consistency. Materials and activities are carefully checked to ensure that course objectives are properly covered in instruction and testing. Materials are also checked to ensure compliance with the approved course development plan. Problems noted during the internal review process are corrected and any necessary revisions are made in the course materials.

## Committee Review

Originally, two committees (a Bias Review Committee and a Content Review Committee) reviewed IST course materials.

Both committees met with the development staff early in the development process for a briefing on the IST model and to decide on the best method of conducting the reviews. At this meeting, the first section of Unit I of Alaska History was reviewed. Subsequent review was to be by mail. Because of the large membership of the Bias Review Committee, the committee was divided into three groups of three members each. Each group was to review different units; the committee chairman was to review all materials. Material pertaining to a particular ethnic or cultural group would be reviewed by the appropriate Native representative. Forms were developed for committee members' comments and

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concerns. It was later decided that it was more convenient, both for the reviewer to record his/her comments and for the development staff to compile comments, if the comments were written directly on the text. Development staff then recorded the notes on "comment sheets" with indications of action taken or reasons why material was not changed.

'After the first two units of Alaska History were reviewed in this manner, it became apparent that another strategy had to be developed for the review process. The number and degree of problems experienced in reviewing the materials and the problems encountered in receiving comments from the reviewers in a timely manner, mandated a different procedure be used for subsequent courses.

A screening and selection of candidate courses and an indepth review were incorporated as steps in the development process in order to ensure that materials to be used for IST course development were appropriate for the target population and free of cultural, ethnic, racial or sexual bias.

A Field Review committee was constituted to review materials during the IST development process for accuracy, thoroughness and appropriateness of content for target students. This committee has been comprised of three Alaska educators who are specialists in the content field of the course being developed. Drafts of IST materials are sent to the committee members at regular periods throughout the development process. Committee members record comments and suggestions directly on the draft materials; development staff then compile these notes on "comment sheets" and indicate action taken or reasons for no action. Drafts of materials are simultaneously reviewed by an experienced editorial consultant who is responsible for final editorial clearance of the developed materials.

## Alaska Department of Education Review

At periodic intervals established by contract, drafts of materials are delivered to the Alaska Department of Education for review and approval prior to final revision.

## Final Revision

During the Field and editorial review process, comments and suggestions are recorded, as indicated earlier. Changes requested by the Alaska Department of Education are also recorded and notes indicating actions to be taken are made by the development staff based on all comments and suggestions.

Revisions are carried out on the basis of these notes; corrections, additions or deletions are made in IST materials wherever appropriate. Suggestions which will enhance the effectiveness of the IST model are recorded and influence the development of subsequent courses. Pagination of all materials is done after revisions are made and approvals are received.

## Production and Editing of Audiotapes

When Department of Education approval for tapescripts is received, recording proceeds. The process of recording is closely monitored by development staff to ensure accurate interpretation of scripts, instructional validity and appropriateness of the presentation for the target population. Following recording of the narrative, tapes are edited to include sound effects and background music.

## Curriculum Entry

One of the most time-consuming steps in the development process is the entry of computer activities onto curriculum disks. This curriculum entry overlaps many other steps in the process.

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To be prepared for curriculum entry, each activity, pool and question must be coded to indicate to IST its limits and options. A course header indicating the sequential number, lesson number and activity letter, the number of pools and type of activity (pretest, drill, review or posttest) is prepared for each computer activity. This information is entered onto the IST system disk.

Once an activity, its pools and each question has been coded, the coded information as well as all synopsis, direction, pool help, local help, graphics and question and answer text must be entered directly onto a curriculum floppy. Each entry is logged.

The printing, proofing and editing which follow are essential and extremely time consuming steps in the process. The computer is connected to a printer and hard (printed) copy of each entered activity is run. A member of the instructional development team proofs the printed copy for computer and human errors, noting any required edits. Working from this noted copy, the proofed activities are run on IST. Any additional problems are noted for editing. Typical edits include typographical errors, too lengthy question or answer text, required pagination, spacing, placement of graphics, incorrect or incomplete coding.

The print, proof and edit cycle is repeated until all edits have been made and checked on IST. As editing takes place, it is frequently necessary to compress the information on a disk in order to make maximum use of the space on each disk.

Bench testing by secondary students is another component of curriculum entry. Students check each computer activity and all of its options (pool and local help, objectives, time available, recording of

goals and answers). A bench testing log is used for any final edits required.

Once the final round of editing has been completed and each activity has been checked on IST, a final hard copy is run, coding sheets are updated and the status file of the system disk on which the "students" have been enrolled must be cleared. At this point the system disk and curriculum disks are ready for duplication.

## Duplication

Student materials. Multiple copies of student materials are printed and assembled. Student Manuals and Computer Readings Booklets are combbound; color-coded folders of heavy paper are used for Student Folders; worksheets and listening guides are printed on two-copy NCR paper.

Teacher materials. Teacher materials are printed and assembled along with copies of all student materials into Teacher Guides which are contained in three-ring spiral binders. Tabs are used to delineate lessons or chapters. Color-coded folders of heavy paper are used for other teacher materials (as indicated earlier).

Other materials. Multiple copies of audio cassettes, floppy disks and supplementary materials are produced in the quantity specified by contract.

## Delivery to Alaska Department of Education

Following duplication, all materials are delivered to the Department of Education for distribution to pilot test sites.

SECTION IV:

POTENTIAL ENHANCEMENTS TO THE INDIVIDUALIZED

STUDY BY TELECOMMUNICATIONS MODEL

## Alternative Enhancements

IST courses presently involve the use of audiotapes and microcomputers in addition to various print materials. While there is potential for the effective use of other media, any additions or substitutions must be carefully scrutinized for both the particular benefits to be derived and the requirements that their use would impose in terms of staff, time, additional equipment and actual dollar costs.

One major advantage of both media currently in use is that they may be operated in the same room with other instructional activities without creating additional noise, requiring room darkening, or requiring extensive manipulation by students. When accompanied by headphones, audiotape cassette players can be used simultaneously with other instruction in a classroom. The microcomputer and its screen require a specific amount of space, but can be placed within a room in such a way as to avoid disturbing other students. Use of the other media suggested here will impose some limitations on the capacity for simultaneous instruction of several courses within the same room.

A rationale for including other media should evolve from a consideration of the specific enhancements which each might provide the IST courses. In addition, consideration should be given to the availability of similar enrichment through other support services such as the Alaska State Library.[8] The following narrative presents a brief overview of a variety of visual media which might contribute to the effectiveness of IST courses. Each will be examined in terms of specific characteristics, special equipment needs, production requirements and availability.

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[8]Films and videotapes placed within the Alaska State Library must be made available to any borrower. This could limit access by IST schools.

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## Motion Picture Film

Film is a photographic medium of motion and sound. IST courses presently include an audio component; therefore, the enhancement which the film medium would contribute is motion. In a number of instances (e.g., science labs and experiments or visual reenactment of historical events) this capability could greatly enhance instruction. Film is a relatively expensive but durable medium and its inclusion in an IST course would generally not require an addition outlay for equipment on the part of IST schools.

Film may be stored relatively easily and has a long "shelf life." It is a permanent medium. Film use does usually require room darkening; this is a disadvantage where individual use is desired.

The actual production of film specifically for IST courses would be extremely costly. Also, one disadvantage of film production in an area such as science is the possibility that the commercial development and production time may be so time-consuming that the field will have advanced considerably before the film becomes commercially available. IST course Teacher Guides currently include suggested films which may be borrowed from the Alaska State Library. Others are recommended for supplementary use based upon the resources for rental at individual sites. When a film is the best medium for effective presentation of course information and when that topic is not covered in films available from the State Library, it might be feasible for some project resources to be used to purchase several copies of commercially available films. These could then be placed with the Alaska State Library for loan to IST schools.

It may be possible for IST courses to make effective use of the related medium of film loops. Such brief films, either with or without sound, are usually built around a single concept, idea, action or experiment. The use of film loops does, however, impose a specific equipment requirement that may not be met by existing facilities at many IST schools.

## Filmstrips

The filmstrip is a photographic medium of picture and sound. Although lacking the characteristic of motion, the filmstrip has potential for instructional enhancement similar to that of film. Filmstrips have the advantage of being self-contained and appropriately sequenced to teach a concept, idea, or skill. Many include printed instructional notes, questions, or explanations on individual frames. This can be a distinct advantage in organizing information for the student. Filmstrips with graphic instruction can be used easily in an individualized program or can be used by the supervising teacher in a group situation.

Filmstrips are relatively durable and easily stored and a filmstrip projector is a fairly standard piece of audiovisual equipment which is generally available at most schools. The equipment requirements for sound filmstrips, however, can be more difficult to meet. While it is possible to use separate tape recorders and filmstrip projectors, this alternative would require a great deal of individual handling of filmstrips for coordination of pictures and sound. The potential for damage to the filmstrip from frequent handling and improper loading into the projector is a disadvantage in an individualized program such as

IST. Also, the use of a filmstrip projector in most situations requires room darkening which can make individual use more difficult. While a Dukane type projector, which contains both tape recorder and filmstrip projection capability may alleviate this problem, it is a relatively expensive piece of equipment that may not be readily available at most schools.

Filmstrip production requires the use of a half-time camera and generally requires professional processing and duplication. The costs, while not so great as those for production of motion picture films, can be high depending on the amount of special production required.

A relatively cost-effective use of filmstrips in IST courses may be the purchase of outstanding filmstrips by individual schools or by the State Library system. Regional or district media centers could also serve as distribution centers for filmstrips. At times when Alaska-specific visual information may be vitally important, it may be possible to secure the use of existing still photographs or slides which can be copied with a half-frame camera and developed in filmstrip format.

## Slides

Another photographic medium is the slide. Slides offer the advantage of being readily reorganized by the teacher to include the preferred sequence of visuals. Some may be removed, others replaced by newer visuals. This medium can also be combined with sound. Slide sets with cassettes are readily available from a variety of commercial distributors.

Slides are somewhat less durable than either films or filmstrips because of the frequent individual handling that is required for their use and because they are susceptible to dampness. The potential for disorganization and individual picture loss is a further disadvantage.

One dumped tray of slides can undo an hour of organizing and planning.
Other important considerations are the noise of the sound slide projector
and the need for room darkening which might interfere with other
instruction in the same room.

## Videotape

Videotape is an electronic medium of motion and sound. This medium,
while in many ways quite similar to the motion picture, has specific
characteristics of its own. One interesting possibility with the
videotape, which may expand the usefulness of certain tapes, is that the
user, with the addition of a microphone, is able to create a new audio
track while erasing the old (for updating information, localizing the
visual examples, and so on). Depending upon the production of the tape
and the capability of the playback machine, it is also possible to record
a separate audio track in addition to that already prepared. Teachers
have used this procedure to promote student writing and localization.
This particular characteristic of the videotape medium, however, is not
often recognized by the teacher in the field and would require some
direction for its effective use.

Commercial videotapes are usually less expensive than films of the
same length and are readily available on a number of topics. Tapes can
be reused locally when their usefulness has come to an end although a
good quality videotape will begin to lose its visual purity and clarity
after approximately one hundred showings.

Videotape is not as long-lasting as film and because of its bulkiness
may present some minor storage problems at small schools. It is also
somewhat susceptible to dampness and static electricity. Most schools

have some video playback equipment available, but the number of formats and the lack of a universal standard could require duplication of videotapes in any of three or four tape sizes or formats. Commercial videotapes are distributed in 3/4" cassette, 1/2" cassette, 1" open reel and 1/2" open reel. Broadcast tapes are usually mastered on 2" open, reels. Such variety of format is also found in equipment in place in the schools. The Alaska State Library distributes only in 3/4" cassette format. This, along with 1/2" beta cassette, is becoming one of the two most frequently used educational formats,

The production of videotapes is not as costly as film production because of the nature of the material used. Videotapes do not need developing and special processing. Recording is immediate and playback can take place at any time. This medium would provide an opportunity for Alaska-specific motion materials that could be developed within the time frame of the IST project. Several EMS stations have the capacity for such production at this time. Like film production, however, video production requires both technical and content staff as well as sophisticated editing equipment for top quality master copies. Videotape can be edited much more readily than film for updating visual and audio information, but such editing is best done by a production facility. The duplication of videotape is also less costly than the purchase of additional prints of motion pictures.

Unlike most other visual media, videotapes can be viewed without room darkening if a monitor with a speaker/headphone jack or a modified home receiver is available. Without this type of playback equipment, however, videotape would interfere with courses being conducted in the same room.

Although quite new, there is now on the market a videotape player which can interface with a microcomputer. Access to visual information is somewhat slow at this time but the potential for using this medium with the microcomputer should not be overlooked. Some of the strongest arguments in favor of videotape development, in fact, are brought within range without some of the enormous costs, by the combination of these two media.

## Videodisc

The videodisc is an unusual medium in that its most frequent applications enhance the effectiveness of other media. It includes a record-like disc, a videodisc player, a display monitor and often a separate microcomputer.

Like videotape, videodisc can incorporate motion, sound and still pictures. Because it can store up to 54,000 pieces of visual information, retrieve them very quickly (by comparison to videotape), and with the addition of a computer, access them according to a variety of patterns and criteria, the videodisc offers the potential for information storage and retrieval of visual information in much the same way that the computer has been used to store statistical information. Unlike videotape, which may be electronically edited, or film, which may be edited by splicing, a master videodisc cannot be altered. The information is permanent. Thus, unlike the computer, it would not be effective as a storage and retrieval system which demanded updating periodically. The cost of pressing a master disc at this time is approximately $2,000-$3,000. Additional copies range from $10-$25 each, depending in part on how many copies are to be made.

Instructional use of the videodisc can be very effective. The combination of computer capacity, extremely quick access, slow motion and real-time motion offers the promise of a complete instructional package, all on a single disc. This, however, is not without its drawbacks. The cost of the videodisc player is comparable to the cost of a quality videocassette player. Added to this is the cost of the video display monitor and microcomputer. Production costs at this time, and for the foreseeable future, are extremely high. To make an effective instructional videodisc, a production team is required which includes a computer specialist, an instructional designer and a content/education specialist. Videodiscs can and are being produced by smaller groups, but their quality, use of the capabilities of the computer and the effectiveness of the videodisc medium are obviously reduced. It is, unfortunately, just as easy to produce a poor quality disc at great cost as it is to put together a sloppy videotape or an inconsequential computer program. Those in the field estimate that the design and development time necessary to produce a quality videodisc exceeds actual production time of the aforementioned by almost ten to one. Discs currently in production, or recently completed, represent months and often years of work, and generally include one particular segment of content—not an entire course. Some of the educational groups involved in videodisc production plan to offer their discs to other users in the future, but few, if any, are commercially available at this time.

Several educational institutions, (e.g., The University of Nebraska and the University of Utah) have set up production groups which include the specialists needed to design, develop and produce videodiscs for educational users. It might be possible to work cooperatively with such

groups to develop videodiscs which could be appropriate for one or more IST courses. The costs, however, seem to outweigh the tangible benefits at this time. The burden of equipment purchase--be it by the state of the schools--would be tremendous, especially when the question of standard formats has not been settled.

Some videodisc players can play back discs produced by another company--but at this time, the full capabilities of the recorder, such as slow motion, are not standarized. There are also two distinctly different formats of playback--the stylus and the laser. Some videodisc players will only interface with one type of microcomputer. Others must have internal modifications or require the purchase of a separate piece of equipment to permit the interface. The difficulties and costs at present appear to relegate the use of videodisc for IST to a distant dream.

It may be possible to capture some of the instructional features of videodisc--the ability to directly display motion pictures, still pictures or instructional text in direct response to student input by a carefully planned use of the new videodisc player. Development costs, however, would not be greatly diminished because the need for production expertise, computer expertise and content knowedge does not change.

## Conclusion

The use of any or all of the other media discussed in this section requires some careful consideration of both costs and distribution. To require individual rural schools to purchase films, videotapes, or other media may impose a considerable financial burden beyond the cost of the original IST courseware and hardware. Project purchase of all necessary

films or other materials, would severely limit the available money for other phases of the development and implementation process. A workable alternative might be to contract the producton of essential Alaska-based materials and to provide a limited number of commercially available materials to libraries, regional media centers or district media centers for distribution. Individual purchase could then be the school's decision.

APPENDIX A:

OUTLINE OF DEVELOPMENT/

ADAPTATION PROCESS

Outline of Development/Adaptation Process

1.  Screening and Selection

    a.  Screen each course according to preliminary criteria

    b.  Review each set of course materials according to established criteria

    c.  Generate a course summary for each set of materials

    d.  Generate a subject area summary across courses

    e.  Nominate and describe candidate course materials

    f.  Selection by the Department of Education of course materials to be adapted

2.  Development of Course Design (Indepth Review)

    a.  Identify essential concepts and objectives

    b.  Identify potential problems and solutions

    c.  Recommend areas in which audiotapes would be appropriate

    d.  Determine areas suitable for computer activities, worksheets, projects

    e.  Suggest supplementary materials

    f.  Conduct bias review

    g.  Identify effective teaching strategies

    h.  Generate a course development plan

3.  Computer Systems Review

    a.  Identify types of Computer Activities needed to meet lesson objectives

    b.  Draft a sample Computer Activity of each type

    c.  Conduct a review by systems analyst of feasibility and appropriateness of proposed Computer Activities

    d.  Determine screen formats

    e.  Modify as needed

4.  Development of IST Materials

    a.  Secure copyright releases

    b.  Identify and/or develop course goals and objectives

c. Draft Student and Teacher Materials

o Develop computer activities and tests

o Develop audio scripts (including Listening Guides where approriate)

o Develop worksheets and keys

o Develop projects and accompanying teaching suggestions

o Identify supplementary materials

o Prepare Progress Charts and direction sheets

o Suggest teaching strategies

o Identify optional activities

o Compile Teacher Guides, Student Manuals, Computer Readings Booklets and other related materials

5. Internal Review and Revisions

a. Check coverage/testing of objectives

b. Monitor compliance with course development plan

6. Committee Review

a. Field review

b. Editorial review

7. Department of Education Review

8. Final Revision

a. Record comments and suggestions on response sheets

b. Keep record of suggestions for future development

c. Make corrections, additions, deletions where appropriate

9. Production and Editing of Audiotapes

10. Curriculum Entry

a. Code each activity, pool and question

b. Prepare course header

c. Enter coded information and text

d. Print

e. Proof and run on IST

f.  Edit from noted printout

g.  Compress files

h.  Print edited text and headers

i.  Proof and run on IST

j.  Edit as needed

k.  Compress files

l.  Bench test

m.  Edit as needed

n.  Print final copy

o.  Clear header files

11. Duplication

a.  Student materials

o  Student Manual

o  Student Folder

o  Computer Readings Booklet

o  Worksheets

o  Listening Guides

b.  Teacher materials

o  Teacher Guide

o  Teacher Folder

c.  Tapes

d.  Floppy disks

e.  Projects and supplementary materials

12. Delivery to Department of Education

APPENDIX B:

COURSE MATERIALS

PREVIEW FORMS

# VERIFICATION THAT COURSE SHOULD
# BE REVIEWED

COURSE: _____

_____

Any course to be reviewed must meet these preliminary requirements, therefore answers to all of these questions should be "Yes." If any questions must be answered "No," please check with Alaska Telecommunications Program staff before proceeding.

1. Is this course a standard course offering in secondary schools in the U.S.A.?

_____ YES       _|_____ NO

Comments:

2. Does the course cover two complete semesters?

_____ YES       _____ NO

Comments:

3. Are the following materials part of the course?

| First Semester | | | Second Semester | | |
|---|---|---|---|---|---|
| Text | ____YES | ____NO | Text | ____YES | ____NO |
| Scope and Sequence | ____YES | ____NO | Scope and Sequence | ____YES | ____NO |
| Student Workbook | ____YES | ____NO | Student Workbook | ____YES | ____NO |
| Teacher Guide | ____YES | ____NO | Teacher Guide | ____YES | ____NO |

Comments:

4. Is the course available in large quantities from a commercial publisher or other curriculum development project?

_____ YES       _____ NO

Comments:

5. Is the copyright date for the course 1975 or later? ____YES ____NO
Specify the copyright date: _____

Comments:

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CANDIDATE COURSE MATERIALS

SUMMARY RATING SHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

AREA                                                    RATING

1. Reading level of materials is at or below
   8th grade.                                           YES    NO

2. Sufficient quantities of supplementary
   materials are readily available.                     YES    NO

3. Defined scope and sequence is available.             YES    NO

   Complete teacher's guide containing
   suggested class/student activities and
   projects is available.                               YES    NO

4. Copyright release license requirements
   assured.                                             YES    NO


                                                   Low                        High
5. Course is organized and complete.
                                                    1      2      3      4      5

6. Course is adaptable for unique
   requirements of Alaska (within                  Low                        High
   project constraints).
                                                    1      2      3      4      5

7. Course exhibits usability and                   Low                        High
   flexibility.
                                                    1      2      3      4      5

8. Course content is complete and of               Low                        High
   high quality.
                                                    1      2      3      4      5

9. Course avoids inappropriate                     Low                        High
   stereotyping or bias.
                                                    1      2      3      4      5

10. Course is compatible with IST                  Low                        High
    Software (Version II).
                                                    1      2      3      4      5


Summary and Recommendations:

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CANDIDATE COURSE
REVIEW WORKSHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

Area 1:  Establish that course reading level is at or below 8th grade (publisher data, use of readability formula, other data).

Questions to Consider in Your Review:

o  Is publisher data on reading level complete?

o  Are publisher claims data-based or are they opinions?

o  Do claims appear to be born out in your review of the materials?

o  Is the reading level for supplementary materials the same as for the text(s)?

o  If not, is the teacher alerted to variations and/or provided with alternatives?

o  Are provisions made for teaching specialized vocabulary?

Strong Points:

Weaknesses:

READABILITY REQUIREMENT MET:        YES        NO

CANDIDATE COURSE
REVIEW WORKSHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

Area 2:  Establish that sufficient quantities of supplementary materials are
readily available.

Questions to Consider in Your Review:

o  Are the recommended supplementary materials (accompanying or referenced in
the course materials) generally available, or would they have to be developed
or adapted?

o  Does the course rely extensively on the teacher to identify and provide
supplementary materials?

o  Are problems in obtaining, providing or using supplementary materials evident?

o  Is there an over-reliance on the use of supplementary materials?

o  Are existing supplementary materials consistent with course materials?


Strong Points:


Weaknesses:


REQUIREMENT FOR AVAILABILITY OF SUPPLEMENTARY MATERIALS MET:   · YES      NO

CANDIDATE COURSE
REVIEW WORKSHEET

SUBJECT: _____

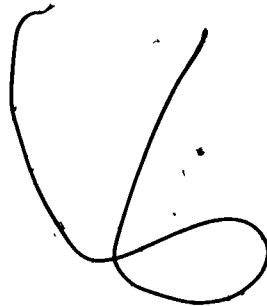MATERIALS: _____

PUBLISHER: _____

Area 3:  Establish the availability of:
  3.1  a defined scope and sequence statement
  3.2  a complete teacher's guide containing suggestions for class/student
       activities and projects

Questions to Consider in Your Review:

o  Is the scope and sequence statement clear, comprehensive and easy to follow?

o  Are the teacher materials comprehensive?

o  Could a teacher whose specialty is <u>not</u> the specialty of the course find enough
   information in the teacher materials to teach the course comfortably and
   competently?

o  Does the teacher's guide provide adequate guidance for using course materials?

o  Are suggestions for activities/projects adequate?  Could they be implemented
   in rural Alaska villages?


Strong Points:




Weaknesses:




REQUIREMENTS MET FOR:  o  AVAILABILITY OF SCOPE AND SEQUENCE      YES      NO
                       o  COMPREHENSIVE TEACHER'S GUIDE            YES      NO

CANDIDATE COURSE
REVIEW WORKSHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

Area 4: Establish that copyright release license requirements needed would be assured.

Questions to Consider in Your Review:

o Is copyrighted material used extensively in the course?

o Do the course materials include the necessary releases? Are sources appropriately acknowledged?

o Could computer activities and audio materials be created without requiring that numerous copyright releases be secured?

Strong Points:

Weaknesses:

COPYRIGHT RELEASE REQUIREMENT MET:        YES        NO

CANDIDATE COURSE
REVIEW WORKSHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

Area 5:  Assess the nature and extent of the course's organization and
         completeness.

Questions to Consider in Your Review:

o  Does the table of contents provide a clear overview of the contents of the course?

o  Do chapter headings clearly defind the content of the chapter?

o  Is there a glossary?  An index?  Does the glossary contain all the technical
   terms used in the textbook?

o  Are graphs and charts clear and supportive of the textual materials?

o  Are illustrations well done and appropriate for the student population?

o  Is there any use of advance organizers or other guided reading format?

o  Do end-of-chapter questions include literal, interpretive and applied levels
   of comprehension?

o  How well do the "pieces" of the course fit together?

o  Do materials compliment and reinforce each other?

Strong Points:

Weaknesses:

RATING FOR THE COURSE IN THIS AREA:     Low                High
                                         1      2    3    4    5

CANDIDATE COURSE
REVIEW WORKSHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

Area 6: Assess the adaptability of the course in terms of meeting the unique requirements of Alaska taking into consideration the Project constraints of time, staff and budget.

Questions to Consider in Your Review:

o  How easily can audio and computer activities be developed 'that will cover appropriate content and reflect the unique aspects of Alaska?

o  How well does the course lend itself to the use of Alaska "examples"?

o  Is the course designed in such a way that Alaskan examples would fit in with and reinforce the content? (Would they compete with or detract from the content?)

o  Would Alaskan students be able to relate to and understand the manner in which the course content is presented?

o  Would adaptations require deletion of materials, extensive time or money, or additional staff?

Strong Points:



Weaknesses:



RATING FOR THE COURSE IN THIS AREA:        1    2    3    4    5

CANDIDATE COURSE
REVIEW WORKSHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

Area 7: Assess the usability of the course.

Questions to Consider in Your Review:

o  Does the course represent an organized system of learning?

o  Is the course organized in such a way that the text must be followed exactly or
   is the organization flexible so that it permits variations in use?

o  Does the course require training or extra information for the teacher before it
   can be taught?

o  What was the assessment of organization and completeness (Area 5) and how does
   this relate to usability?

o  Are materials durable, attractive, easy to use?

Strong Points:

Weaknesses:

RATING FOR THE COURSE IN THIS AREA:        1    2    3    4    5

CANDIDATE COURSE
REVIEW WORKSHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

Area 9: Assess the nature and extent of bias in the course.

Questions to Consider in Your Review:

o  Does the course reflect the cultural and ethnic diversity of our society?

o  Are minority and ethnic groups treated naturally and knowledgeably?

o  Is the material free of inaccurate and/or offensive information?

o  Does the material avoid reinforcing stereotypes?

o  Are individuals, groups and families presented in diverse and representative manner?

o  Are males, females and minorities adequately and appropriately represented?

o  What kinds of role models are presented?

Strong Points:

Weaknesses:

RATING FOR THE COURSE IN THIS AREA:      1      2      3      4      5

CANDIDATE COURSE
REVIEW WORKSHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

Area 8:  Assess the quality and completeness of course content.

Questions to Consider in Your Review:

o   Does the content challenge students to think and find solutions?

o   Is the concept level appropriate for the student population?

o   Does the content reflect valid and current knowledge?

e   Does the content address basic educational objectives?

o   What kind of educational need does the content address?

o   Does the material make provision for both process (skill) and knowledge (content)
    development?

o   Is content organization logical?

Strong Points:

Weaknesses:

RATING FOR THE COURSE IN THIS AREA:          1     2     3     4     5

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## CANDIDATE COURSE
## REVIEW WORKSHEET

SUBJECT: _____

MATERIALS: _____

PUBLISHER: _____

Area 10: Assess the compatibility of the course with IST Software Version II.

Questions to Consider in Your Review:

o What kinds of computer activities could be appropriately developed for this course?.

o Will the format available for computer activities in Version II permit the development of activities appropriate for the course content?

o Are there logical places in the course where computer activities would be appropriate?

o Are there course requirements in terms of content that cannot be handled via the IST software? If so, are such requirements adequately addressed by existing materials?
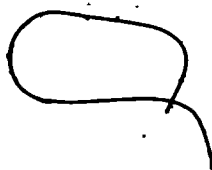
Strong Points:

Weaknesses:

RATING FOR THE COURSE IN THIS AREA:     1   2   3   4   5

APPENDIX C:

COURSE DEVELOPMENT

PLANNING FORMS

| LESSON/ CHAPTER | PAGES | TAPE | LG | CA# | WS | OTHER | TITLE AND COMMENTS |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

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WORKSHEET

IST COURSE PREVIEW

Previewer: _____

Name of Course: _____

Lesson(s) Previewed: _____ Pages: _____

I. Suggested Audio Activity(ies):

A. _____
   _____
   _____

B. _____
   _____
   _____

C. _____
   _____
   _____

D. _____
   _____
   _____

II. Suggested Computer Activity(ies):

A. _____
   _____
   _____

B. _____
   _____
   _____

C. _____
   _____

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D. _____

_____

_____

III. Suggested Supplementary Activity(ies):

A. _____

_____

_____

B. _____

_____

_____

C. _____

_____

_____

D. _____

_____

_____

IV. Suggested Worksheet(s):

A. _____

_____

_____

B. _____

_____

_____

C. _____

_____

_____

D. _____

_____

_____

If any of the above are not suggested, please so indicate. Please indicate what
the activity should consist of and where it should be "plugged in."

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APPENDIX D:

STUDENT DIRECTION SHEET

AND PROGRESS CHART

LESSON FIFTY-FOUR Activities:

READ:

Objectives, student manual page 59

DO:

Pre-Test Computer Activity 54-A

You may use a calculator, scratch paper
and a pencil. If you get 100% you will
be directed to go on to lesson 55,
Pre-Test Computer Activity 55-A.

LISTEN TO AND DO:

Tape 54-A: Introduction to Percent

You will need the listening guide for
tape 54-A, your text and a pencil.

DO:

Skills Practice Computer Activity 54-B

Renaming Ratios as Percents You may
need scratch paper and a pencil. You
may use a calculator.

DO:

"Using a Calculator," page 294

| Lesson | Manual Page | General Math Page | Activity | Date Begun | Date Ended |
|---|---|---|---|---|---|
| 89 | 31 | | Application Topics Procedures<br>Do any two: | | |
| | | 428-430 | Recreation | | |
| | | 431-433 | Wheels | | |
| | | 434-437 | Money Matters | | |
| | | 438-441 | Jobs and Careers | | |
| | | 442-445 | Hobbies and Crafts | | |
| 90 | | 446-447 | Chapter 9 Test<br>Take this test as a review before taking the final chapter 9 test. Check your work and then go back to the pages in your text that introduce any of the items that you missed. Use your corrected listening guide and lab guides to help you study. | | |
| 90 | | | Chapter 9 Test<br>See your teacher for a copy of this test. You may use a calculator, scratch paper and a pencil. | | |
| 91 | 37 | | Case Study Procedures | | |
| 91 | | 448-459 | Case Study: Earning a Living | | |
| 92 | | | Competency Test; Part II<br>Do ALL of the problems. Show ALL of your work. You will need a copy of the Competency Test, Part II and a pencil. When you have completed the test, turn it in to your teacher. | | |

APPENDIX E:

EXAMPLES OF TEACHER MATERIALS

## ALTERNATIVES

These activities are
optional.      They are
challenge readings.

This material may also
be useful for those
students who have
selected projects on the
fur trade.

We have included a
worksheet of challenge
questions for extra
credit. The assignment
of such credit is up to
you.

LESSON SIX

BEGIN:

   Worksheet IV-C:  Fur Trade
   See page 22 in your student
   manual.

LISTEN TO:

   Tape #4:  Fur Trade (with picture
   guide in The Alaskans, pages
   52-53)

COMPLETE:

   Worksheet IV-C:
   Fur Trade

*READ:

   "Fur Seal Hunting" in
   The Alaskans, pages 60-64

*DO:

   Challenge Questions:
   Fur Seal Hunting
   page 23

LISTEN TO:

   Tape #5:  Review

COMPLETE:

   One project from pages 5 to 8

* Optional Activities

YOU SHOULD BE FINISHING YOUR PROJECT FROM PART I NOW.  DON'T LET IT

CARRY OVER INTO THE NEXT PART OF THE UNIT.

12

This selection is part of
an autobiography of Julie
Harris. The written
introduction in the
student manual summarizes
some of the topics which
are discussed in the
selection.

Some students will be
able to read the selection
independently. Others
will benefit from a guided
reading approach in which
they have a list of
questions to answer for
themselves as they read.
These questions can be
provided by you either
orally or in written
form. Questions which
can be used are as
follows:
  What events led Julie
    Harris into acting?
  What were some of the
    things Julie Harris
    could do well when she
    was in school?
  How did Julie's parents
    help her become
    interested in acting?
  Is acting "simply a job"
    for Julie Harris? How
    does she feel about it?
  Why does Julie say
    "acting is very
    personal"?
  What was the name of the
    "perfect" play? Why was
    it so good?

A follow-up discussion using these questions will provide students with an
opportunity to share their perceptions; it will also help you check on their
comprehension of the selection.

Students are directed to
choose one of the three
projects listed.

PROJECT A - a report
(oral or written) on a
famous person--is suitable
for *all* IST Reading
students.

PROJECT B - reading a
biography or autobiography
and then making a list of
words which describe the
person--can be *easy* or
*difficult depending on
the book read*. *With
your guidance*, the project
would be appropriate for
*any* student.

PROJECT C - writing one's
own biography--calls for
independent research and
writing skills and is
most appropriate for
*some average and all
advanced* IST Reading
students.

Students are referred to
the "Standards for
Written Work" for criteria
to follow. Grading and
weight of this written
project is at your
discretion.
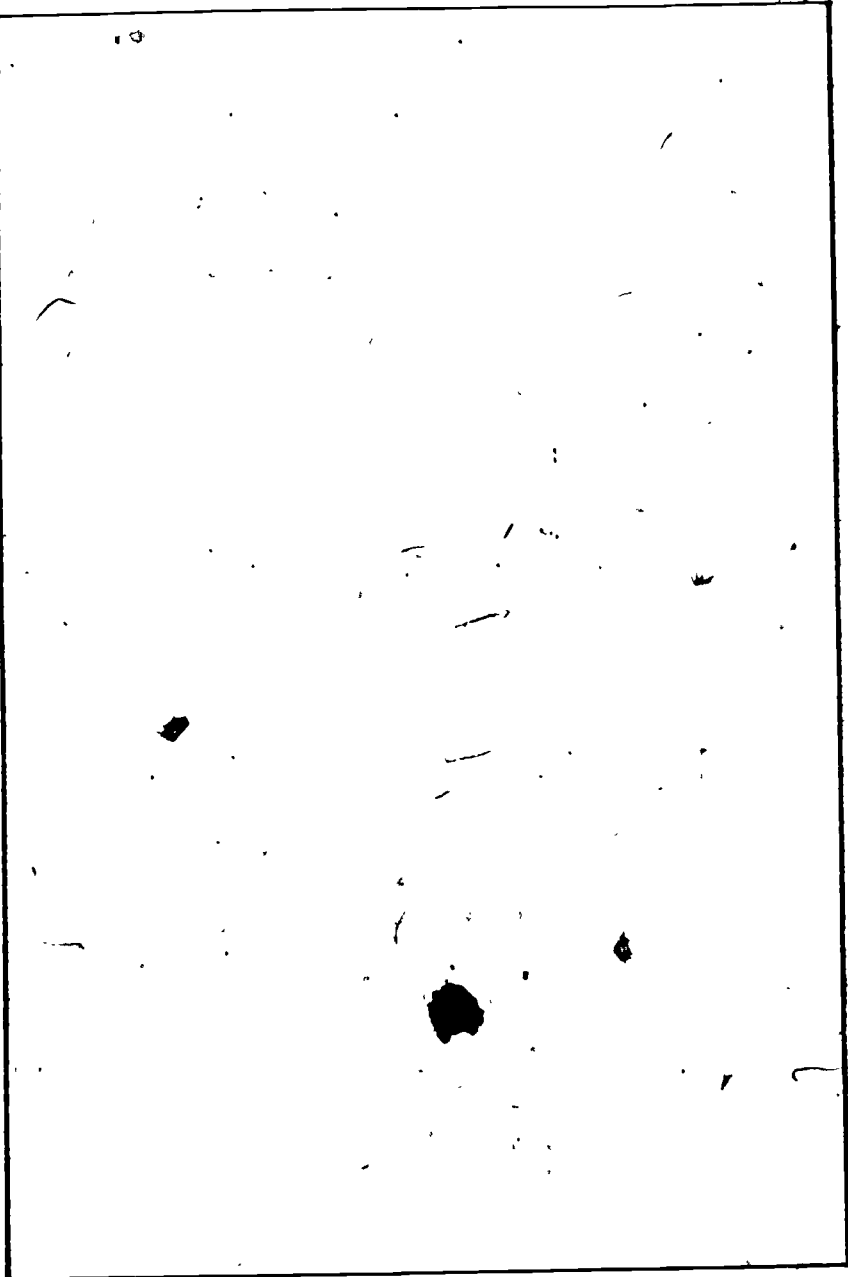
# BIBLIOGRAPHY

Alaska Department of Education, Educational Telecommunications for Alaska, (Proposal to NIE), Alaska Department of Education, Juneau, January 1977.

-----, Office of Planning and Research, Operational Plan: Educational Telecommunications Project, December 1978.

Bork, A., Videodiscs, Computers and Educational Delivery Systems of the Immediate Future, Northwest Regional Educational Laboratory, March 1978.

Browne, S.P., and Nemec, J.E., An Electronic Mail System for Alaska Educators, undated.

Busick, K., and Pietila, D. Formative Evaluation Report: Alaska History (Individualized Study by Telecommunications), Northwest Regional Educational Laboratory, undated.

Caldwell, R.M., Considerations and Guidelines for Developing Basic Skills Curriculum for Use with Microcomputer Technology, NECC, 1980.

Copley, C., IST System Documentation: Version 1.0, Northwest Regional Educational Laboratory, undated.

-----, Specifications: IST System 4.0, Northwest Regional Educational Laboratory, September 1980.

Forbes, N., Emberlin, C., Greene, M. and Edwards, J., Educational Telecommunications for Alaska Project: Needs Assessment Regarding Instruction via Audio Telecommunications, Northwest Regional Educational Laboratory, March 1978.

Lee, M.M. and Browne, S., Electronic Mail System: Initial Report (Technical Report #1, Educational Telecommunications for Alaska), May 1978.

National Association of Educational Broadcasters, Radio's Role in Instruction (Part II: Guidelines for Developing Effective Audio Instruction, National Association of Educational Broadcasters, January 1973.

Northwest Regional Educational Laboratory, Educational Telecommunications for Alaska, IST Candidate Courses: Review and Nomination, Northwest Regional Educational Laboratory, August 1979.

-----, Development Documentation Report: General Math, August 1980.

-----, Documentation Report: Developmental Reading Course, August 1980.

-----, IST Candidate Review and Nomination, August 1980.

Parker, L., Monson, M., and Carson, L., The Effectiveness of Broadcast Audio and Two-Way Audio Instruction for Distant Learning, Northwest Regional Educational Laboratory, July 1978.

Pietila, D., Formative Evaluation Report: English Course (Individualized Study by Telecommunications, Northwest Regional Educational Laboratory, 1979.

Richardson, D., Hansford, B., and Greene, M., A Summary of Perceived Curriculum Needs Pertinent to the Educational Telecommunications for Alaska Project, Northwest Regional Educational Laboratory, April 1978.

Thomas, D.B., A Summary of CAI Programs Available for Use in Secondary Education, Northwest Regional Educational Laboratory, July 1978.

-----, The Effectiveness of Computer-Assisted Instruction, Northwest Regional Educational Laboratory, July 1978.

Van Dusseldorp, R., and Lee, M.M., Guidelines for Implementation of Educational Telecommunications for Alaska Case Studies, Northwest Regional Educational Laboratory, September 1978.

Van Dusseldorp, R., Initial Systems Analysis and Cost Feasibility Study for SPAN Knowledge Base System, Northwest Regional Educational Laboratory, September 1978.

Wilson, H.A. Student Diagnostic Testing: A Component of Individualized Study by Telecommunications (IST), Northwest Regional Educational Laboratory, October 1978.

-----, Student Diagnostic Testing: A Component of Individualized Study by Telecommunications (IST), Northwest Regional Educational Laboratory, December 1978.

-----, Individualized Study by Telecommunications (IST), Northwest Regional Educational Laboratory, October 1978.

-----, IST Exploratory Test Design, Northwest Regional Educational Laboratory, April 1979.

-----, Pilot Test Design (Preliminary), Northwest Regional Educational Labbartory, August 1979.