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AUTHOR Goldmark, Peter
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ABSTRACT

It is necessary for the United States to make better use of its resources, both human and environmental, if there is to be an optimal distribution of population. This requires the innovative application of communications technology to make life in rural communities more attractive. In terms of continuing education, there are presently two means of distributing materials. One is audio tape with text, and the other is video--either through live pick-up or stored on tape. The development of video storage discs may make stored video more feasible. Community colleges would seem to be the institution best suited to offering courses in learning centers over wide geographical areas. As a pilot operation six community colleges have formed a consortium called ACCESS to work with Goldmark Communications in developing the requirements for a delivery system, and to develop six courses to be made available to all educational institutions. In order to make the distribution of these courses nationwide, the Rapid Transmission and Storage (RTS) facility of ATS-6 might be used. (WBC)

GOLDMARK
COMMUNICATIONS
Corporation
99 Commerce Road
Stamford, Connecticut 06904
(203) 327-7270

PROPOSED PLANNING STUDY FOR NATIONWIDE DELIVERY OF LEARNING PROGRAMS

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I Statement of the Need

Approximately one-third of this nation's population living on three quarters of our land lacks adequate employment, health care, learning and cultural opportunities.

The work of the "New Rural Society" project, funded by the U.S. Government, deals with satisfying these needs as part of the interdependent urban, rural and energy crises. These studies demonstrate that we could make far better use of our human, earth and environmental resources, if we were to encourage a more optimal population distribution. The innovative application of existing communications technologies is a crucial factor in making life in rural communities more attractive. Among the major criteria, there are three essential services; namely employment, health care, and continuing education which by virtue of their strong instructional components, fall under the responsibility of federal agencies charged with the development and implementation of new learning systems. Furthermore, the coordination among states and regions is necessary in order to maximize the use of existing resources, through processes of sharing and collaborating.

Some of the major needs in the programming area are the following:

1) Primary and Secondary Schools for teachers and students.

2) Community and four-year colleges on campus and in rural satellite learning centers.

3) Professional Education: physicians and paramedical personnel in hospitals, nursing homes, etc.; teachers, lawyers, engineers, business people, etc.

4) Agricultural and Food: in learning centers, in community and farm centers.

5) Government Operations: career oriented, including training, management, etc.

6) Continuing Adult Education: in learning centers (schools, churches, libraries, community centers etc.)

job oriented skills,
home health care,
home improvement,
child care,
arts, languages,
hobbies, crafts, etc.

7) Rehabilitation through job preparation in adult and teenage correctional institutions.

8) Energy: Conservation methods to builders, financing institutions, and consumers.

While the above outlines the distinct needs, what inhibits the implementation on a national basis is the following:

1) Lack of software of sufficient quality and variety.

2) Suitable delivery systems permitting access to learning

for people in all areas of the country - particularly rural.

3) The lack of a system that derives adequate income to become self-sufficient.

Other major requirements are:

To be able to update programs frequently and inexpensively.

To provide enrollment flexibility to meet individual schedules.

The practicality and economy require that electronic communications media be considered. These could be classified in three categories:

1) Studying at home, which for many people, is not an effective and enjoyable way to learn, but is necessary for those who cannot leave their residence easily. Other than through correspondence courses, the audio and video media cannot provide the choice, timing, and quality at a reasonable cost to satisfy a sufficient proproportion of home bound people.

2) Learning in groups for those who live or work within a few miles of a community center (or church, school, library, etc.) Television screen presentation with maximum scheduling flexibility becomes the medium of choice. A very important factor is the sharing of learning experiences by small groups which can enhance human relationships and mutual interests in the community.

3) Learning opportunities for people located in institutions, such as schools, hospitals, correctional facilities, and in business and industry.

Instructions by audio with accompanying text and learning material is practical in the home and in inaccessible areas, but does not appear to be attractive in learning centers, except where it is the only medium available for use by groups in discussions or over long distances.

Next we want to consider conventional video, which is applicable in two modes. One is where live pick-up is used for transmitting the presentation by teachers or panels, and the other mode where the program is pre-recorded on videotape and is presented over-the-air or via closed circuit. The use of this medium in instruction is now commonplace. The Sony videotape machine is used in industry, classrooms, and also in some learning centers.

In discussing the first mode, one has to consider how essential it is to provide real-time presentation of the program in place of pre-recording. Unless a very outstanding and imaginative instructor is conducting the course, the quality of the presentation to students at a distance on a television set will usually be less satisfactory than carefully produced pre-recorded lessons. An advantage that can be derived from a real-time program is audio feedback from reception points, and thus create a certain amount of interaction between the teacher and the distant students.

The methods of delivery of the two video modes can differ substantially. Live video-programs presented in real time, can be transmitted over broadcast television stations, cable and satellites. These have in common a lack of flexibility in terms of individual scheduling and a limited choice of subjects due to the fact that instructional programs can usually be presented only during a fraction of the day.

The second mode of video instruction uses a storage medium which currently is almost exclusively video tape, but could, in the future, also be video records. Currently, video tape played through the Sony or similar recorders and playback machines provide a convenient, but not inexpensive, method of distributing stored video programs. Programs can be provided to the place of showing by cassettes forwarded by mail, or recorded off-the-air from broadcast stations or microwave links, satellite transmission, or cable systems. In the last case, programs can be made available to individual subscribers free or as part of a pay TV service.

Distribution of video programs over existing closed circuit facilities, such as in schools, hospitals, etc., is an important medium but requires adequate programming. Video-discs, on the other hand, in the light of current technology, will require the preparation of a relatively costly master and a record plant from which duplicates are made for distribution by mail, similar to audio records.

Having presented a quick overview of current and near-term techniques for distribution and presentation of learning material, it is important to recognize that one of the highest priorities

in the field of education is to provide the opportunity for life-long learning to everyone in the nation. This does not hinge on any one particular technology, but requires the design of a system that combines all the essential components into a practical and cost-effective process. The following are the major considerations:

1) Institutional issues encountered by educators and the government, arising out of a new and versatile system of learning.
2) Method of preparation and initial financing of a broad range of learning programs.
3) Involvement of the most creative and imaginative talents in the country to generate courses which are not only of highest quality, but also extremely enjoyable.
4) Electronically delivered audio-visual presentation at low cost and high performance to schools, colleges, correction, health and government facilities, and community learning centers accessible to everyone in the nation with maximum flexibility in scheduling and subject.
5) Method of payment by the users which, because of the scale of operation, will result in a profitable undertaking able to pay for all of its operational costs, as well as for the preparation of new and frequently updated course material.

The educational institutions, whose current posture and objectives most closely coincide with the above, are the community colleges. For the past three years, an intensive effort has been underway with a leading group of these institutions and ourselves to develop a nationwide learning system that can best satisfy those needs enumerated earlier.

It is essential that relating the unique relationships and the resulting processes that are now underway not be interpreted as self-serving in view of our own involvement. We are proud of having stimulated the advances which we will now summarize.

Eighteen of the leading community college districts, representing some 45 institutions from around the country, formally known as the League of Innovation of the Community College, joined with us to develop the universal learning system characterized earlier. Referring to the five point objectives, the following is pertinent:

1) The average community college has approximately 7000 students on the campus, yet has the potential to reach a population some twenty times larger in a greatly extended service area, particularly rural. According to the recent report of the Carnegie Commission on Higher Education, since 20 percent of the population takes at least one adult educational course per year. If the community college could offer its available courses in learning centers over a wide geographic area away from the main campus, but near where people live or work,

then such an institution would, indeed, be fulfilling its growing mission. Unfortunately this is not now possible without additional investment in plant and facilities.

The role of some 1200 community colleges and similar educational institutions wanting to participate in this major extension of the learning environment to reach all people is not only a challenge to the educators, but represents an opportunity for everyone to belong to a learning institution and obtain instruction with or without credits, yet always under the tutelage of a representative from the sponsoring institution in his area.

Not only would satellite learning centers enhance the opportunities for life-long learning, but could also provide the stimulus for community participation in other related activities.

In addition, appropriate courses for lay people and professionals would be provided in educational, health, and correctional institutions, as well as government, business, and industrial facilities. These services must be made available not only in all rural areas, but in metropolitan regions as well, where appropriate facilities or organizations are lacking.

A specific pilot operation is now being undertaken for which purpose six of the initial community college districts have formed a consortium called

ACCESS (Association of Community Colleges for Excellence in Systems and Services) to develop jointly with us the requirements for the hardware necessary to satisfy the needs of the delivery system. In addition, to provide the broadest range of high quality program material, each of the six college districts has selected the best faculty person to head up a Design Team for each of the six courses, to be prepared with a total of 180 modules. Commercial production teams work with the course designers in the preparation of the audio-video material. The community colleges are financing the generation of the initial six courses, which will be made available to all other community colleges against payments, from which royalties will be derived for the institutions and faculty responsible for originating the courses. For the first time, a group of community colleges have pooled their resources to generate outstanding learning material to be made available to all educational institutions. Printed text and testing material will be provided to accompany the audio and video portions.

Referring to that category of learning described earlier under continuing adult education, a broad base of income can be generated from student fees but only after a wide variety of programs have been created. Thus, the initial cost for developing the

program material and providing the necessary delivery systems of hardware has to be sought from state and federal governments, as well as private capital.

3) Because of the broad distribution of users of all of the learning material offered under this plan, whether for public schools, colleges, vocational and technical schools, institutions, health or other professional training, the economics will permit the creation of outstanding programs by the most creative and imaginative teachers, artists, writers, video-and-audio technicians, etc. These programs nationally used would not only be extremely instructive but must also be enjoyable.

4) In order to provide nationwide learning opportunities with the requirements outlined earlier, there can be two alternative ways to utilize the newly developed programming procedures and delivery system developed with the community colleges.

Alternative 1 is based on the ATS-6, or similar satellite. With its concentrated antenna patterns and a time-sharing process specially developed, it can provide nationwide coverage while using low-cost ground receiving equipment.

The approach that appears practical and uses existing technologies and exprrience for the program outlined here, is described in the following:

The antenna system of the ATS-6 can readily be oriented through a momentum change procedure, for which energy is supplied from solar power via batteries. The two antenna patterns produced by the 2.69 GHz video transmitters of the ATS-6, are so adjusted that approximately nine north-south segments measuring in width about 350 miles and 1000 miles in north-south direction, could cover virtually the entire continental United States including Alaska. Essentially, we would be scanning the U.S. with nine, relatively narrow north-south zones, with a choice of covering the nation three times in a 24-hour period, and remaining stationary for almost an hour over each zone, or once in a 24-hour period with an average of almost three hours stationary service assigned to each zone. The dwell time for each zone can be varied according to the population density and distribution within each zone.

A new system of learning, storage, and delivery called RTS (Rapid Transmission and Storage) has been developed with the group of leading community colleges, mentioned earlier, whereby 30 half-hour audio-visual courses in a special format can be transmitted during one hour via satellite, over a cable system, or over educational television stations at night time. The receiving equipment can automatically select any or all of these for later use or for permanent storage. It is also possible to store 60 such half-hour programs on a one-hour, one-inch video cassette to be forwarded by mail.

For nationwide distribution by the ATS-6 satellite outlined above, a terrestrial video link can be used for tracking the satellite in case a number of uplinks across the nation are necessary. Thus, whenever the satellite dwells over a given zone, the necessary video and sound signals are beamed to the satellite through the ground stations and the appropriately located uplinks.

During a 24 hour period, each of the nine zones can receive, on the average, eighty different half-hour programs or, over a week's period, 560 programs. These can be received directly in learning centers, institutions, etc., three times a day, with an average of 27 different half-hour course units available at a time. Coupled with the ground recording and playback system, the necessary flexibility in choice and scheduling easily meet the other critical requirements of the system.

Alternative 2: In this case, the ATS-6 satellite would distribute RTS learning programs in Alaska only, drawing on all instructional material enumerated on page two of this document. Thus at night time, when no other services are con-

templated, approximately 240 different course modules of one-half hour duration can be offered for use during the following day. Each learning or community center or hospital in Alaska will be able to select and record each night, all or portions of these courses for which printed text and testing material will also be provided.

The ground receiving antenna for the ATS-6 provides the signal for the RTS equipment which records and plays back the learning programs.

Regarding all the other states in the country, the RTS programs would be distributed on video tape by mail to learning centers and institutions. One can also transmit at night time to these places over the nearest educational television station, at a rate of thirty half-hour programs per hour.

When RTS programs are received by satellite or over-the-air or by microwave, specially designed electronic equipment converts the received signal for recording on the RTS playback machine.

Summary and Recommendations

Based upon extended studies and experiments, and current implementation with the community college group operating as the ACCESS organization, a universal learning and delivery system called RTS has been described. It would appear that a major step could be taken in bringing universal learning within reach of everyone in this nation and based on the best utilization of existing facilities and technologies through

alternatives 1 or 2 described in point 4.

The initial pilot operation of modest proportions, but broad enough in scope, would consist of the following three parts.

A) Service to Alaska:

Approximately ten learning centers would be equipped with the RTS system in that many strategically located communities. It is presumed that these areas are supplied with other services as well via the ATS-6 satellite. Thus, ground receiving facilities could be common.

B) In five of the continental states, the RTS will be in operation through the ACCESS community college members (two in Illinois). It is proposed that in each of the other 45 states, at least one community college be equipped to operate three remote learning centers using a single transportable RTS machine. Each of the colleges will acquire by mail a set of program tapes with 60 half-hour lessons each. A program coordinator representing the college would be present at each of the learning centers to supervise the classes. Using multiple classrooms, programs in the tape cassettes are so organized that each course can be started fresh every other week. Also, subjects can be repeated a number of times during the day or evening.

C) As the third part of the recommended program, one state with a significant rural population, would

undertake an expanded pilot operation to involve twenty community colleges, with three learning centers each in rural areas, or a total of sixty.

Preliminary discussion with a state already committed to using the RTS system in one of its colleges, has indicated interest and willingness to consider such participation in this program within its state at its own expense. This would include hardware and the generation of five additional courses.

It is believed that the initial range of program material should consist of twenty-five courses, totalling approximately 750 half-hour modules. Some of these are already in preparation, and sources for others can be pinpointed.

The selection and preparation of programs of consistently high quality should probably be organized on a regional, as well as national basis.

Regarding quality, the RTS system will provide all the technical performance of which our color television standards are capable. The superiority of these pictures has been demonstrated clearly, particularly when compared with the currently used video-cassette systems.

The opportunity for serving an extremely large student body through the combined resources of the best qualified educations, institutions, artists, and producers would, for the first time, make education not only enjoyable, but a viable industry.