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EDUCATIONAL RADIO FOR FORMAL PRIMARY SCHOOL
THE RURAL RADIO EDUCATION PROJECT IN PARAGUAY

VOLUME I
TECHNICAL

September 1979

This Final Report has been prepared by the Academy for Educational Development under Contract No. AID/1a-C-1178, Project #526-15-699-502, for the Human Resources Development Division, Office of Development Resources, Bureau for Latin America and the Caribbean of the Agency for International Development.

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The Ministry of Education and Worship, through its Teleducation Center, has launched a Rural Radio Education Project in Paraguay. Dr. Raul Peña, Minister of Education and Worship, has provided policy guidance and moral support throughout the Project. Lic. Mabel Palacios Morínigo, the Director of the Teleducation Center, converted an "impossible dream" into a well-organized Project. She has been an inspiration to all involved in the Project. The entire staff of Teleducation Center, truly hard-working individuals, assisted in developing an idea into a reality. Other Ministry officials and Agencies of the Government of Paraguay also supported the project at both local and national levels.

The Rural Radio Education Project in Paraguay was made possible, in part, by support received through the Bureau for Latin America and the Caribbean of the United States Agency for International Development. The Academy wishes to acknowledge the contribution that U. S. Agency for International Development officers have made to this Project. Mr. Abe Peña, Director, USAID Mission to Paraguay (presently Director, USAID Mission to Bolivia); Mr. Jon A. Gant, Chief, Education and Human Resources Officer USAID Mission to Paraguay (presently, Education and Human Resources Officer, USAID Mission to Botswana); Dr. Max Williams, Acting Chief, Education and Human Resources Officer, USAID Mission to Paraguay; Dr. James Singletary, Education and Human Resources Officer Latin America Bureau, AID/Washington and Mr. Heriberto Coronel, Project Monitor, USAID Mission to Paraguay, have all been cooperative and helpful.

Today, this Project is an on-going program of the Ministry of Education and Worship. The Academy's role of providing technical assistance to this Project ceases with this Final Report. This report in no way should obscure the fact that the Academy was chosen to provide technical advisors and institutional resources to a well-planned and executed Government of Paraguay project. We feel grateful for having been associated with these fine Paraguayan professionals and for learning from them some important lessons about educational development.

FOREWORD

The Ministry of Education and Worship's Teleducation Center in Paraguay has completed more than two full operational years of the Rural Radio Education Project. Initial planning for the project began in 1975 and continued with subsequent pre-planning through 1976. The Governments of Paraguay and the United States signed a Project Agreement in July, 1976 in which the United States provided grant funds for project support and technical assistance. Project activities began in January, 1977.

The Academy for Educational Development was awarded a contract by the U.S. Agency for International Development in January, 1977 to provide technical assistance to the project. It has completed two and one-half years of service.

During 1977 the Teleducation Center carried out a series of planning activities that were necessary to launch this innovative project. Those activities included conducting base line studies in the rural setting of the project; designing and writing a rural primary school curriculum for radio; upgrading the skills of most Paraguayan personnel; installing a radio recording studio; producing support materials for the radio programs; and setting up rural radio learning centers. It is not just a radio school program nor solely a radio-teaching program for adults. Rather, it is a multi-media program in the native language of Guaraní, which gradually introduces its students to the structure of the Spanish language. The program enables the rural adult population (those older than 15 years) to complete two courses in the grades 3, 4, 5, and 6.

On March 7, 1978 the rural Radio Education Project was inaugurated by the Minister of Education and Worship. Primary school radio programs were aired on two radio stations in Caaguazú Department. During 1978 there were rigorous and intense activities to complete the first year of instruction. Courses terminated in mid-December 1978 for the first operational year of radio instruction. As of this writing the project is in its second full year of operation.

This Final Report has two volumes. Volume I provides a succinct, analytical narrative of the project, with evaluation, costs, and lessons learned. Appendix A lists five previous reports submitted by the Academy and the appendix materials and documents in those reports. Interested parties can receive these documents from the Academy.

Volume II contains a variety of materials and documents produced for the project. It brings together key documents for interested parties wanting deeper understanding of the project.

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SUMMARY

The Government of Paraguay considers education an integral part of its commitment to improve opportunities for its people through rapid cultural and economic development, but it has been unable to provide education to all its people through conventional means.

It is not economically feasible to construct enough new schools or classrooms or train enough teachers to serve the population that is not now being reached. Any program to increase educational opportunities must also take into account the particular needs of the rural population. With these realities in mind, the Ministry of Education and Worship of Paraguay began the Rural Radio Education Project in 1976 with the cooperation of the U.S. Agency for International Development.

The Ministry of Education and Worship has been involved in radio education since 1972 with broadcasts of fifty to sixty radio programs during the school year to enhance urban primary and secondary programs. The Rural Radio Education Project represents an expansion of the efforts and requires an increase in administrative and technical capabilities of the Ministry in order to produce radio programming for any given school year.

The Rural Radio Education Project has been set up in the predominantly rural Department of Caaguazú, following the Ministry's special primary curriculum at the second level (grades 4, 5 and 6). The first year of multi-media broadcasting -- 1978 -- focused on the 4th grade, with grades 5 and 6 added in 1979. Multi-media instruction is in three areas: social studies and language arts; applied natural sciences, technical skills and health; and applied mathematics, with 15 to 20 minute programs in each area offered five days per week through a learning center in the community, under the supervision of a local monitor.

Since January, 1977 the Academy for Educational Development under Contract No. AID/1a-C-1178 has provided a team of four specialists (radio education, research and evaluation, supplementary materials production, and radio scriptwriting) to work with their counterparts in the Department of Teleducation. Together they have made significant achievements:

- Production of Curriculum and Instructional Materials

Design of special curriculum for multi-media instruction

Design and coordination of 540 instructional programs, supported by print materials which constitute a mode of primary education corresponding to the third and fourth grades.

- **Provision of Professional Development Training**

Scriptwriting, and production of printed materials.

Training of educators in the Ministry to prepare, produce and direct the instructional radio series, including in-service teacher training courses in the utilization of the new curriculum.

- **Research and Analysis**

Study of student age population of Caaguazú and their radio listening habits.

Evaluation of learning taking place in the multi-media process by implementing an ongoing formative and summative evaluation which is now in the final process of computerized analysis.

Evaluation of the effectiveness of the printed materials and radio broadcasting.

In 1977 activities of the Rural Radio Education project focused on action-research oriented planning and implementation. During 1978 the project produced 540 instructional programs, the first stage of actual broadcasts of the third and fourth grades. This was followed by the second stage of the project, that of broadcasting to fifth and sixth grades in 1979.

Many accomplishments have taken place in the Rural Radio Education Project. A trained team of multi-media educators are now administering the program. The establishment of the four original test centers has led to a continual development of 45 new learning centers. All efforts at curriculum and instructional development, staff training and research and analysis have had a positive effect on the educational system and have led to an improvement of educational services to the Paraguayan poor and rural people.

By mid-year 1979, after one and one-half years of instructional radio broadcasting, the project is proceeding quite well. Over 1,000 participants were enrolled in over 45 rural radio learning centers in Caaguazu Department. The Teleducation Center has a full year radio program for rural adults and older youth who have dropped out of regular primary schools or who have stopped formal education because no primary school was available in the near vicinity. Some very substantial improvements have been made in curriculum design and development, production of support materials, and ongoing evaluation. It is considered by all project participants that a gradual series of actions are now accelerating and will continue to progress and improve in 1979 and beyond.

End of Project Status Results

Curricula, Radio Programs, and Support Materials

- Design and coordination of 540 instructional programs
- Adaptation of workbooks to radio education, corresponding to grades 3 and 4 of primary school (1978)
- Production of seven workbooks in offset for the same grades and corresponding to radio broadcasts
- Production of seven workbooks and guidebooks in mimeograph for 5th and 6th grades (July 30, 1979)

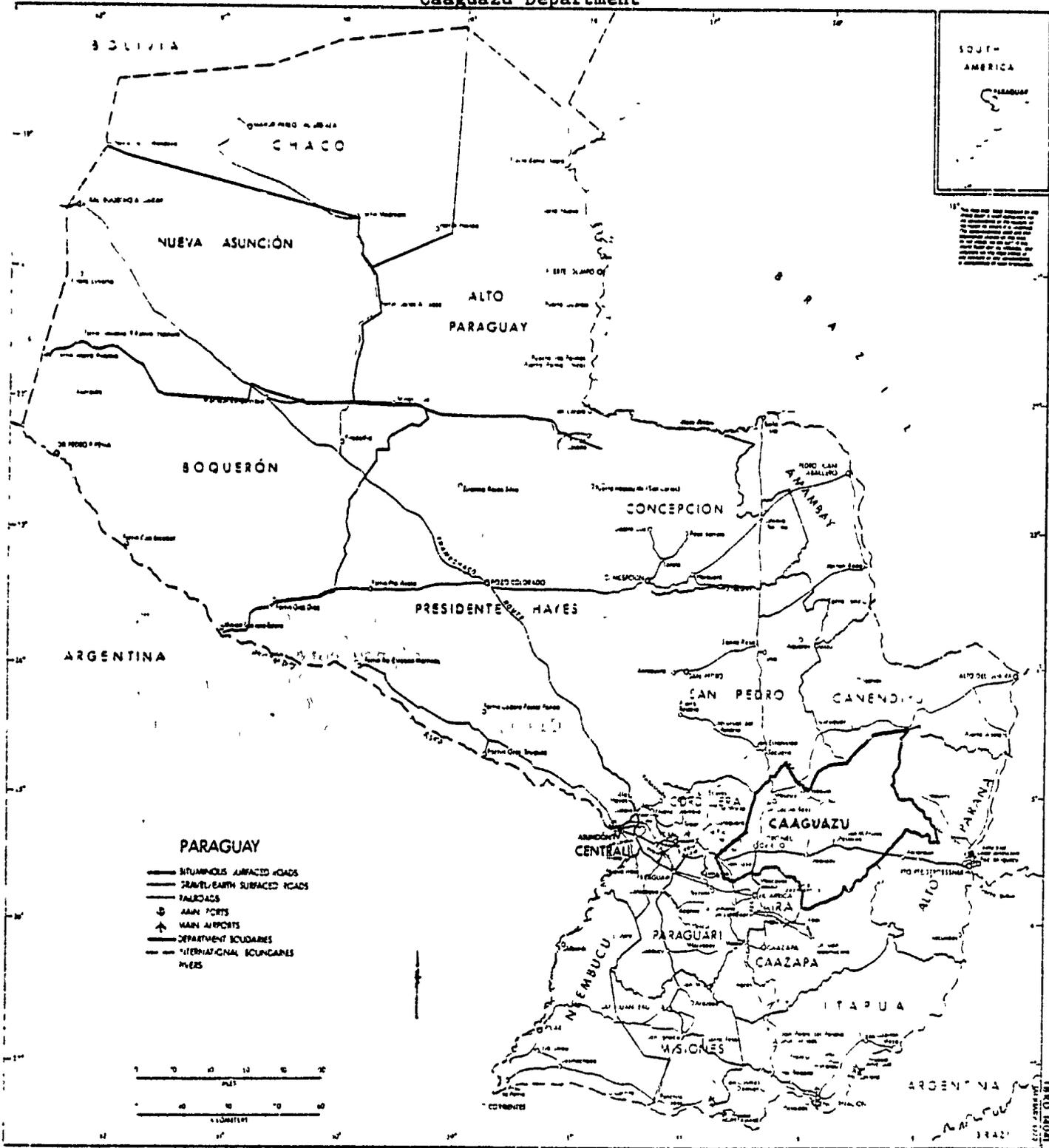
Professional Training

- Preparation of personnel named by the Ministry for the interpretation of curricula especially for production, coordination of radio programs, and materials production
- Preparation of personnel in planning and execution of formative and summative evaluation

Investigation, Analysis, and Evaluation

- Identification of the characteristics of audience potential in Caaguazú
- Establishment of test sites in Caaguazú

REPUBLIC OF PARAGUAY Caaguazu Department



1:500,000
This map was prepared by the Army Geographical Institute of the Republic of Paraguay. It is based on the latest available maps and aerial photographs. The scale is 1:500,000. The map is published by the Army Geographical Institute, Asunción, Paraguay.

I. Project Description

A. Background

The different studies conducted about Paraguayan education reveal that the rural population of low income has a deficit in educational services. As noted in the Paraguay Education Sector Assessment- 1977,^{1/} there are not enough schools or teachers to accommodate all potential students at once. "Given the figures available it seems likely that the MOE would have to build 250 schools each year to provide current levels of coverage, and twice that number to begin to reduce overcrowding".^{2/}

In addition, the quality and relevance of the educational program to rural population has been a major concern of the Ministry. Much of the rural population cannot identify or relate to the traditional education program geared to an urban environment. The need to develop a relevant, rural curriculum of high quality is apparent.

"In summary, the problem in rural primary education is that existing resources are insufficient to provide the minimal levels of education needed for economic and social development. Students fail too often and repeat too often, crowding poorly-built and maintained buildings, overtaxing teachers, preventing new generations of children from enrolling until they too come close to the age in which they begin to be more useful on the farm than in a dead-end school."^{3/}

The Government of Paraguay has demonstrated growing and constant interest to resolve these problems and to provide all its inhabitants with quality education. A national program of distance education, an alternative solution to the detected problem, was designed on an experimental basis. This was the understanding of the Ministry of Education and Worship and the U.S. Agency for International Development in signing a grant agreement for the Rural Radio Education Project which was designed for a typical rural zone, with low income families, in the agricultural zone of the Department of Caaguazú.

^{1/} Paraguay Education Sector Assessment - 1977. The Academy for Educational Development, May, 1977.

^{2/} Ibid., p. 231

^{3/} Ibid., p. 232

The project was planned to be a pilot project for three years, with the possibility of extending it later to other areas where there are incomplete schools.

The Agency for International Development awarded the Academy a contract on December 28, 1976 to provide technical assistance to:

1. Develop Ministry capability to provide radio instruction to the rural population
2. Experiment with different methodologies and techniques to provide rural primary education through the use of radio
3. Determine what institutional mechanisms help to make rural radio education programs feasible and effective

To fulfill these objectives, the work was divided into two operations:

1. Planning and implementation of objectives (1977)
2. Execution of instructional programs (1978 and 1979)

Planning was considered a priority: the design of the curriculums, personnel training in radio programming, preparation of learning materials, and evaluation. The Academy sent technical advisors to the field in January, 1977 and throughout the project in the following areas of expertise: (1) educational radio programming; (2) production of learning materials; (3) research and evaluation; and (4) preparation of workbooks. [Section IV has a full list of AED advisors used in this project.]

B. Project Objectives

The Project Objectives were to:

1. Provide primary instruction to a representative percentage of the rural population through the use of radio
2. Experiment with different methodologies and techniques to provide such education
3. Institutionalize mechanisms to make rural radio programs feasible and effective

Project Objective 1: Providing Instruction by Radio

The Rural Radio Education Project had a goal of producing taped radio programs and printed materials. This objective was achieved by producing 1,080 radio programs, with their complementary texts, corresponding to the third, fourth, fifth and sixth grades of primary school. In 1977 there was planning for this production. In 1978 the Ministry of Education and Worship produced 540 radio programs, and nine workbooks for grades three and four. In 1979, lessons for 5th and 6th grades are being prepared.

1. Pre-Planning

The Ministry of Education and Worship decided to determine experimentally how mass communication could be incorporated into the school system. It decided that a unique curriculum designed for radio, along with special evaluation procedures, might lead to a new mode of primary education within the existing school system.

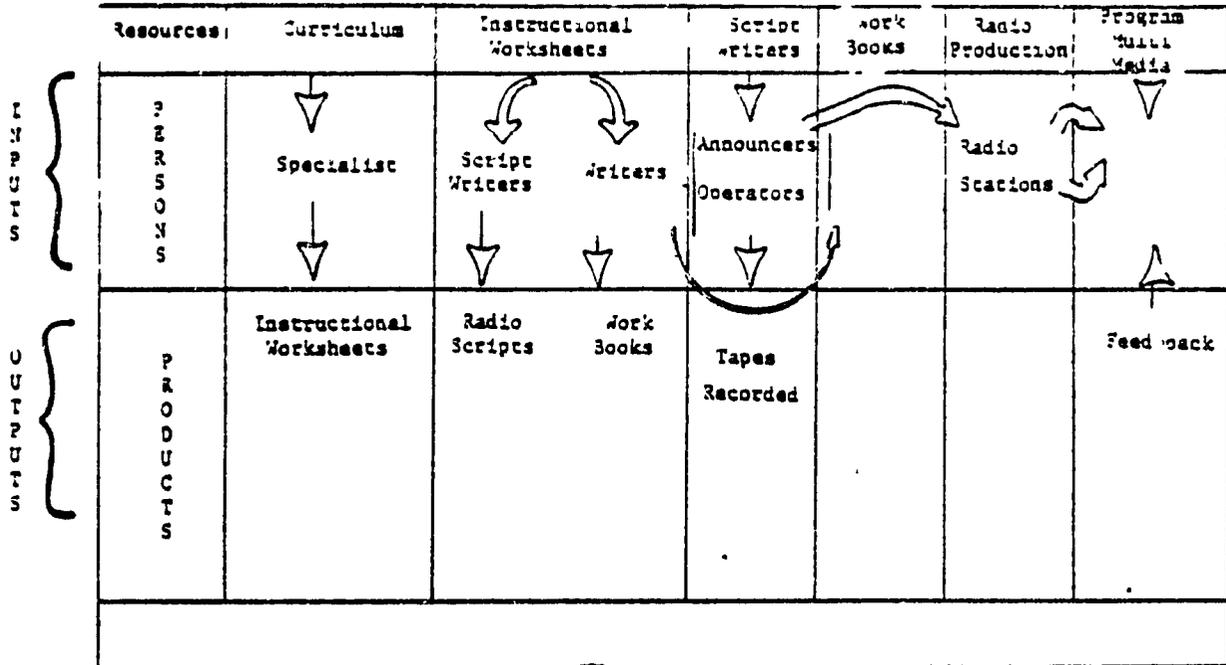
The first year emphasized instructional design techniques. The project staff evolved a technique called "instructional worksheet". This worksheet, designed before a script is actually written, is used to analyze in outline format what learning objective the program would achieve.

The testing of these instructional techniques was conducted throughout 1977. These tests served to orient the staff to the realities of instructional radio. The staff learned that production procedures must be clearly and easily coordinated. Instructional formats were tried and revisions were made based on field experience.

During 1977 the foundation was set to provide school instruction through the use of radio. The experiment was finished in 1978 and the findings put into operation for the 3rd and 4th grades.

The following chart shows the system set up to design a rural radio primary school curriculum, radio programs.

Table No. 2. Operational Functions of Project
 This operation scheme was devised during pre-planning in 1977 and was used throughout the project.



The human resources--people--were the inputs of the system; and the products--worksheets, scripts, tapes--were the outputs. The sequence of the curriculum development was: 1) the curriculum specialist designed instructional sheets; 2) from the objectives set forth in the worksheets, the script writers and writers produced radio scripts and workbooks; 3) the scripts were then given to the announcers and production operators who produced recorded tapes; and (4) finally the radio tapes were distributed to the radio stations which broadcasted to the rural audience. Feed-back from the audience was the final output.

2. Production

Instructional broadcasts went on the air March 7, 1978. Radio Caaguazu in Coronel Oviedo and the radio station in Villarica each broadcast instructional radio one hour daily.

The staff produced radio programs about one month in advance of broadcasting. They were taped and sent to the radio stations. One radio station broadcast the programs from 12 - 1p.m. while the other repeated the same program from 6-7 p.m.

In 1978, the radio programs, workbooks, and evaluations were completed for the first year. Workbooks were revised, redesigned and nine of them were printed

The Teleducation staff systematically produced programs using the reformed radio education curriculum. In 1977 testing of materials was started; in 1978 and 1979 testing continued daily.

Production proceeded through an integrated work plan which included instructional design, script writing, printed work sheets, and evaluation techniques mapped out in terms of the target dates. There was a continual need for coordination in the area of production, evaluation, experimentation and organization. A series of weekly meetings took place which allowed each staff member to contribute and participate in the production process. The area which received principal attention was the transposition of instructional concepts to the oral/aural mode. This required careful study of the curriculum to determine how objectives could be effectively achieved through the use of radio.

Project Objective 2: Experimentation

A central project purpose was to experiment with different methodologies and techniques to provide primary instruction using radio. At the project outset it was not completely clear how such a project as instructional radio could be used for both formal and non-formal education in Paraguay. It was possible to learn from other similar experiences in Latin America and elsewhere, but it was realized that the radio instructional model would have to be adapted to Paraguay. The program evolved into a multi-media program for teaching basic skills to the rural bilingual population.

The Ministry of Education and Worship recognized that it had to experiment to determine how mass communications could be incorporated into the school system. It decided that a unique curriculum designed for radio, along with special evaluation procedures, might lead to a new mode of primary education within the existing school system.

The variables taken into consideration fell into two categories: instruction variables and production variables. The instruction variables included entry behavior, instructional design format, integration of content material, self-instruction techniques, didactic material, and organization factors such as time, locale of learning center and participant selection. The production variables were dramatization format, magazine format, use of key characters, sound effects and the question of language utilization.

The work in 1978 and 1979 shifted from experimentation and pre-testing of broadcasts to evaluation of the actual instructional programs being produced. The evaluation staff as well as the Academy's evaluation specialist carried out systematic formative evaluations of all components of the project. The primary concern was assessing learning taking place as a result of the instructional programs. In December, 1978, the first overall assessments were made of learning taking place during the first year of actual implementation of the project. These were analyzed carefully in early 1979 and the results are presented in Section III.

Diagnostic tests of reading and math skills were first carried out from February 4 - 11, 1978. These tests measured the learning which occurred as a result of the broadcasts through pre-test and post-test techniques. A follow-up testing occurred in August and a final test for the first year in December, 1978.

The results of the diagnostic tests in February, 1978 indicated that most students had basic mathematical skills, but had difficulty with information such as the number of days in a week. In reading and writing there were some indications of bilingual confusion (e.g., in reading there was difficulty differentiating verb tenses). The information from these tests was incorporated into programming. The full test results were completed in December, 1978.

The project experimented with different programming techniques, some of which include:

1. Radio programs started out in Guaraní with an introduction and a short soap opera. Spanish is used gradually during the lesson.
2. Workbooks were produced first in mimeograph and pre-tested with students. Once revisions were made they were mass produced in offset.

?

Project Objective 3: Institutionalization

Three specific actions dominated the institutionalization process of this project, as follows:

1. The reorganization of the Teleducation Center to better its efficiency.

2. Coordination in the Ministry of Education and Worship to offer distance teaching/learning to rural primary school students.
3. Training of personnel in the Teleducation Center, other Ministry of Education and Worship officials, and others.

In the Teleducation Center, job assignments were re-defined according to the project needs. Work flow plans and controls were devised. This made it possible to make more efficient decisions regarding the direction of the project.

More intensive coordination was made with other Ministry departments especially the Curriculum Department, in adapting the regular primary school curriculum to a new rural radio primary school curriculum. There was more intensive coordination with the Orientation Department for evaluation; with the Education Materials Department to coordinated printing of workbooks; and with the Primary Education Department to determine study levels, policies, and teacher needs with this new form of primary education.

Prior to the initiation of this project, the Center served the needs of urban schools in Asuncion. The staff was small and it produced two programs per week. As a result of this project, the staff of the Center quadrupled in size. The Center became closely involved with more extensive program planning. An informal committee composed of the Director General of the Ministry, the Director of Primary Education, and the Director of Curriculum was formed.

Institutionalization in 1978 picked up considerably. The radio recording studio was installed at the Teleducation Center in March and was fully functioning in April, 1978. This relieved the burden of having to borrow radio studio space at Radio Charitas in Asuncion. Now all taping is made at the Teleducation Center recording studio.

Another institutional improvement was the production of instructional materials to accompany radio education programs. Workbooks now accompany all radio programs so that all student participants have their own worksheets during the radio broadcasts.

Institutionalization of radio script writing and instructional radio production was also considered important. It was imperative to have a group of professionals to produce effective radio programs from the rural radio curriculum. At the project outset only two well-trained professionals were on the staff. Today there are four major units with 16 professionals. These individuals came from diverse departments within the Ministry of Education and Worship and had to be integrated into the Teleducation Center. At the same time this group of professionals set up a system of writing radio scripts from the radio curriculum, pre-tested the scripts, directed the radio production of these scripts onto tapes, and received feedback in order to improve their quality.

Another area of institutionalization was using monitors and establishing the Learning Centers. The Minister of Education and Worship approved the appointment of monitors to work in the Learning Centers as the field staff of the project. Their function and responsibilities are in the areas of administration, evaluation and distribution of materials in the Learning Center.

II. Rural Radio Education Programming Components

In order to achieve the educational objective described above, the project had ten education programming components. These are described below.

A. Project Planning

The project staff was concerned that logical planning be used in setting up the project. Fortunately, the Teleducation Center began planning early in 1975 for a project that would start up in 1977. The Director of Teleducation Center presented to USAID/Paraguay a draft proposal for this project. The Mission reviewed the project and contracted consultants to assist in working with the Teleducation Center to bolster project ideas and rite up a Project Paper. Thus, from initiation there were clear ideas as to where this project might go.

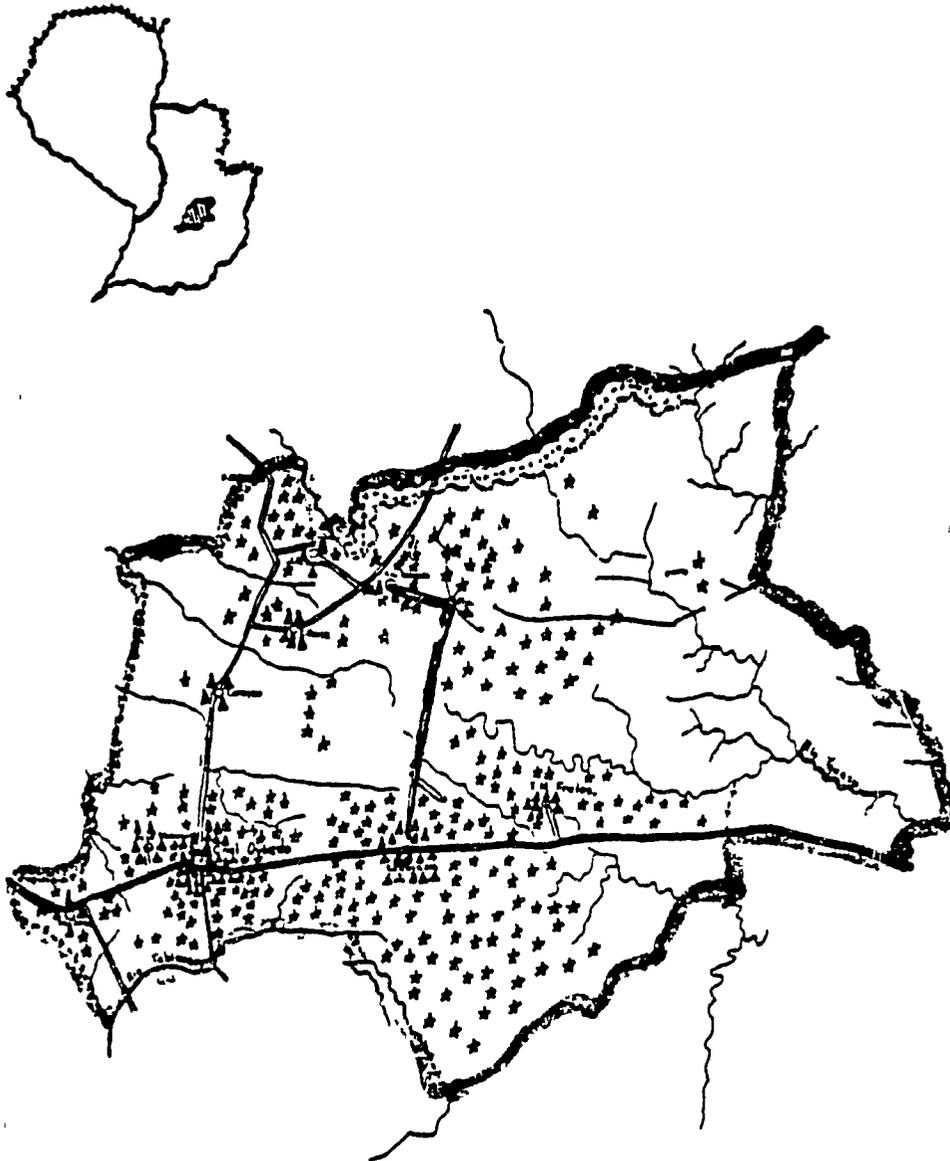
An initial planning activity was to understand better the project site -- the Department of Caaguazú. The Center contracted with a Paraguayan educational institution, EDUCADES, to conduct site surveys in the target area. The study surveyed the possible target audience, conditions of the Department of Caaguazú, and issues related to formats and methodologies. This report was the backbone for making some key decisions regarding the project.

From this study it was possible to gather information necessary in the programming such as:

1. Identification of population needs which distance education could satisfy.
2. Limits of the experimental area.
3. Definitions of characteristics of the experimental sample.
4. Needs for selection and training of necessary personnel.

The EDUCADES study also provided information about possible experimental sites, potential radio learning centers, and monitors and facilitators. It was established that experimentation would be made with students completing two years of education.

DRAWING OF CAAGUAZU DEPARTMENT



REFERENCES

▲ Complete Primary
Schools - 73

* Incomplete Primary
Schools - 252

The potential population established for the project was 59,927 students, as follows:

| | |
|---|--------|
| 8 - 14 years with two years of schooling..... | 17,367 |
| 15 - 18 years with two years of schooling..... | 8,476 |
| 18 years and over with two years of schooling.. | 12,942 |
| Heads of households with two years of schooling | 17,042 |

The target population was limited to 700 students in grades 3 and 4 in 1978 during the first phase and 1,500 students for grades 3,4,5, and 6 in 1979.

Data was also collected by EDUCADES on the student age population of Caaguazú and their radio listening habits. The most significant findings of this early investigation were: the interviewees expressed a great deal of interest in participating in the project, indicating their homes as the preferred listening centers. In suggesting content themes, 70 percent of the population interviewed said agriculture was most important to them. The preferred listening times were between 11 a.m. and 2 p.m. and between 6 p.m. and 9 p.m. According to this report, a monitorial system would be difficult without the use of teachers. The interviewees preferred a combination of Spanish and Guaraní. There were various groups of possible target populations and it was decided that the 14 to 20 year group seemed most appropriate.

Four listening centers test sites were identified in the Department of Caaguazú, each having different socio-economic characteristics. These test sites served a variety of functions. They were the contact point of the central office staff with the rural population of the Department of Caaguazú. Through these centers a procedure was established to inform the target population of the objectives of the Project. A procedure was established to investigate how the target audience would learn from radio programs. The central office staff prepared cycles of lessons in mathematics, science and communications. These were not taken from an organized

curriculum at this time. The cycles were simple materials used for preliminary investigation into how the rural population would react to radio "presentational learning." These lessons were taped on cassettes and brought directly to the potential audience. The staff was then in a position to study learning styles. Evaluation was included in each field test. The work pattern established in 1977 continued in 1978. The major difference was the use of the special curriculum and careful control of sequence. With the formation of the four original test centers the continual development of the new learning centers became an organized activity. At the end of 1978, 45 centers had been formed with over 700 students participating.

B. Rural Radio Curriculum

The evolution of a rural primary school curriculum adapted for radio was a salient project component. Using the existing primary school curriculum as a base, it was necessary to adapt that curriculum for both a rural setting and also make it applicable for radio. This required close coordination and intense coordination with the Teleducation Center by the Departments of Primary Education and the Department of Curriculum.

A first step was the preparation of a curriculum block which outlined objectives and content. This was then used to plan and develop daily instructional designs for each radio lesson. These lessons were analyzed in order to produce effective audio and written components. The instructional designs (called libretos) became the curriculum. The libretos were tested at the learning test sites and revised by the Center. The final versions of these libretos became the radio curriculum.

The general objectives for the radio curriculum were to insure that students:

1. Would possess knowledge about personal hygiene, prevention of sicknesses, prevention of accidents, nutrition, as factors affecting their health.
2. Were able to use numeracy skills for operations and mathematical calculations in solving problems related to work and commerce.
3. Would possess knowledge that facilitates and assures betterment of agricultural practices, forestry, and animal husbandry.
4. Would understand and communicate in Spanish (spoken and written) according to personal and commercial needs.
5. Would be aware of cultural values of their own community and that of Paraguay.

The general orientation of this curriculum design concentrated on:

1. Agricultural development techniques.
2. Communication in Guaraní and methodical introduction of Spanish language materials.

3. Sanitary preventive measures and conservation of health.
4. Use of basic mathematics to solve local problems.
5. Review of social and civic values for the integration of the family.

The new curriculum took as its base the general educational objectives of Paraguay and the basic primary education objectives. Specific rural radio primary education objectives were established.

The rural radio curriculum which was devised took into account a multi-media format. Radio programs produced for 1978 and 1979 were made from this revised curriculum. The Center staff worked on radio scripts from the rural radio curriculum.

In 1979, the group of instructional and curriculum specialists have listened to each original lesson and made necessary revisions. Some of these lessons have had to be re-taped. This has meant that additional time has been spent in the curriculum development process. In order to revise the lessons originally produced, it has been necessary to validate their effectiveness. Ideally, the revision process should occur concurrently with development, but time and personnel constraints have not permitted this to be carried out completely.

Primary Rural Radio Curriculum has three major subject areas:

1. Communication (Language Arts) - reading, writing, spelling, civics.
2. Mathematics - numerary, calculations.
3. Natural Sciences - basic sciences, agriculture, health, nutrition, community development.

C. Radio Programming

A decisive and crucial element of the project was radio programming. This important phase took a radio curriculum and transposed it into action. The Center for Teleducation had considerable experience in designing educational radio programs for formal education settings in urban Asuncion. In analyzing this experience, it was found that the staff could produce good radio programs, but it was necessary to transfer this experience to a rural setting. During the planning phase the Center devised different work techniques to incorporate a new rhythm of presentation and format.

The Center staff took the studies of EDUCADES and the revised radio curriculum to design and produce experimental cassette tape programs to be played to learning groups at test sites in Caaguazú Department. Experimentation with cassettes was made testing (1) types of programs and (2) instructional formats. Different tests were made on the following variables:

- Acceptance of different kinds of formats
- Use of soap opera and dramatic presentations
- Levels of knowledge and entry behavior tests
- Total dramatization
- Sequential programming
- Partial dramatization
- Presentation of personalities with coordinated episodes
- "Newspaper" style
- Narrative of lessons
- Lecture format
- Dialogue format
- Audience two-way participation
- Humor formats
- Sounds (orchestra, vocal, bands, instruments, distribution of voices and space, special effects, tone and loudness of voice)

Initially, the Center set up elaborate systems of variable testing at the learning center testing sites. Armed with different experimental cassette tapes, testing combinations of variables, the staff made rigorous controls of each program. After about six months of testing it became clear that this specific testing was not required to continue in order to make further refinements. This procedure was replaced by a less formal procedure of testing and more intensive dialogue with listening participants.

The Center needed about three months to set up the learning center test sites. This required vigorous support from city and town officials in order to get rural people to participate.

Decisions were made and formats chosen as these experiments took place. For example, according to the EDUCADES study, most rural people in Caaguazú Department speak Guaraní. For this reason, radio programs were produced in Guaraní with methodical bi-lingual introduction of Spanish. Decisions were made concerning types of instruction, modular instruction, dialogue, indirect or direct teaching.

The following format was adopted:

Creation of a discussion with a coordinated episode surrounding a typical Paraguayan family in a rural area. Daily life situations were dramatized, including life styles, language use, social organization, work techniques, and customs. The dialogue took place in Guaraní and had special effects that made the presentation lively. It discussed issues and educational concepts that would be discussed during the radio lesson for that day. A make-believe "Benitez family" was the nucleus of these programs.

The Benitez family was composed of:

Don Toni, 49 years old, farmer. Studied through 4th grade in Coronel Oviedo. Expresses himself well in Spanish. Sells his crops to middlemen or takes them to town.

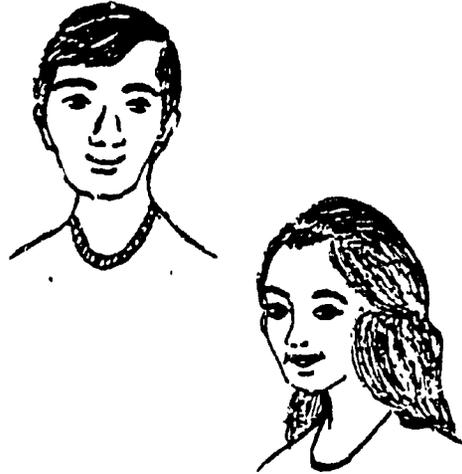
Doña Justa, 42 years old, housewife. Second grade education. Speaks little Spanish. Friendly, hospitable, and kind. Takes care of the house well.



Juanchi, 16 years old, has finished second grade. Has asthma. Helps his father. Wants to get ahead and takes radio primary school courses.

Marfa Pabla, 14 years old. Finished last grade of primary school. Helps her mother. Has boyfriend, Peru, a teenager who attends high school.

Peru, friend of Marfa Pabla has the highest cultural level of the group.



The family lives in Pastoreo in a house inherited from their grandparents. It has a small creek running through the land. The town is typical of rural Paraguay. People travel by horse, bicycle, horse-driven wagons, or on local buses.

Soap opera-type dialogues are made in developed and coordinated episodes concerning daily rural life activities. A calendar was made of events that coincided with the agricultural production cycle and introduced learning content. The family discussed the issues and ways in which the problems could be solved.

Each radio lesson had the following scheme:

1. Dramatized situation (a single episode lasting four to five minutes) with personalities on a theme that "led into" the class lessons.
2. Radio teacher leads into lesson for the day by referring back to the episode. Professor is always friendly and kind. By using colloquial expressions and good humor, an informal climate is created. The purpose is to stimulate the lesson for the day and objectives expected to be accomplished during the broadcast.
3. Discussion is given in great detail and very slowly so that there is no mistaking the daily assignment.

4. New ideas are related to the student's environment through stories, songs, popular colloquial expressions, newspaper commentaries, etc. These are inserted at appropriate times to keep interest, as attention spans appeared to have a maximum of five minutes.
5. Development of themes focused on both learning and application.
6. Homework assignments were made to continue after the radio broadcast. It was quite important to assure that these assignments were carefully understood.

The following is the rough format for each radio program, with slight variations taking place for each day. Total time for each day ran 50-60 minutes.

Radio Broadcasting Format

| <u>Activity</u> | <u>Time</u> |
|-----------------------------------|---------------|
| Initial music -- Paraguayan songs | 2 minutes |
| Dramatized Episode | 5 minutes |
| Interlude Music | 30 seconds |
| Development of Theme for Day | 2 minutes |
| Mathematics Lesson | 12-15 minutes |
| Music Interlude | 1 minute |
| Communication Lesson | 12-15 minutes |
| Music Interlude | 1 minute |
| Natural Science Lesson | 12-15 minutes |
| Summary and Review of Homework | 2 minutes |
| Signoff -- Paraguayan Music | 1 minute |

A significant fact was the constant feedback that Center staff members received from the radio learning centers to assure that the programs were having an impact on the students.

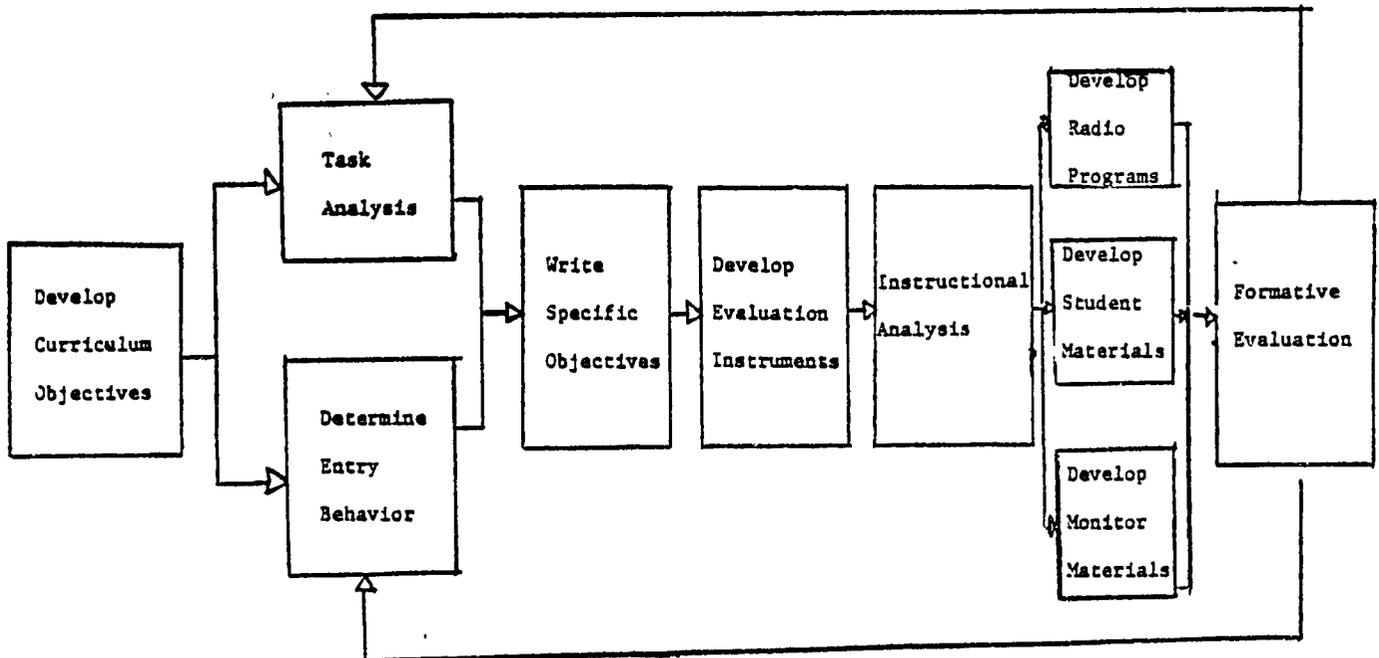
D. Educational Materials

Educational materials were designed to accompany the radio programs. Workbooks (libretos) were written for each lesson and in each subject. They contained written and graphic materials that could be used by the students during the radio broadcast and also had the exercises or homework assignments for after the radio broadcasts.

In similar vein to preparing radio programs, intensive prior investigations were made to determine how best to make the workbooks. Work began with analyzing instructional designs in other Latin American countries that had combined radio broadcasting and instructional materials.

An instructional design was contemplated that included (1) statement of objectives, (2) classification of objectives, (3) determining conditions of learning with each objective, and (4) determining instruction activities required to achieve the objectives. The following model was used to assure a systems design.

INSTRUCTIONAL DESIGN MODEL



Alternative designs of materials were tested, including:

1. Instructional units integrated with radio that responded to behavioral objectives
2. Modules or packaged instruction
3. Programmed instruction
4. On-the-spot materials (to be used before, during, and after the radio broadcast)
5. Individual or group use of materials

Included in these tests or probings were formats of workbooks. This included diagram models, types of drawings, sizes, style, number of letters per page, indications for the radio, and sizes of pages.

A consensus was that workbooks should be integrated instructional units coordinated with the radio broadcasts. Each page corresponded to a unit lesson. Word images were used as well as graphic identifications of each subject, as follows:



Mathematics



Communications



Natural Sciences

For the first year (1978) of Rural Radio Primary Education (grades three and four), the Center produced seven workbooks which covered an average of 26 radio hours of instruction per workbook. Each hour consisted of the lesson in mathematics, communications, and natural sciences. The completion of the 180 hours of radio broadcasting (540 lessons) with the seven workbooks constituted the school year.

Grades 5 and 6 will have about the same number of radio lessons and workbooks.

In addition to workbooks, each monitor had a teacher's guide to assist in the kinds of learning activities that should take place before, during, and after the radio broadcasts.

E. Monitors

Recent non-formal and radio education projects in Latin America have been utilizing para-professional community leaders to assist in promoting learning and community development activities. They have been called monitors, facilitators, promoters, or simply para-professional education assistants.

In this project it was decided to use community para-professional educators to assist with this project. This seemed most appropriate because radio learning centers were to be established where there were no existing rural primary schools and thus most likely few available rural primary school teachers.

Monitors are responsible for the operation of a learning center. They promote enrollment, organize the regular meeting sites, obtain a radio for use in the class (if needed), maintain enrollment records on students and encourage the students to arrive on time. They assist students during the radio broadcast, give follow-up instructions taken from radio cues, encourage and lead discussion after the broadcast, make printed materials available as well as paper and pencils, and maintain order within the groups.

Some monitors of the learning centers located at the primary schools are teachers. Monitors of the learning centers located in places other than the school are mothers, retired teachers, graduates of secondary schools, older children in the community who have completed primary school and others in the community with sufficient educational background and managerial competence to conduct the center activities.

Monitors were recruited by the Ministry of Education and Worship through interviews and group meetings. Both groups of monitors (teachers and other volunteers) received in-service training and orientation before the radio broadcasts began. They received instruction on how to handle the instructional materials, how to use the "teachers" guides, what kinds of exercises should be given, enrollment and attendance procedures, and other appropriate information. Additionally, monthly monitor meetings were held in Caaguazú to assure coordination throughout the time of the project.

In pedagogical terms, monitors completed the instructional design system radio-instructional materials-monitors. However, the monitor did not have a major teaching function at the learning center but rather a coordinating function. To have the monitor teach would violate a basic principle of the project to "get into the learning center the very best possible instruction with a well-designed radio education program."

The monitor is a representative of the Rural Radio Education Project with three functions:

1. To represent the project for the students, local authorities, and community leaders.
2. To provide technical direction of learning evaluations and supervision of the learning groups.
3. To perform administrative tasks such as providing the radio, handing out materials, registration, and discipline.

As a representative of the project, the monitor

- Explains the radio learning program and how instructional materials complement the radio programs
- Observes the learning process and notes difficulties
- Discusses with local authorities the project as an experiment of using new educational techniques for an alternative primary school education and to better the student's life
- Explains that the project is a new effort by the Ministry of Education and Worship to broaden its services to all Paraguayans who want further education
- Explains that in no way is the project replacing teachers but rather complements and reinforces learning for those who had left primary school or who for some reason did not attend school.

Monitors played an interesting role in the project. The Center staff underestimated at first the importance of monitors but this was quickly corrected during the planning phase. It was found, however, that it was not crucial to have monitors at the centers every day, but perhaps once a week. This can have interesting consequences for multiplying the use of monitors in other centers.

F. Students

When the project was announced in Caaguazú Department in early 1977 there appeared to be enormous interest by drop-out students and students who had finished second grade. This was confirmed more fully by the EDUCADES study and confirmed also the Center's earlier thesis that there were untapped number of students who would go to school, given the opportunity. It was quite easy to get interested students to assist the Center at the four learning center test sites.

There appeared to be a critical demand by students to attend the radio education classes. The variation of student ages in the EDUCADES study that requested enrollment indicated interest by the population. It recognized that it was possible to recruit students who had left the formal system and who wanted to finish primary school. Another later indicator was the low drop-out rate of students in radio education courses.

In 1978, over 700 students were enrolled in the 45 learning centers. It could have been possible to recruit many more but the Center decided to limit the number of students during the first year. In 1979, the second year, over 1,500 students are enrolled.

G. Community Involvement

A dynamic consequence of the project was the community involvement in the project. In planning the project only minimal attention was given to the relationship of the learning center to the communities and also how learning at the centers might have development consequences emanating as a result of learning in the centers. Most rural communities with incomplete primary school showed demonstrable interest in having a learning center and to be involved in the project.

Local community authorities (civil, military, political, and religious) gave excellent moral support in setting up learning centers and recruiting students.

Much of learning by radio consists of themes relevant to local communities. Themes in agricultural production, health practices, community development, and sanitation began to have residual effects in the communities. For example, there are several instances in which students have initiated community action projects.

H. Learning Centers

It was envisioned that students enrolled in this project would be expected to meet on a regular basis at a designated place called a "learning center." The learning center might be located in a school if there were available space and if the children who wanted to enroll in the program lived within easy walking distance. Other community centers, homes, or any other building facility that seemed appropriate and was available could also be designated as learning centers. Each learning center was to be managed by a monitor.

The idea of a learning center was well accepted in the rural villages of Caaguazú Department. Parents of students enthusiastically planned their local centers. They served as excellent centers where students could get together daily to listen to the radio together. Curiously enough, however, some older students preferred to listen to the radio in their homes and to go to the center only once a week.

In 1978, 35 learning centers were formed with about 700 students. In 1979, this has doubled to 70 centers with about 1,500 students enrolled.

I. Transmission by Commercial Radio Stations

An important characteristic of this project was the use of commercial radio stations. Arrangements were made whereby time was donated for the instructional radio programs. In the Caaguazú area two radio stations contributed time. By using more than one station some degree of flexibility was made in scheduling. Participants who could not listen to one station at the allotted time could listen to the other. In addition, the utilization of two stations meant the project had wider diffusion.

Broadcasting from a local commercial station in Caaguazú was important to implement as soon as possible because the use of free commercial radio was one of the fundamental characteristics of this project. The objective was reached during May, 1977 and continued during the entire year. In 1978 the project was using two radio stations in Caaguazú. One broadcast the programs from 12 - 1 p.m. while the other broadcast from 5 - 6 p.m.

In 1979, the radio stations used these time slots for commercial programs so the project had to use less favorable hours. Students accepted these changes with only minor problems.

For the future, and as the program expands nationwide, it is expected that broadcasts will be placed on the national radio network, Radio Nacional. There is also some discussion of the Ministry's starting its own educational radio station. This might be appropriate if the project were to expand nationwide.

J. Training a Team of Radio Educators

A primary goal of this project, as was seen in the third objective, was the training of a team of radio educators. With the exception of the Project Director and the Radio Coordinator, staff working on this project had little experience in radio education. An important achievement of 1978 was the on-the-job training of Center staff members who were changing their professional roles.

During 1978, the procedure for the production of the instructional radio and print materials was a team effort of the instructional specialist, the script writer and the text writer. These people were guided by the Instructional Coordinator and the Evaluator, all under the direction of the Project Director.

The staff received training in (1) educational technology, (2) radio broadcasting, (3) development of instructional materials, (4) educational research, or (5) educational evaluation. Through the efforts of the technical assistance team, the staff received both structured and unstructured learning experiences in the above areas. Training techniques which proved most useful were daily informal tutorial sessions, informal seminars, and practical experiences in producing materials. The gradual change from conventional classroom teachers to radio educators was observable in the project staff. A staff emerged which could continue to serve the needs of the Ministry of Education and Worship in the preparation of the instructional radio programs, including utilization of the new curriculum, parent-directed seminars on school maintenance, enrichment courses in secondary education, seminars integrating educational project of various Ministries and a wide variety of other possibilities.

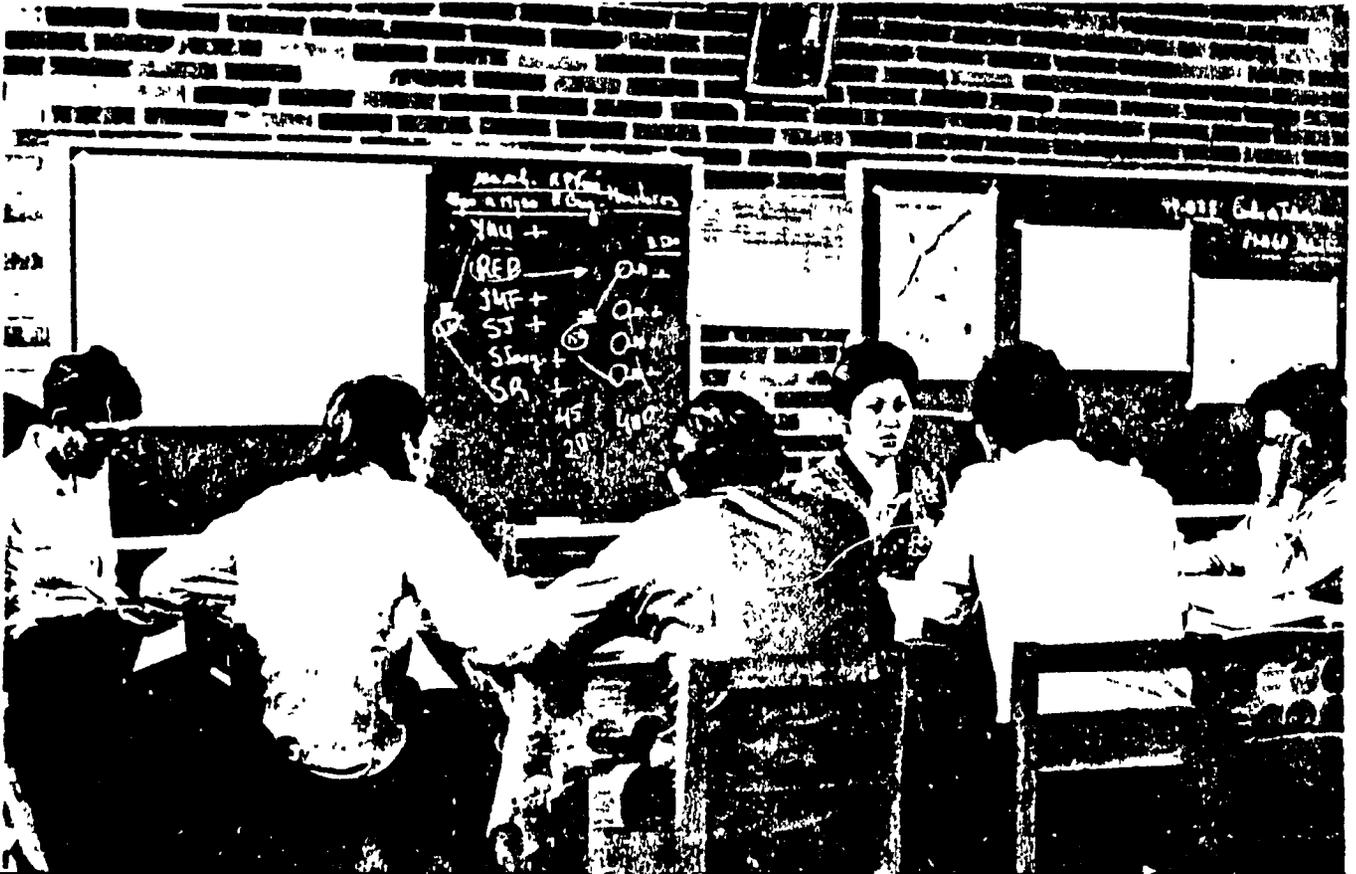
The staff had to alter their usual ways of thinking about curriculum design, instructional delivery systems, evaluation procedures and conventional school management. The growth of this group of persons has been significant. In addition, other ministerial departments collaborating in the project began to alleviate doubts regarding using radio as an instructional medium.

RURAL RADIO EDUCATION PROJECT PARAGUAY PHOTOS

Inauguration Ceremony with Minister of Education



Training Monitors



MONITORS REVIEWING LEARNING MATERIALS



STUDENTS USING WORKBOOKS



Students at Learning Center



Small Group Students at Learning Center



A Man Learning



III. Rural Radio Project Evaluation

The Rural Radio Education Project was designed in part as an experimental project using radio to provide formal primary education in a rural area. It was to provide education in disperse rural sections that had no rural primary school or where rural primary schools went only to grade three. In some other cases these were areas where simply not enough students were available to provide a school building nor teachers, given the Ministry's limited financial resources. In order to evaluate the project performance, several evaluation schemes were used throughout the project. While not as elaborate nor extensive as other evaluation procedures used in other similar experimental projects, the procedures used were thorough, practical, and would be within the possibilities of the Ministry to replicate at a later date during further project expansion. This section, then, deals with an overview of the evaluation process and findings, with emphasis on implications for policy decisions concerning the project.

A. Evaluation Design and Method of Analysis

1. Background

The project evaluation was based on objectives expressed in the Project Agreement between Paraguay's Ministry of Education and Worship (MEC) and the U. S. Agency for International Development (AID) and was expressed in the following terms:

- To make primary education available to a representative percentage of the rural population by way of radio
- To experiment with different methodologies and techniques to provide this education program
- To institutionalize the mechanisms that would make possible and effective the rural radio program

The Rural Radio Education project now in full operation offers radio instruction for the 4th, 5th, and 6th grades. The curriculum covers three areas: social studies and language arts; applied natural sciences, technical skills and health; and applied mathematics, with 15 to 20 minute programs in each area broadcast five days per week through a learning center in the community under the supervision of a local monitor. The radio programs are broadcast from regional radio stations and the students listen to the broadcasts either at home or at the learning center. Simple workbooks and other visual materials are distributed to aid the students in the lessons. Field supervision is maintained through a project supervisor and

Regional Supervisors of the Ministry in the Department of Caaguazú who visit the learning centers periodically to assist in measuring the effectiveness of the learning activities, and to serve as a feedback link to the central offices, thus establishing an administrative system for effective coordination.

To assure effective learning, it was necessary to examine the elements of the project. The elements are as follows:

- A curriculum
- Programs prepared for radio
- Workbooks and other visual material
- Monitor/guides
- Students
- Communities
- Locales to hold classes/Learning Center
- Radio stations
- A system of field supervision
- An administrative system for effective coordination

The relation of these elements can be seen in Figure 1.

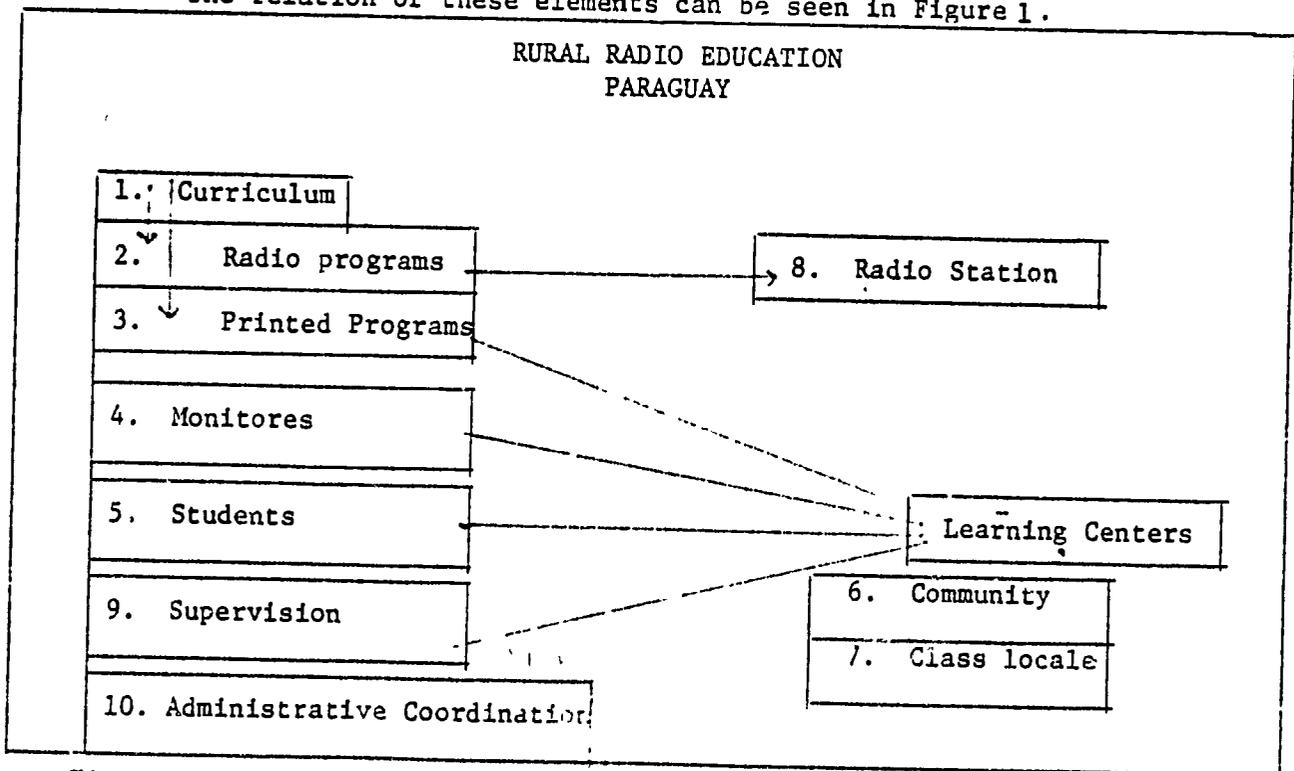


Figure 1.

The evaluation framework consisted of specific tasks that were outlined in the Project Agreement, as follows:

- Basic data that are collected in the design stage of the project will give the specific information for the continual evaluation of the progress of the students who are participating in the program
- A periodic investigation will be made of the participants in order to determine their expectations and opinions about the classes
- A cost-benefit analysis of the project will be carried out to determine the real economic cost, the internal efficiencies and the relation of cost and benefits of the project
- An evaluation design will be prepared and used to examine the efficiency of the rural radio education system
- A control design will be used to test and to control the important variables so that necessary adjustments can be made. Also, the global results of the project will be measured by the learning accomplished

2. Evaluation Plan

The evaluation plans were developmental rather than fixed. They were modified at the end of the first year of programming.

a. The principal problem

The overall problem on which the evaluation of the radio education project focused can be expressed in the following question: "Is it possible to use a combination of radio, monitors and printed back-up materials as complementary media for effective primary education in the rural areas?"

"Radio" is understood to mean the diffusion of instructional programs through regional commercial stations during weekday hours of the afternoon.

"Monitor" is understood to mean a person from the locality where the students come from who has had some academic preparation, but not necessarily as a professional teacher, who has been given training for the work, and who does not depend on the job as a monitor for his complete salary.

"Back-up materials" is understood to mean those educational printed materials such as workbooks for the students, educational guides for the monitors, and orientation manuals and posters. "Primary education" is understood to mean the equivalent of the content of the third, fourth, fifth and sixth grade.

"Rural areas" is understood to mean those localities outside the urban zone that are characterized by offering only the first three grades of primary education.

b. Reconnaissance surveys and preliminary investigation

Before preparing the design or plan for evaluation it was necessary to conduct a preliminary investigation. Two principal sources of information were used. The first came from the literature including theoretical as well as field experiences concerning education by radio. The second focused on the information about the locality where the evaluation was to take place. Specifically the sources of information that were used in this preliminary investigation were the following:

- The potential audience for the experimental program of education for radio (EDUCADES, 1977)
- Principal documentation of the contract between the Ministry of Education and Worship and the U.S. Agency for International Development
- Written reports of the visits to the testing sites
- Written reports of the tests of studies on "communication" that were done in the localities (one of the content areas of primary education)
- Personal experiences of the persons that had visited the community
- General writings concerning education in rural areas of Paraguay

- Writings concerning education by radio in Mexico, Guatemala and other countries
- Writings concerning evaluation of educational progress in rural areas
- Experiences and reading related to theories, of learning, theories of human behavior, and theories of scientific investigation

3. The Research Design

A design is a general plan for conducting an evaluation. In order to develop the plan it was necessary to have in mind the objectives of the project, the locality where it would be carried out and some idea of the persons who would be participating in the experiment. The design was selected on its appropriateness to the project and, secondly, on its flexibility to adapt to the project needs.

In addition to providing the mechanism to measure the results of the project, the design also served a planning function to help determine the activities best suited to reach the objectives. The evaluation design served to measure results and also served to help focus on the activities that were a part of the program.

The evaluation design was based on the comparative measures of the outcomes of the project compared to the objectives that were listed in the initiation of the project (outcomes vs. goals). This can be seen in Figure 2.

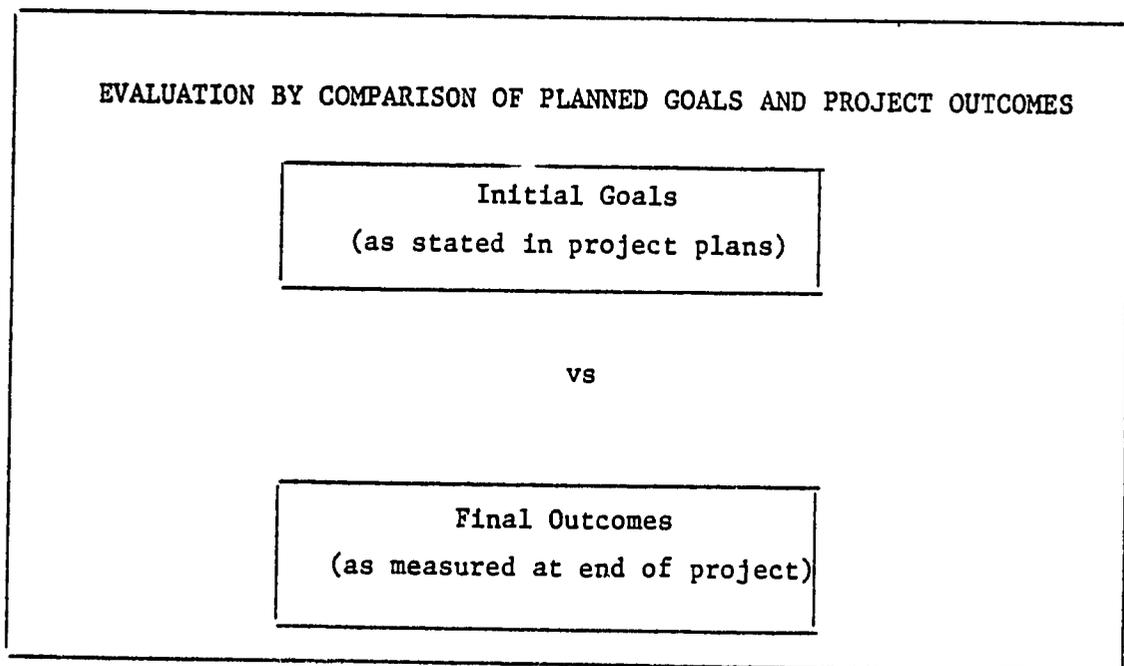


Figure 2.

There are many aspects of the program that could have been used as measures of final outcome such as the number of learning centers. More important than the total number of learning centers, was measuring the amount of actual learning that took place at the individual level. For it was possible to have learning centers that were well-equipped and active, but this would not assure that learning was taking place. In order to measure learning, it was necessary to compare the learning results with the learning objectives. The design with this added feature is presented in terms of the comparison of objectives and results in Figure 3. This measure has been the most important measure of results of the project.

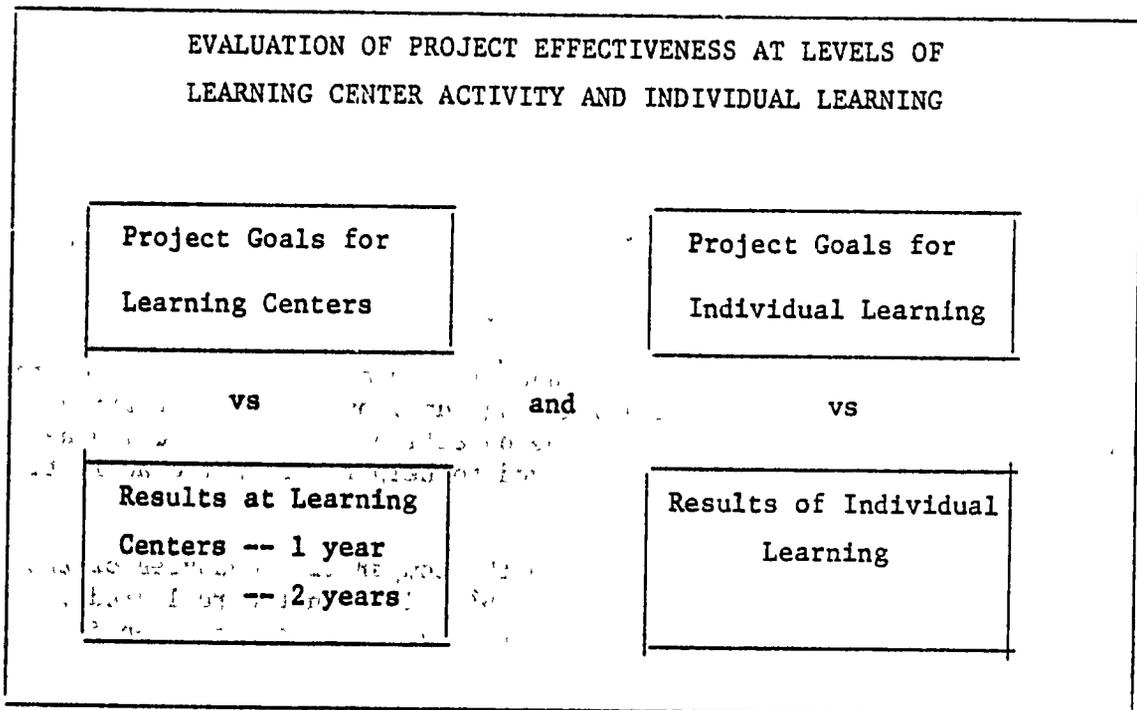


Figure 3.

In addition to this, the evaluation of effectiveness and efficiency of the different component parts that made up the project were also assessed. There were a number of factors or elements that had to come together in the moment that classes were held in the centers, if these were to be effective centers of learning.

These elements and their relation to the learning centers were illustrated previously in Figure 1. Each component part is dealt with in more detail in the following discussion.

a. The Curriculum. The definition of the curriculum is basic in the whole system of learning. It was essential for the evaluation because it determined the content of the instruments created to measure the results. For example, if the curriculum were not prepared in relation to the felt needs of the students, it would be difficult to motivate the students to participate in the classes. In addition, if the curriculum were not related to the present level of knowledge, then the student would feel disheartened. Not understanding his lesson, he probably would not continue in the studies.

The Radio Education Project curriculum had three fields of study: (1) Social Studies and Language Arts; (2) Applied Natural Sciences, Health, and Technical Skills; and (3) Mathematics. Each of these were at an equivalent level of study for fourth, fifth and sixth grades in the traditional primary education program. With the curriculum as a base, the back-up materials and the radio programs were designed, and served as the base for the preparation of the program.

b. The Radio Programs. The use of radio as part of teaching was fundamental in this project. For this reason it was important to measure the effectiveness of the radio programs. There were two aspects that were very important to consider.

1. The preparation of the radio programs, and
2. the distribution of the programs to the radio stations so that they could be broadcast.

c. The Back-up Materials. The back-up materials constituted one of the key components in the total media used for the classes. In the same manner as in the case of the radio programs, there were two aspects considered:

1. The preparation of the back-up materials, and
2. the effective distribution of those materials to the learning centers.

d. The Monitors. The use of the monitor, as the use of the radio, was an innovative aspect in this project. The monitor, as the coordinator of the activities of the center, was the person who observed the immediate results of the learning. Three aspects that were considered:

1. The selection of the monitors,
2. their preparation, and
3. their maintenance on the job.

e. The Students. The total effectiveness of the project of radio education can best be measured at the level of learning of the individual students. This aspect has been considered amply in the above paragraphs. In addition to the learning, it was important to evaluate the selection and maintenance of the students.

f. The Localities. The radio education project was planned with the needs of the rural areas in mind. As a result of the studies that were done by other entities in the past, the pre-investigation done by EDUCADES, and the investigations that have been done in the field, the criteria for the selection of the localities for the establishment of learning centers prepared in 1977. served as the basis for evaluation. In addition to the selection of the localities, it was also important that these localities be cultivated and maintained as communities in which learning centers were accepted favorably.

g. The Classroom. The place where classes were held was also another factor that affected the learning. A well set-up classroom would have been an ideal location to hold the classes, but in some of the communities there were no schools available. There were three aspects important for planning and for evaluation:

1. The selection of the locale,
2. The preparation of the locale for class purposes, and
3. The maintenance of the classroom.

h. The Radio Stations. The radio programs would have been of little value if there were no stations to transmit the programs. This project never contemplated the establishment of educational radio stations but depended on commercial stations already in operation. There were three aspects important in the planning and evaluation of this factor, selection, preparation, and interest maintenance.

4. Preparation of Evaluation Instruments

The instruments used in the evaluation were selected on the following objectives in mind:

- to measure quantitatively the ability of the students to comprehend the radio lessons
- to provide information about programs through pre-testing of alternative radio programs to determine the application and feasibility of the radio program in rural Paraguay
- to measure quantitatively the different methods and techniques to determine cost-efficiency and effectiveness
- to measure quantitatively the comprehension and learning achieved by the radio program
- to assure that the radio program which was developed would be correctly perceived by the participant of the program
- to measure the effect of the type of program that would be offered by radio

a. Summative Evaluation. The principal instruments for summative evaluation were those used for the measurement of learning at the level of the individual students. In addition, a number of instruments were used to measure the effectiveness of the learning centers, such as the data kept as part of the records, the number of established learning centers, the number of students in each learning center, etc. This information was recorded as part of the regular record keeping at each of the individual learning centers and summarized for the whole project.

In addition to these measures, which recorded the global aspects of the project, summative instruments were developed by selecting key indicators to measure the effectiveness of the individual component parts (i.e., curriculum, back-up materials, radio programs, monitors, students, localities, classroom, radio stations, and supervision). In this way, it was possible to measure the comparative learning which took place in the different learning centers and to give a further indication as to why some centers were more effective than others. Also, it was possible to evaluate the relative importance of each of the components in the total

learning process. For example, in one community learning could have been less effective than in the other communities as measured by the global instrument. In examining the different components that make up the learning center, it was possible to see which were weak in this particular community. In some communities, the monitor lacked one of the essential criteria such as "take part in the training program." By observing this particular aspect of the various component parts, it was possible to indicate why more effective learning took place in some communities others. With this kind of evaluation, the source of the problem was located and necessary changes were made in order to have a better chance of desired results in the future.

The instruments used in summative evaluation were the following:

1. Control Sheet for each one of the learning centers with basic data such as total number of students that were registered and their daily participation.
2. Standardized tests which were broken down in each one of the areas of study. These were used as a post-test based on the behavioral objectives and the curriculum items. The content areas included: Social Communication, Natural Science, Health, Vocational-Technical skills (including Agriculture) and Mathematics.

These instruments were prepared and pre-tested through a combination of objective tests, observation, oral questions and answers, and in some cases through the observation of project activities.

Tests were administered in December, 1978 to the 589 students enrolled in the 35 learning centers. They were processed by computer and analyzed by the Teleducation Center. The results of those findings are presented below in the section on findings.

b. Formative Evaluation. From the very initiation of the Radio Education Project, each activity was evaluated so that all of the component factors could be developed in a more efficient way. For example, in the test of materials on the subject area of Communication, the following skills were measured:

1. The reading and writing ability of basic vocabulary
2. Family word lexicon

3. Present/Past tense
4. Accentuation of syllables
5. Understanding of Spanish

During the tests that were done in the four different sites, it was possible to see the reaction of the students and, as a result, the lessons materials and radio program were adjusted to better meet the needs of the students and reach the learning objectives. In this case, the evaluation instrument served in the formation of the teaching materials and methods. Also, the feed-back experience served to improve the evaluation instruments.

A second aspect of formative evaluation in the project included the preparation of instruments for the formative evaluation of all of the component factors that were included in the learning centers (learning materials, monitors). Each of the formative instruments was based on selected indicators from the criteria list. Further, some of these same items became part of the summative evaluation that measured the total effectiveness of the project.

In December, 1978, the project performed a formal formative evaluation that analyzed the factor components of the system: radio, print materials, monitors, and how these interrelate during the teaching-learning process. This examination/survey was made with both monitors and the enrolled students. Instruments were devised for both groups, interviews made in the field, and processed. Opinions were sought by students and monitors on radio programming and educational material support. In total, 450 students and nine monitors were interviewed.

5. Data Gathering

The collection of data was done by different people and in various manners depending on the instruments. In some cases the evaluation technician collected the data. In other cases it was the content specialist, the monitor, or the field supervisor. In some cases, and according to the indicators developed, objective tests were used, and in other cases, it was through interviews. Sometimes the evaluation was done through observation using a checklist by a person who was observing the behavior. Each of the instruments was tested until the best place and the best person could be selected.

6. Data Processing and Analysis

Each of the items included in the instrument was hand-checked and tabulated as a preliminary step in analysis and then converted to percents

or means allowing for a comparison with the goals and objectives of the project. This comparison was made globally (look to Project Findings); also each of the learning centers was compared with all of the others. In addition to this comparison there was a comparison of the effectiveness of the different factors (i.e., monitor, locale, etc.) in each center.

During the first year of operation, the data were hand tabulated and, at the same time, mechanized equipment was found to be an efficient way to process the information. The final stage of the analysis produced a series of cross tabulations with the learning scores as the dependent variable.

B. Findings: Preliminary Results of First Phase*

The findings of the formative and summative evaluation played important roles in shaping the radio program. Especially in the case of the formative evaluation, the information was immediately processed and fed back into the program. Also, the findings of the formative evaluation were incorporated into the final summative report.

The findings of the formative and summative evaluation played important roles in shaping the radio program. As in all education projects, the quality of the education program can not be measured necessarily by quantitative analysis. In interpreting the findings of the evaluation, the statistics of the formal testing have been seen in light of observations, discussions and informal interviewing. This more sensible approach to project evaluation allows for the identification of basic tendencies that are useful in future programming.

1. Formative Evaluation

The results of the ongoing formative evaluation were used to adjust the radio programs to be more effective. Examination of different project components took place every three months with a total of four formative evaluations. Information was gathered by the monitors on an on-going basis, while the formative evaluations were conducted by a team of the program specialists, the staff of the Teleducation Center, and the Academy's Evaluation Advisor. The methods used for learning about the various components were as follows:

* These results are a synthesis of a larger study by the MEC entitled, "Radio Primaria Rural: Evaluación, Primera Etapa," March, 1979.

- a) Questions to most students in the Learning Centers
- b) Obtaining a sample size of at least 25 percent of the students in the testing of the variables, such as age, sex, etc.

Guidelines instructed the monitors in the implementing of the evaluations. These investigations were done orally in Spanish and in Guarani. Guidelines standardized and controlled the evaluation process.

Test findings were grouped into two categories: mathematical/science and communication results. The following lists the general tendencies found by the tests given early in the year:

Communication

- Dictation writing is poor with incorrect spelling due to the poor pronunciation of the words by the student
- Print materials effectively support the lessons, especially the word-object relations in which the picture of the print material supports the concept behind the word
- Past and present tense is one of the most difficult exercises for the students

Mathematics

- Ordering of numbers in 10's, 100's and 1,000's is confusing to the student
- Mental calculation is difficult for the students
- Measuring time proved the most difficult exercise
- Geometric figures did not present problems to the student

Findings such as these were then fed back into the program, adjusting lesson content, script writing, and print materials to strengthen the lessons which proved most difficult for the students.

As was stated earlier, a second formative evaluation took place in December, 1978. In total 450 students and nine monitors were interviewed. Opinions were sought from students and monitors about radio programming and educational material support.

The salient results of the survey were as follows:

Radio Programming -- Student Opinion

- Most students (47 percent) prefer to listen to radio courses in their homes and go to the learning center only when the monitor is present.
- Twenty-two percent had considerable problems listening to the radio with clarity because there was internal interference in the classroom and external interference with the radio reception.
- Most students listen to both radio stations that transmit the radio courses: Panambi Verá in Villarica and Radio Difusoras Caaguazú in Coronel Oviedo. Radio Difusoras Caaguazú alone had 35 percent of the listening audience.
- Most students (50 percent) preferred to learn by radio, accompanied with their workbook, and have the monitor there to assist once a week.
- In the soap opera family Benitez, María Pabla was preferred most (40 percent) while Don Toni was preferred least (20 percent).
- Most students (72 percent) felt that the radio courses had helped them to learn Spanish "alot."
- Between each subject there was an interval of music. Most students (70 percent) liked to hear that music between classes.
- Most students (53 percent) preferred to hear Paraguayan music with singing along with the classroom assignments.

Radio Programming -- Monitor Opinions

- Most learning centers heard the radio programs clearly, but the centers in Juan Manuel Frutos "A" and the two centers in Yhú had some serious problems with poor reception and getting too much interference.
- Most monitors (89 percent) believed that the subject themes, for the most part, were addressing the students' felt needs.
- Monitors believed that students have most problems with mathematics (67 percent). This was attributed to trying to teach too many important points at the same time and because not enough exercises were done during class.
- All monitors (100 percent) believed that after students had listened to radio classes for one hour in all three subject areas, there was still interest by students to learn more.
- Eighty-nine percent felt that the amount of music used in the radio courses was sufficient.
- There was divided opinion concerning the amount of time within the hour for doing exercises. Five of the nine monitors felt it was enough; the other four wanted more time.
- Five of nine monitors thought that the actors spoke clearly and with good spacing; the other four had some problems with the protagonists.
- Monitors themselves do not necessarily believe that students should go to the learning centers every day. Five of nine monitors feel students can learn just as much at home.

Educational Material Support -- Student Opinion

- Most students (62 percent) felt that the workbooks were easy to read and that words were relatively easy to understand. The others had some degrees of difficulty with the workbooks and words.
- Sixty-four percent preferred an equal distribution of drawings and words.
- A great majority (79 percent) of students like the size of the workbook (legal size) while most others prefer it smaller.
- Seventy-five percent thought the drawing helped to understand themes and 62 percent felt they were very clear.
- Eighty-seven percent of students thought the workbooks helped them to understand the radio programs.

Educational Material Support -- Monitor Opinions

- Fifty-six percent felt the workbook drawing helped students learn better in class.
- All monitors thought workbook instructions by radio were clear and that one page per lesson was good.
- Five of nine monitors believed the workbooks helped explain the radio lessons; the other four believed radio could stand on its own.
- Five of nine monitors preferred print lettering while the other four wanted cursive lettering.

Students' Opinions of Monitors

Students were asked to assess the usefulness of monitors to the program, with the following results:

- Most (63 percent) listened to radio classes at home and went only once a week to the learning center.

- Sixty-eight percent believed that when they did not understand something on the radio, monitors were always helpful.
- Sixty-one percent felt they would learn less without monitors.
- Eighty-six percent felt monitors were good administrators, handed out workbooks on time, helped learning in the classrooms, and assisted in organizing social meetings. Few students are discontented with monitors. These few would like to see them organize more extra-curricular activities and get parents more involved.
- Eighty-eight percent believed monitors were good classroom guides, maintained classroom discipline, and helped with radio instructions.
- Sixty-two percent thought monitors were good social activity organizers and ran good centers.
- Forty-seven percent of the students would themselves like to be monitors.

These surveys with both students and monitors provided excellent feedback mechanisms about the inner-working of the project. Though not comprehensive by any means, due to limited research funds, they have provided solid information on which to make policy decisions for 1979 and beyond.

2. Summative Evaluation

Standardized tests, approved by the Ministry of Education and Worship, were given to all 589 students enrolled in the 35 learning centers during December, 1978. As was stated earlier, these were post-tests (final examinations) in all three subject areas of Social Communication (listening, reading, writing, etc.); Natural Sciences (including health, vocational education, agriculture); and Mathematics. Basic demographic information was also collected from each student (age, sex, school level completed, learning center attended, availability of radio) so that comparative information could be collected and cross tabulations made with learning achievements and these other demographic variables.

The summative evaluation design compared final results (outcomes) with the formulated project goals (objectives). Data were collected to make such comparisons, and were processed by the National Center of Computation in conjunction with the Teleducation Center staff.

a. Enrollment, Dropouts, and Performance

The project had six geographical regions within Caaguazú Department (Dr. Juan M. Frutos region was sub-divided). There were 35 learning centers with 700 students enrolled initially. During the school year 1978, 111 students dropped out of the radio courses. At the end of 1978, 589 students were given achievement tests in all three subject areas. Of this total of 589 students, 520 students (88 percent) passed the final examination while 69 students (12 percent) failed. Table 3 provides the breakdowns by region and sex for each of these variables.

| Regions | Enrolled | | Drop-out | | Examined | | Passed | | Failed | |
|---------|----------|-----|----------|----|----------|------|--------|-----|--------|----|
| | M | F | M | F | M | F | M | F | M | F |
| 1 | 45 | 55 | 6 | 6 | 39 | 49 | 34 | 45 | 5 | 4 |
| 2 | 56 | 54 | 21 | 8 | 35 | 46 | 30 | 36 | 5 | 10 |
| 3 | 44 | 47 | 4 | - | 40 | 47 | 31 | 43 | 9 | 4 |
| 4 | 35 | 70 | 4 | 9 | 31 | 61 | 29 | 56 | 2 | 5 |
| 5 | 78 | 40 | 11 | 2 | 67 | 38 | 58 | 32 | 9 | 6 |
| 6 | 29 | 47 | 11 | 11 | 18 | 36 | 14 | 33 | 4 | 3 |
| 7 | 41 | 59 | 13 | 5 | 28 | 54 | 28 | 51 | - | 3 |
| TOTAL | 328 | 372 | 70 | 41 | 258 | 331 | 224 | 296 | 34 | 35 |
| T. Gen | 700 | | 111 | | 589 | | 520 | | 69 | |
| | 100% | | 16% | | 84% | 100% | 88% | | 12% | |

REGIONS:

- | | |
|-----------------------|---------------------------|
| 1. San José | 5. Repatriación |
| 2. San Joaquín | 6. Dr. Juan M. Frutos (A) |
| 3. Yhú | 7. Dr. Juan M. Frutos (B) |
| 4. Dr. Juan R. Chaves | |

The observed 88 percent passing rate indicated a high rate of achievement. This percentage figure represents a major accomplishment of the project, in addition to that of producing 540 lessons, writing nine workbooks comprising the radio curriculum and the establishment of 35 learning centers to reinforce the radio programming, in order to produce these high achievement rates. The variables tested in the evaluation provide a greater understanding of how the different components of the project influenced its success and achievements.

b. Students

Students who participated in the radio program can be grouped in two categories: (1) women in their early 20's with a third or fourth grade education; (2) men in their early 30's with a fourth grade education.

- Sex - Of the students enrolled in the program, 53 percent were women and 47 percent were men. Women achieved greater performance than the men, especially in communication and sciences. Men excelled in mathematics.
- Age - The median age of participants was from 16 to 20 years. The highest level of performance was among women of 20-25 years of age, and among men of 31 years and older.

Previous Grade Level - Most students had an education level of 3rd or 4th grade. It must be noted that the program was limited to students who had a third grade education or better; thus it is not surprising to find this grade level as the norm for the project.

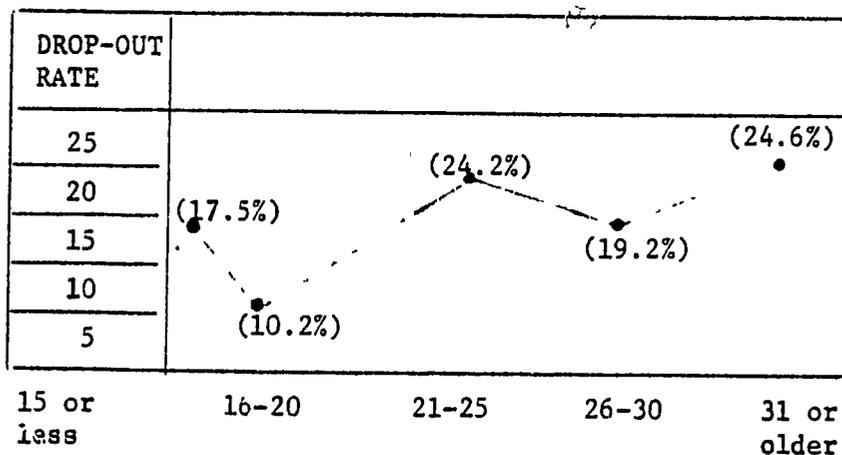
The drop-out rate of the students in the program is directly related to these three variables. The previous grade level of the student largely determined his/her retention in the program. (See Table 4). The percentage of students with a 3rd or 4th grade education who finished the program was 38 percent and 48 percent respectively. A question that comes immediately to mind is, "Why would a student with a 3rd or 4th grade education want to repeat the same studies?" A tentative answer is that when testing students on their previous grade levels, only the fact that the students began to study at a certain grade level was considered, not that students had completed that grade level. This partially explains why students at the 3rd and 4th grade level maintained interest in the radio studies program.

TABLE 4 Drop-Out Rate Based on Past Grade Levels

| PAST GRADE LEVEL | TOTAL | DROP-OUTS | | COMPLETED | |
|------------------------|-------|-----------|------|-----------|------|
| | | N | % | N | % |
| Grade 1 | 6 | 2 | 33.3 | 4 | 66.7 |
| Grade 2 | 100 | 32 | 32.0 | 68 | 68.0 |
| Grade 3 | 257 | 35 | 13.6 | 222 | 86.4 |
| Grade 4 | 323 | 39 | 12.1 | 284 | 87.2 |
| Grade 5 | 14 | 3 | 21.4 | 11 | 78.6 |
| Totals | 700 | 111 | 15.9 | 589 | 84.1 |

The other two variables of age and sex were examined in explaining this drop-out rate. It was found that 43 percent of the men finished and 56 percent of the women. This male-female retention rate is similar to findings in other studies. Men usually have higher drop-out rates in education programs mainly due to their need to join the workforce. The drop-out rate compared to age re-confirms this conclusion. As Graph 1 shows, when testing the drop-out rate by age, there is a range of 10.2% to 24.6 percent. The 16-20 year olds have the lowest rate and the 31 or more have the highest rate. This age/drop-out relationship is obviously tied to the older students entering the workforce.

GRAPH I. Age/Drop-Out rate Correlation



This 16 percent drop-out rate of the program is most significant when compared to other formal education programs. As Table 5 points out, drop-out rates in regular primary school programs are high in Paraguay, especially in the rural region. These rates varied from 18 percent to 54 percent in the primary school during the 1970's. Under such comparison, the Rural Radio Education Program was most successful in retaining its students in its studies program.

TABLE 5

| YEAR | RETENTION IN THE SECTOR | | | | |
|------|-------------------------|----------|----|----------|----|
| | Grade | Urban | | Rural | |
| | | Students | % | Students | % |
| 1970 | 1st | 110,559 | - | 14,493 | - |
| 1971 | 2nd | 87,660 | 79 | 11,925 | 82 |
| 1972 | 3rd | 69,919 | 63 | 9,957 | 69 |
| 1973 | 4th | 53,714 | 49 | 8,433 | 58 |
| 1974 | 5th | 40,427 | 37 | 7,447 | 51 |
| 1975 | 6th* | 30,838 | 28 | 6,601 | 46 |

Source: MEC , Anuario 1975, p. 34.

c. Geographical Region

The radio program was offered in six geographical areas, in the Department of Caaguazú. To determine whether the radio program was more effective in one area than in another the following were compared:

the number of students, the mathematic achievement scores of students, the median score of these achievement tests, and the standard deviation of the means.

TABLE 6 - Geographical Area and Program Effectiveness

| Areas | No. of Students | Math. Achievement Mean | Median Grade | Stand. Deviation of Mean |
|-------------------|-----------------|------------------------|--------------|--------------------------|
| 1. San José | 88 | 101.53 | 109 | 18.83 |
| 2. Juan M. Frutos | 136 | 99.91 | 104 | 16.19 |
| 3. Juan R. Chaves | 92 | 98.45 | 102 | 16.47 |
| 4. Repatriación | 105 | 94.98 | 100 | 21.37 |
| 5. Yhú | 87 | 90.52 | 94 | 22.08 |
| 6. San Joaquín | 81 | 87.98 | 97 | 21.98 |

Of these geographical areas, San José and Juan Manuel Frutos had the greatest performance as measured by the mathematics achievement test. Also, the higher the mathematics achievement score, the less the deviation in the scores, confirming the effectiveness of the program. The exception was the case of San José. To explain why these two geographical areas were more successful than the others, it was necessary to consider the other components of the radio program: the monitors, the importance of the radio, and the place of study.

d. Monitor

Monitors played an important role in the program. In testing the monitor effectiveness, it was possible to compare achievement score of different groups, the number of students in the group, and the monitor of the group and the specific geographical group area. It was possible to make an intra-regional comparison between monitors and achievement

tests. Table 7 shows the breakdown by area and monitors.

TABLE 7.

| Area | Monitor | Place- ment | Mathema- tics Mean | Past School Level | No. of Students |
|------|---------|----------------|-----------------------|----------------------|--------------------|
| 1 | 1 | 2nd | 101.53 | 3.5 | 88 |
| 2 | 2 | 10th | 87.98 | 3.1 | 81 |
| 3 | 3 | 9th | 90.52 | 3.2 | 87 |
| 4 | 4 | 5th | 98.45 | 3.4 | 92 |
| 5a. | 5 | 6th | 95.27 | 2.6 | 22 |
| 5b. | 6 | 1st | 106.47 | 3.3 | 17 |
| 5c. | 7 | 7th | 92.81 | 3.2 | 27 |
| 5d. | 8 | 8th | 91.30 | 3.3 | 39 |
| 6a. | 9 | 4th | 98.85 | 3.3 | 54 |
| 6b. | 10 | 3rd | 100.60 | 3.2 | 82 |

e. Number of Students Per Monitor

As can be seen in Table 8 , the number of students per monitor did not influence achievement level of the students. The highest achievement obtained had a total number of 18 students per monitor; the second most effective had 28 students, and the third most successful had 3 students. No correlation can be drawn between number of students per monitor at each learning center.

TABLE 8.

| No. of Students per center | Mathematics Achievement Mean | Region |
|----------------------------------|------------------------------------|----------------|
| 18 | 109.06 | Juan R. Chaves |
| 28 | 108.90 | Juan M. Frutos |
| 3 | 107.52 | San José |
| 30 | 106.78 | Juan M. Frutos |
| 4 | 106.66 | San José |
| 22 | 106.47 | Repatriación |
| 35 | 105.43 | Juan M. Frutos |
| 26 | 104.36 | Juan M. Frutos |
| 6 | 84.41 | San Joaquín |
| 9 | 81.20 | San Joaquín |
| 27 | 75.60 | Juan M. Frutos |

Also, the evaluation found that students attending the learning center to meet with the monitor once a week achieved comparable results to those who met with the monitor every day. Only in the mathematics area was a daily meeting of student and monitor more helpful.

TABLE 9.

| [Achievement Tests] | | | | | | |
|---------------------|-----------------|------|-----------------------------|--------------------------|-----------------|---------------|
| Monitor Treatment | No. of Students | % | Communi- cations Mean | Mathe- matics Mean | Science Mean | Total Mean |
| Weekly | 484 | 82.2 | 33.14 | 30.28 | 32.85 | 96.24 |
| Daily | 105 | 17.8 | 32.53 | 30.53 | 31.91 | 94.98 |

Little relationship exists between the number of students per monitor and number of sessions with the monitor per week and the success of the program. These results would imply that the effectiveness of the monitor related to a great extent to the monitor's ability to explain and reinforce the lessons to the students. Informal interviews and observations confirmed the importance of well-trained monitors.

f. Place of Study

Another factor related to program success was where the student participated in the program -- the home or the learning center. When comparing mathematics, communications, and science achievement scores with the place of study, the evaluation found that: (1) most students studied at home; (2) the difference in achievement levels between home and learning center was minimal. Table 10 shows this as follows:

TABLE 10. Comparison of Place of Study to Achievement Levels of Students

| [Achievement Tests] | | | | | | |
|---------------------|-----------------|------|-----------------------------|--------------------------|-----------------|---------------|
| Study Place | No. of Students | % | Communi- cations Mean | Mathe- matics Mean | Science Mean | Total Mean |
| Home | 357 | 60.6 | 33.17 | 30.33 | 32.92 | 96.43 |
| Center | 232 | 39.4 | 32.80 | 30.31 | 32.31 | 95.38 |

These results reconfirm findings discussed earlier that the number of sessions students met with monitors per week had little bearing on the students' learning. However, these findings only beg the question, "Is it actually that the number of sessions per week or the place of study is irrelevant to the success of the program or is it the quality of the monitor?" For if the monitor were ineffective, it would not make much difference if students attended sessions once a week or every day of the week, or if students studied at home or at the center. This question remained largely unanswered, but would be an important consideration in future program evaluation.

g. Importance of Radio

In looking at the effectiveness of radio in transmitting educational lessons, communication, mathematics and natural science achievement tests were completed with students who owned radios, those who did not and attended the Center, and others.

TABLE 11.

| Radio | No. of Students | % | Communi- cations Mean | Mathe- matics Mean | Science Mean | Total Mean |
|---------------------|-----------------|------|-----------------------------|--------------------------|-----------------|---------------|
| 1. Owned by Student | 466 | 79.1 | 33.39 | 30.54 | 32.86 | 96.77 |
| 2. Center | 94 | 16.0 | 31.96 | 30.09 | 32.40 | 94.46 |
| 3. Others | 29 | 4.9 | 30.68 | 27.55 | 30.65 | 88.89 |

The large percentage of the students (79 percent) owning their own radios had higher achievement test scores.

h. Summary

The question is whether the effort to plan, design, implement, experiment and institutionalize a rural radio education project

for out-of-school young adults and parents has impact on their learning needs and on their lives. The findings of the evaluation show that the project was successful in providing instruction to this population. Success has been seen in:

- the overall passing rate of the students (88 percent)
- the low drop-out rate of the students (16 percent)
- the effectiveness of the monitor on a weekly basis
- the importance of the radio in the home learning for the adult students

While it is premature to determine the impact of the radio program on the individual lives of the students, generalizations can be made. Young adults and parents are now participating in an education program which provides basic skills such as math, reading, and writing and also information on nutrition, health and agricultural practices.

IV. Project Costs

The Rural Radio Education Project has been concerned with cost since there are limited resources within the Ministry of Education and Worship. This is even more critical in the Teleducation Center. At the project outset there was some interest in keeping good records of costs to complete a cost-benefit analysis. This was not achieved because more interest was delegated to planning and implementing the project. However, there appeared to be keen awareness throughout the project for assuring that resources were used properly.

This section provides some preliminary project cost figures. A complete cost analysis and cost-benefit analysis goes beyond the scope of this report. A principal concern is to determine if the project was cost-effective. Does the Rural Radio Project offer a low-cost alternative to formal education? An initial and important step in determining the cost-effectiveness of the program was to analyze the types of costs.

The true value of the project is the increased ability of the program's participants to be productive in Paraguayan society. The students acquired mathematics, communication and science skills which may increase their productivity in the labor workforce; in addition, the students gained "basic living skills" in the areas of health, nutrition and household consumption which in the long-term may increase their productivity. The value of the project in economic terms is the difference between resources used in the project (costs) and the resources gained in the project (benefits). Calculation of costs is based on budgetary data. Benefits are measured by the students' learning gains for it is these gains which will enhance the economic productivity of the student in later years. Only through this comparison is it possible to determine whether or not the Rural Radio project is an economically efficient and viable means to education.

A. Systems Costs

The costs fall into four categories:

1. Central project costs - start up, administration, and research and evaluation
2. Program production costs - curriculum design, radio scripts, print materials
3. Transmission costs - radio time, receptors
4. Reception Site Centers - monitors, community support, building maintenance

The inputs for these project components were (1) Government of Paraguay (Ministry and Teleducation Center); (2) U. S. Agency for International Development donation funds; (3) Academy contract funds with USAID/Paraguay; (4) Community contributions; (5) Students; and (6) in-kind contributions.

The following chart is a summary of those costs, broken down by project component and funding source.

1. Central Project Costs

Central Project costs included start up, administration, and research. The project for practical purposes began in January 1977, although there were other preliminary planning functions before that time. Start up costs included project planning, training, and general policy formulation.

The second category is administration. It is difficult to separate precisely administrative costs from other functions because the staff administered the other project components. Estimates of time allocation are best estimates of how staff spent their time.

General research and evaluation includes the EDUCADES study, pre-testing at center test sites, testing, and the formative and summative evaluations.

Table I summarizes project administration costs based on these best estimates; the total is approximately \$264,000. A great deal of these were start-up costs and thus will not be recurring costs. Considerable time, for example, was spent in project planning, research, and initial site visits to set up the learning centers. There was also considerable trial and error.

2. Program Production Costs

The project produced 180 hours (540 lessons) of radio programs for grades three and four during 1978 and is producing about the same number of programs in 1979. Additionally, it produced nine workbooks for grades 3 and 4 in 1978. Thus the year's effort could be considered productive, which included planning, preparing the radio scripts, taping in the radio studio, and then planning and producing print materials to accompany the radio programs.

Table I summarizes all major costs for preparing the lessons. The total is roughly \$362,000. This is fairly high to produce this amount of programming. However, it must be taken into account that this includes

(1) a reformed rural radio curriculum that will now be the basis for future programming; (2) careful pre-testing of radio lessons at four rural learning center test sites which would not occur as frequently in the future; (3) considerable costs for foreign technical assistance (\$120,000) which would not be required in the future; (4) careful formative evaluation of each step in the process; (5) personnel training; and (6) experiments and trials and errors. In future years the recurring costs will be considerably less, perhaps at a \$75,000 - \$100,000 level. This would make a ten-year lifetime for a completed and revised lesson a reasonable investment.

3. Transmission Costs

The project used two radio stations in Caaguazú Department to transmit the radio programs. Both provided free public service broadcasting. However, calculations are made on what it would normally cost to broadcast a program. These are based on quoted \$129 per hour transmission costs at the radio stations in Caaguazú Department. Total cost for this component is estimated to be about \$150,000.

In future years it may be necessary to pay directly for radio transmission costs. Based on these calculations it may be more cost effective over the long run for the center to operate its own radio stations.

4. Reception Site Costs

There were 35 learning centers established. Each center was without cost to the project, but had a community leader monitor, a radio receiver, and needed supplies and transportation.

Total cost for reception sites is estimated to be about \$637,000. However, \$427,000 of this amount is opportunity cost estimates of both community involvement in the project and students so-called foregone earnings in order to attend courses. As is understandable, while assigned a money value here in many cases they are most likely not foregone earnings in rural Paraguay. Other costs for operating a learning center will also diminish with time as (1) supervision of each center decreases with experience; (2) trial and error corrections are made, so that it may be that it would cost about \$2,000 - \$3,000 to run a rural learning center per year.

What follows are best cost estimates using a cost accounting methodology. To the degree possible, project inputs were traced to project outputs in each component using cost accounting. In principle, inputs traced to outputs help us to understand how to achieve different final outputs. In this way, it was possible to project ways in which changed inputs might affect project outputs. Using these figures it could be possible to project what additional inputs would be required to increase the quantity of program material produced or to estimate the increased inputs required to increase the target population reached.

TABLE I: RURAL RADIO EDUCATION PROJECT IN PARAGUAY

Summary Preliminary Cost Figures January 1, 1977 to June 20, 1979
Project Components and Funding Sources

| Project Component | Funding Sources | | | | | | |
|--------------------------|-----------------|----------------|----------------|---------------|----------------|----------------|------------------|
| | GOP | AID | AED | Community | Students | In-Kind | TOTAL |
| I. Central Project | 37,000 | 84,000 | 147,661 | --- | --- | --- | 263,661 |
| II. Program Preparation | 96,856 | 145,012 | 120,000 | --- | --- | --- | 361,868 |
| III. Transmission Costs | 4,000 | 9,000 | --- | --- | --- | 136,641 | 149,641 |
| IV. Reception Site Costs | 78,075 | 62,086 | --- | 70,000 | 252,000 | 175,000 | 637,161 |
| TOTALS | 210,931 | 300,098 | 267,661 | 70,000 | 252,000 | 311,641 | 1,412,331 |

GRAND TOTAL \$1,412,331

RURAL RADIO EDUCATION PROJECT

COST FIGURES

| Project Component Activity | Funding Sources | | | | | | |
|---|-----------------|---------------|----------------|-----------|----------|---------|----------------|
| | GOP | AID | AED | Community | Students | In-Kind | TOTAL |
| I. <u>CENTRAL PROJECT COSTS</u> | | | | | | | |
| 1 AED Home Coordinator and Assistant | | | 25,500 | | | | 25,500 |
| 1 AED Research and Evaluation Specialist | | | 18,500 | | | | 18,500 |
| 1/2 AED Radio Education Specialist | | | 41,000 | | | | 41,000 |
| AED Office Supplies and Materials | | | 21,667 | | | | 21,667 |
| AED General Administrative | | | 40,994 | | | | 40,994 |
| Local Transportation | | 9,000 | | | | | 9,000 |
| Vehicle | | 10,000 | | | | | 10,000 |
| Pre-testing travel and per diem | | 36,000 | | | | | 36,000 |
| Local purchase supplies and materials for training | | 9,000 | | | | | 9,000 |
| Sub-contract EDUCADES survey | | 20,000 | | | | | 20,000 |
| 1 Project Director | 9,000 | | | | | | 9,000 |
| 3 Staff support | 15,000 | | | | | | 15,000 |
| Central Administrative Overhead | 5,000 | | | | | | 5,000 |
| MEC vehicles | 3,000 | | | | | | 3,000 |
| TOTALS | 32,000 | 84,000 | 147,661 | | | | 263,661 |

RURAL RADIO EDUCATION PROJECT

COST FIGURES

| Project Component Activity | Funding Sources | | | | | | TOTAL |
|---|-----------------|----------------|----------------|-----------|----------|---------|----------------|
| | GOP | AID | AED | Community | Students | In-Kind | |
| II. PROGRAM PREPARATION | | | | | | | |
| ◦ Curriculum Planning | 6,000 | 10,000 | | | | | 16,000 |
| ◦ Workbook Preparation | 20,952 | | | | | | 20,952 |
| ◦ Teachers Guide Preparation | 12,571 | | | | | | 12,571 |
| ◦ Secretarial Services | 5,700 | | | | | | 5,700 |
| ◦ Ministry Administrative Costs | 4,500 | | | | | | 4,500 |
| Workbooks, 1,000 @ .76 x 9 workbooks | 1,000 | 5,840 | | | | | 6,840 |
| 2 Technicians in sound | 3,285 | 3,000 | | | | | 6,285 |
| 10 Radio actors | | 10,714 | | | | | 10,714 |
| 1 Maintenance Technician | | 1,905 | | | | | 1,905 |
| Cassette tapes | | 7,937 | | | | | 7,937 |
| 5 materials productions specialists @ \$2856 | 7,140 | 7,140 | | | | | 14,280 |
| 5 Graphic Specialists @ \$2856 | 7,140 | 7,140 | | | | | 14,280 |
| 1 Composition Specialist @ \$2856 | 1,428 | 1,428 | | | | | 2,856 |
| 1 Stencil Operator @ \$2856 | 1,428 | 1,428 | | | | | 2,856 |
| 2 Printers @ \$2856 | 2,856 | 2,856 | | | | | 5,712 |
| 2 Bookbinder Operators @ \$2856 | 2,856 | 2,856 | | | | | 5,712 |
| Office Supplies for printing | | 4,268 | | | | | 4,268 |
| 1 Radio Curriculum Specialist (AED) | | | 28,000 | | | | 28,000 |
| 1/2 AED Radio Education Specialist | | | 37,000 | | | | 37,000 |
| 1 AED Materials Development Specialist | | | 55,000 | | | | 55,000 |
| Studio Facilities Equipment | | 20,000 | | | | | 20,000 |
| Studio Facilities Space | 20,000 | | | | | | 20,000 |
| 10 tape recorders @ \$100 | | 1,000 | | | | | 1,000 |
| Audio-Visual equipment | | 9,000 | | | | | 9,000 |
| 1 offset multilith printing machine | | 10,000 | | | | | 10,000 |
| Materials for printing | | 6,000 | | | | | 6,000 |
| 6 typewriters | | 1,000 | | | | | 1,000 |
| Records | | 1,500 | | | | | 1,500 |
| Travel and Per diem staff personnel to pre-test materials | | 30,000 | | | | | 30,000 |
| TOTALS | 96,856 | 145,012 | 120,000 | | | | 361,868 |

RURAL RADIO EDUCATION PROJECT

COST FIGURES

| Project Component Activity | Funding Sources | | | | | | |
|--|-----------------|-------|-----|-----------|----------|---------|---------|
| | GOP | AID | AED | Community | Students | In-Kind | TOTAL |
| III. <u>TRANSMISSION COSTS</u> 180 hours radio transmission time x two radio stations = 360 hours @ \$129 per hour, Grades 3 and 4 x 2 years (Provided in-kind by stations) Studio facilities for recording Supervision of radio studios 180 hours radio transmission time x two radio stations = 360 hours @ \$129 per hour, grades 5 and 6 | | | | | | 91,094 | 91,094 |
| | 4,000 | 9,000 | | | | | 9,000 |
| | | | | | | 45,547 | 45,547 |
| TOTALS | 4,000 | 9,000 | | | | 136,641 | 149,641 |

RURAL RADIO EDUCATION PROJECT

COST FIGURES

| Project Component Activity | Funding Sources | | | | | | |
|---|-----------------|---------------|------|---------------|----------------|----------------|----------------|
| | GOP | AID | AED | Community | Students | In-Kind | TOTAL |
| IV. <u>RECEPTION SITE COSTS</u> | | | | | | | |
| General Operating Expenses, \$1,925 per year x 35 Centers x 2 1/2 years | 59,688 | 30,000 | | | | | 89,688 |
| 35 Monitors @ \$480 per year | 16,800 | | | | | | 16,800 |
| 35 Radio Receivers @ \$80 | | 2,800 | | | | | 2,800 |
| Local Transportation | | 14,286 | | | | | 14,286 |
| Center Maintenance | 1,587 | | | | | | 1,587 |
| Travel and per diem to supervise sites | | 15,000 | | | | | 15,000 |
| 35 Community level investments into centers @ \$2,000 per community (estimate) | | | | 70,000 | | | 70,000 |
| 35 Communities opportunity cost expenses, in-kind, @ \$5,000 per center (includes volunteer time, meetings, supplies, planning) | | | | | | 175,000 | 175,000 |
| 700 students opportunity cost time, 700 students x \$1.00 per hour x 360 hours | | | | | 252,000 | | 252,000 |
| TOTALS | 78,075 | 62,086 | ---- | 70,000 | 252,000 | 175,000 | 637,161 |

B. Annual Project Costs

Another important breakdown is to determine project cost by year. This type of analysis provides information about a "normal" project projection discounting start-up costs during the first two years. In the third year most experimentation, pre-testing, research and evaluation, as well as foreign technical assistance had been completed.

Table II summarizes cost figures for project components by year. In 1977, the project spent about \$326,000 in central project costs and program preparation. About 40 percent of this total was foreign technical assistance from the Academy for Educational Development. It represents a considerable planning in order to launch a completely new program in Paraguay.

In 1978, the first year of instructional radio began with 180 hours of lessons at 35 learning centers. The second year cost went up to about \$551,000 because of in-kind radio transmission costs and in-kind and opportunity costs at the community level by both students and parents. If opportunity costs of \$202,000 were deleted, total direct costs would have been about \$348,000.

By 1979, central project costs and programs preparation costs continue to drop considerably. Total actual costs will be about \$535,000. Deleting community level opportunity costs (\$221,000), direct costs are about \$314,000 for 1979. This includes about \$50,000 for foreign technical assistance and another \$75,000 - \$100,000 to prepare radio lessons and workbooks for grades 5 - 6.

In 1980, it is expected that the annual direct operating costs will be \$265,000, based on the following breakdown:

| | | |
|--------------------------|-----------|--|
| I. Central Project | 25,000 | |
| II. Program Preparation | 50,000 | |
| III. Transmission Costs | 90,000 | |
| IV. Reception Site Costs | 70,000 | (excludes in-kind and opportunity costs) |
| | <hr/> | |
| | \$265,000 | |

TABLE II: RURAL RADIO EDUCATION PROJECT

Summary Estimated Cost Figures
Project Component Costs by Year

| PROJECT COMPONENT | 1977 | 1978 | 1979 | 5/ TOTALS |
|-------------------------|---------|---------------|---------------|--------------|
| I. Central Project | 146,833 | 83,833 | 32,994 | 263,661 |
| II. Program Preparation | 167,567 | 119,472 | 74,829 | 361,868 |
| III. Transmission Costs | | 1/ 50,547 | 2/ 99,094 | 149,641 |
| IV Reception Site Costs | 7,000 | 3/ 296,696 | 4/ 333,465 | 637,161 |
| TOTALS | 362,400 | 550,548 | 535,382 | 1,412,331 |

- 1/ 90% of costs are in-kind contribution
- 2/ 91% of costs are in-kind contribution
- 3/ 69% of this figure is in-kind opportunity cost at the community level (\$206,000)
- 4/ 66% of this figure (\$221,000) is in-kind opportunity cost at the community level
- 5/ Projections made for entire year 1979 for comparison purposes

RURAL RADIO EDUCATION PROJECT

Cost Figures

| PROJECT COMPONENT ACTIVITY | YEAR | | | TOTALS |
|--|----------------|---------------|---------------|----------------|
| | 1977 | 1978 | 1979 | |
| I. <u>CENTRAL PROJECT COSTS</u> | | | | |
| 1 AED Home Coordinator and Assistant | 11,500 | 10,000 | 4,000 | 25,500 |
| 1 AED Research and Evaluation Specialist | 9,500 | 9,000 | | 18,500 |
| 1/2 AED Radio Education Specialist | 20,500 | 20,500 | | 41,000 |
| AED Office Supplies and Materials | 9,000 | 9,000 | 3,667 | 21,667 |
| AED General Administrative | 15,000 | 15,000 | 10,994 | 40,994 |
| Local Transportation | 5,000 | 3,000 | 1,000 | 9,000 |
| Vehicle | 3,333 | 3,333 | 3,333 | 10,000 |
| Pre-testing travel and per diem | 36,000 | ----- | | 36,000 |
| Local purchase supplies and materials for training | 6,000 | 3,000 | | 9,000 |
| Sub-contract EDUCADES Survey | 20,000 | ----- | | 20,000 |
| 1 Project Director | 3,000 | 3,000 | 3,000 | 9,000 |
| 3 Staff support | 4,000 | 5,000 | 5,000 | 15,000 |
| Central Administrative Overhead | 2,000 | 2,000 | 1,000 | 5,000 |
| MEC Vehicles | 1,000 | 1,000 | 1,000 | 3,000 |
| TOTALS | 146,833 | 83,833 | 32,994 | 263,661 |

RURAL RADIO EDUCATION PROJECT

Cost Figures

PROJECT COMPONENT ACTIVITY

YEAR

| II. <u>PROGRAM PREPARATION</u> | 1977 | 1978 | 1979 | TOTALS |
|---|----------------|----------------|---------------|----------------|
| ◦ Curriculum Planning | 16,000 | | | 16,000 |
| ◦ Workbook preparation | 10,000 | 7,000 | | 20,952 |
| ◦ Teachers Guide Preparation | 5,000 | 5,000 | 3,952 | 12,571 |
| ◦ Secretarial Services | 2,000 | 2,000 | 2,571 | 5,700 |
| ◦ Ministry Administrative Costs | 1,500 | 1,500 | 1,700 | 4,500 |
| Workbooks, 1,000 @ .76 x 9 workbooks | 3,000 | 2,000 | 1,500 | 6,840 |
| 2 Technicians in sound | 3,000 | 2,000 | 1,840 | 6,285 |
| 10 Radio actors | 4,000 | 4,000 | 2,714 | 10,714 |
| 1 Maintenance Technician | 1,000 | 905 | | 1,905 |
| Cassette tapes | 3,000 | 3,000 | 1,937 | 7,937 |
| 5 Materials Productions Specialists @ \$2856 | 4,000 | 6,000 | 4,280 | 14,280 |
| 5 Graphic Specialists @ \$2856 | 4,000 | 6,000 | 4,280 | 14,280 |
| 1 Composition Specialist @ \$2856 | 1,428 | 1,428 | | 2,856 |
| 1 Stencil Operator @ \$2856 | 1,428 | 1,428 | | 2,856 |
| 2 Printers @ \$2856 | 2,856 | 2,856 | | 5,712 |
| 2 Bookbinder Operators @ \$2856 | 2,856 | 2,856 | | 5,712 |
| Office Supplies for printing | 2,000 | 2,000 | 268 | 4,268 |
| 1 Radio Curriculum Specialist (AED) | 18,000 | 18,000 | | 28,000 |
| 1/2 AED Radio Education Specialist | 18,000 | 19,000 | | 37,000 |
| 1 AED Materials Development Specialist | 21,000 | 21,000 | 13,000 | 55,000 |
| Studio Facilities Equipment | 7,000 | 6,500 | 6,500 | 20,000 |
| Studio Facilities space | 7,000 | 6,500 | 6,500 | 20,000 |
| 10 tape recorders @ \$100 | 333 | 333 | 333 | 1,000 |
| Audio-visual equipment | 3,000 | 3,000 | 3,000 | 9,000 |
| 1 offset multilith printing machine | 3,333 | 3,333 | 3,333 | 10,000 |
| Materials for printing | 2,000 | 2,000 | 2,000 | 6,000 |
| 6 typewriters | 333 | 333 | 333 | 1,000 |
| Records | 500 | 500 | 500 | 1,500 |
| Travel & per diem staff personnel to pre-test materials | 20,000 | 7,000 | 3,000 | 30,000 |
| TOTALS | 167,567 | 119,472 | 74,829 | 361,868 |

RURAL RADIO EDUCATION PROJECT

Cost Figures

PROJECT COMPONENT ACTIVITY

YEAR

| III. <u>TRANSMISSION COSTS</u> | 1977 | 1978 | 1979 | TOTALS |
|--|-------|--------|--------|---------|
| 180 hours radio transmission time x two radio stations = 360 hours, @ \$129 per hour, Grades 3 and 4 x 2 years | ----- | 45,547 | 45,547 | 91,094 |
| Studio facilities for recording | 3,000 | 3,000 | 3,000 | 9,000 |
| Supervision of radio studios | 2,000 | 2,000 | | 4,000 |
| 180 hours radio transmission x two radio stations = 360 hours, @ \$129 per hour, Grades 5 and 6 | | | 45,547 | 45,547 |
| TOTALS | 5,000 | 50,547 | 94,094 | 149,641 |

RURAL RADIO EDUCATION PROJECT

Cost Figures

PROJECT COMPONENT ACTIVITY

YEAR

| IV. <u>RECEPTION SITE COSTS</u> | 1977 | 1978 | 1979 | TOTALS |
|---|--|----------|----------|---------|
| General operating expenses \$1,025 per year | | 29,896 | 59,792 | 89,688 |
| x 35 centers x 2 1/2 years | | 8,400 | 8,400 | 16,800 |
| 35 Monitors @ \$480 per year | | 1,400 | 1,400 | 2,800 |
| 35 Radio receivers @ \$80 | | 5,000 | 2,286 | 14,286 |
| Local Transportation | 7,000 | 1,000 | 587 | 1,587 |
| Center Maintenance | | 10,000 | 5,000 | 15,000 |
| Travel and per diem to supervise sites | | 35,000 | 35,000 | 70,000 |
| 35 community level investments into centers | | | | |
| @ \$2,000 per community (estimated) | | | | |
| 35 Communities opportunity cost expenses, | | | | |
| in-kind, @ \$5,000 per center (includes | | | | |
| volunteer time, meetings, supplies, | | | | |
| planning) | | 80,000 | 95,000 | 175,000 |
| 700 students opportunity cost time, 700 | | 126,000* | 126,000* | 252,000 |
| students x \$1.00 per hour x 360 hours | | | | |
| TOTALS | 7,000 | 296,696 | 333,465 | 637,161 |
| | *These are in-kind and opportunity costs | | | |

C. Fixed and Variable Costs

In all educational projects it is important to distinguish between fixed costs and variable costs. Fixed costs are those costs incurred regardless of the number of students, while variable costs are dependent on the numbers of students serviced by the program. These are most important in analyzing educational technology projects because there are normally high start-up costs but these are amortized over a period of time. If planning and implementation are effective it is expected that the project will increase the number of students, thus decreasing over a period of time the cost per student.

Additional factors influencing the variable costs of the project are (1) the number of broadcast hours, (2) the number of printed materials, and (3) expansion costs for new learning centers. But, in general, per student costs will generally decrease with educational technology projects.

The production costs of the radio lessons and print materials were primarily fixed costs. It is the distribution costs, namely the increased costs to distribute the print materials to additional students and the increased costs due to the additional learning centers which vary relative to the number of students in the program. Similar to other radio projects, such as Radio Math in Nicaragua and Radio Santa Maria in the Dominican Republic, the Rural Radio Project had high fixed costs during the initial phases of the project, and low variable costs. While some of the fixed costs may be recurring (i.e., additional manpower time to revise the radio programs), the major part of costs of the project is the fixed, capital costs during the start-up of the project. Because of the high fixed, capital costs and low variable costs, increased participation in the program (i.e., increased number of students participating in the program) would not significantly affect the program costs in the future. Thus, implementation and expansion costs of the program would be low in comparison to the high start-up costs. There is the potential of a low-cost alternative education system under the Rural Radio Education system. However, to currently assess these costs, the project must be viewed in terms of these long-term investments, allowing for the decreasing project costs to be calculated in its rate of return.

The cost information analyzed above includes most opportunity costs of the project. In the case of the rural Radio Project, the hidden costs of the project were dispersed between the Ministry of Education and Worship,

volunteered time and such things as community efforts. For example, the broadcasting time donated by the radio station was accounted for in the budget data. Also, the foregone opportunity costs of the student's time listening to the radio program instead of contributing productive time to that society, is another example of hidden costs of the project. It is impossible to measure each hidden cost of the project and its significance. While these costs may not be of great consequence in financial terms, they represent the total commitment and dedication of the MEC and the community, and are probably most crucial to the execution of the project.

V. Administrative and Expenditures

This section of the Final Report covers the administrative and expenditures of the Rural Radio Education Project in Paraguay.

A. Teleducation Center Project Staff

The following are the Teleducation Center Project staff conducting the Rural Radio Education Project:

Lic. Mabel Palacios Morinigo - Project Director

Daisy Lopez Caceraces - Administrative Secretary

Julia Leon de Grillon - Technical Coordinator

Celsa Quinonez de Bernal - Instructional Coordinator

Graciela Glizt - Recording Coordinator

Gladys Carreras de Galeano - Supervisor

Maria Isabel de Torres - Communication Specialist

Ana Selva D. de Morinigo - Mathematic Specialist

Gloria Mazo Tiazzo - Science Specialist

Lidia Lopez Gaona - Social Studies Specialist

Santiago Ferreira - Evaluator Specialist

Maria Eugenia de Miranda - Evaluator

Victoria P. de Sos - Research/Writer, Social Studies

Mercedes Susana Aguilera - Research/Writer, Mathematics

Fanny Rolan Filartiga - Research/Writer, Science

Benita D. de Ramirez - Research/Writer, Agriculture and
Home Economics

Amada G. de Piris - Script Writer, Communication

Agustin Ortiz Gonzalez - Script Writer, Agriculture and Science

Ramiro Gomez - Script Writer, Social Studies

Carlota R. de Mendez - Instructional Materials Specialist

Margarita Paredes - Typist

Marta Zazzi Rivas - Typist

Pedro Ramirez - Chauffeur

B. Academy for Educational Development Advisors

Instructional Systems Advisor

Dr. Mary C. Muller
January 15, 1977 - June 30, 1978

Script Writing Advisor

Ms. Julia Ledee
January 15, 1977 - July 15, 1977
Dra. Maria Susana Rugeiro
January 28, 1978 - December 31, 1978
(Nine TDY visits during this period)

Instructional Materials Advisor

Dr. Carmen Siri
April 15, 1977 - October 15, 1977
Dr. José Vicente Alvarez
February 10, 1979 - April 15, 1978
July 15, 1978 - June 30, 1979

Research and Evaluation Advisor

Dr. Donald A. Swanson
March 13 - 26, 1977
Dr. Edgar Nesman
August 15, 1977 - September 17, 1977
March 13 - 24, 1978
July 9 - 26, 1978
December 8 - 23, 1978

Home Office Coordinator

Mr. William Bradford
January 15, 1977 - May 15, 1977
Dr. Donald A. Swanson
May 15, 1977 - August 30, 1978

Home Office Program Assistant

Caroline Fawcett
November 15, 1977 - August 30, 1979

C U.S. Agency for International Development

Director, U.S. AID Mission to Paraguay

Abe Peña

Education and Human Resources, USAID/Paraguay

Jon A. Gant
Dr. Max Williams
Heriberto Coronel

Education and Human Resources/AID/Washington

Dr. James Singletary

D. Technical Assistance

The Academy for Educational Development provided technical assistance in the fields of educational technology, radio script writing, print materials development, and evaluation, through Contract AID/1a-C1178 with the U. S. Agency for International Development. This was provided by advisors in Asuncion and the Home Coordinator in the Washington office of the Academy.

Technical specialists provided advisory services to the Teleducation Center staff. It is abundantly clear to both the Academy and the Teleducation Center that the Center is fully responsible for the project and that the Academy provided technical input under their supervision. This relationship was harmonious and mutually beneficial.

Each specialist provided advisory services with on-the-job training with project staff member counterparts. Specialists and project staff worked together affording the opportunity for daily informal and continual communication between the advisors and the entire staff. Advisors responded to the project staffs requests and needs for assistance in particular and specific components.

On occasion, the advisors, upon request, developed working documents to assist in planning and organizing project components. These internal documents were worked out jointly with project staff members. Much give and take occurred between the advisors and project staff members and indeed on-the-job training and experiences were communicated.

E. Contract Expenditures and Amendments

| <u>Category</u> | <u>Budget</u> | <u>Spent to July 31, 1979</u> |
|---------------------------|---------------|-------------------------------|
| Salaries and Wages | \$ 93,013 | \$ 103,621 |
| Fringe Benefits | 16,563 | 14,602 |
| Consultants | 16,930 | 16,114 |
| Travel and Transportation | 42,709 | 39,722 |
| Allowances | 29,923 | 25,093 |
| Other Direct Costs | 23,985 | 22,260 |
| Overhead at 22% | <u>42,502</u> | <u>40,230</u> |
| GRAND TOTAL | \$265,625 | \$ 261,642 |

Contract No. AID/1a-C-1178 had seven amendments during this period from December 28, 1976 to August 31, 1979.

Amendments Nos. 1 and 2 authorized changes in key personnel of the Academy to perform professional services under the Contract.

Amendment No. 3, signed December 27, 1977, modified the Contract to extend the period of performance through April 15, 1978, and to fully fund the Contract to \$191,396.

Amendment No. 4 extended the period of performance of the Contract by one month from April 15 to May 15, 1978 with no change in the total estimated cost of the Contract.

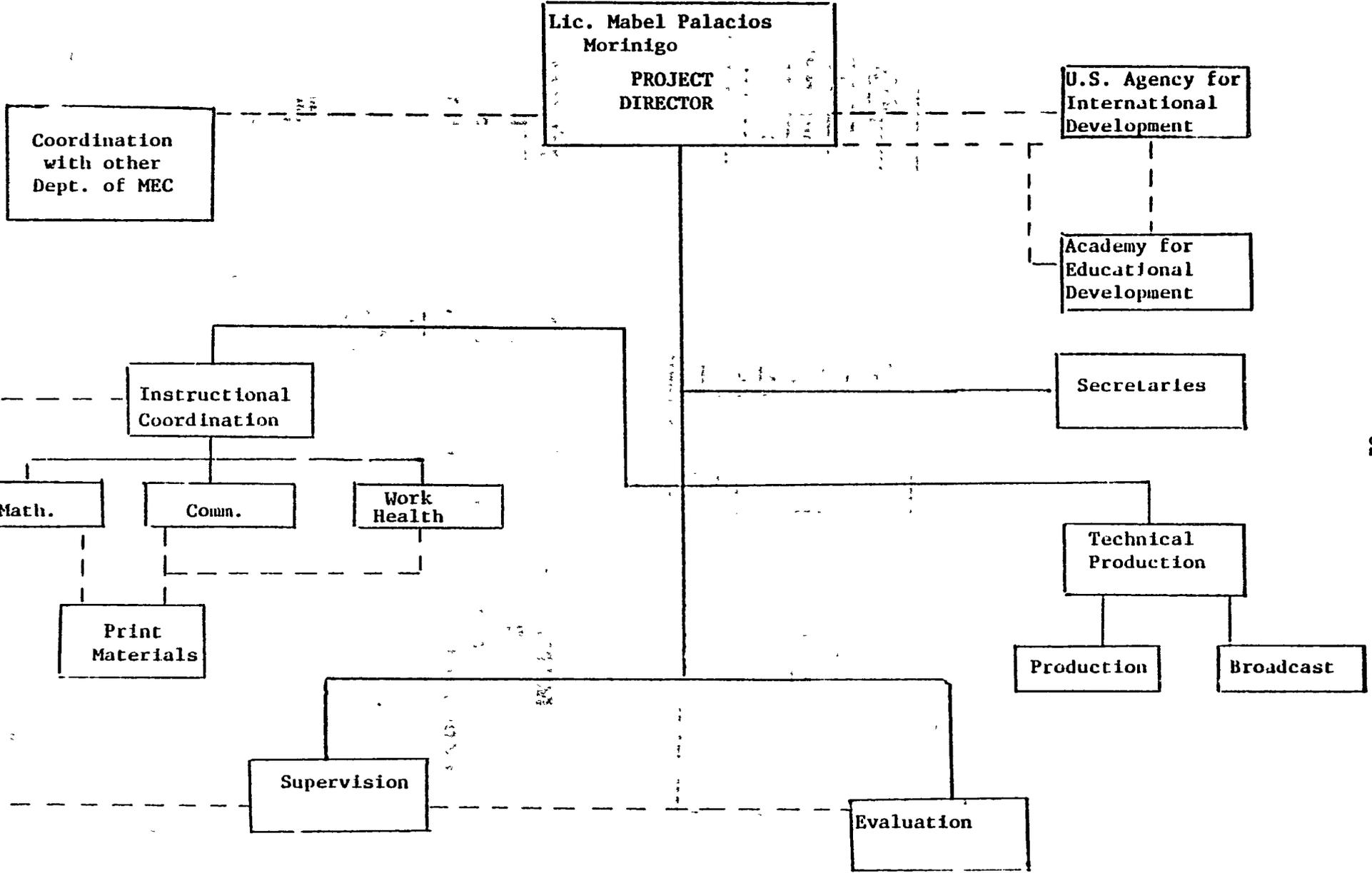
Amendment No. 5 to the Contract, signed on May 15, 1978, amended the level of effort of the Contract and extended the Contract to December 31, 1978. The estimated cost obligated under the Contract was changed to \$265,625.

Amendment No. 6 does not exist. The number was skipped over.

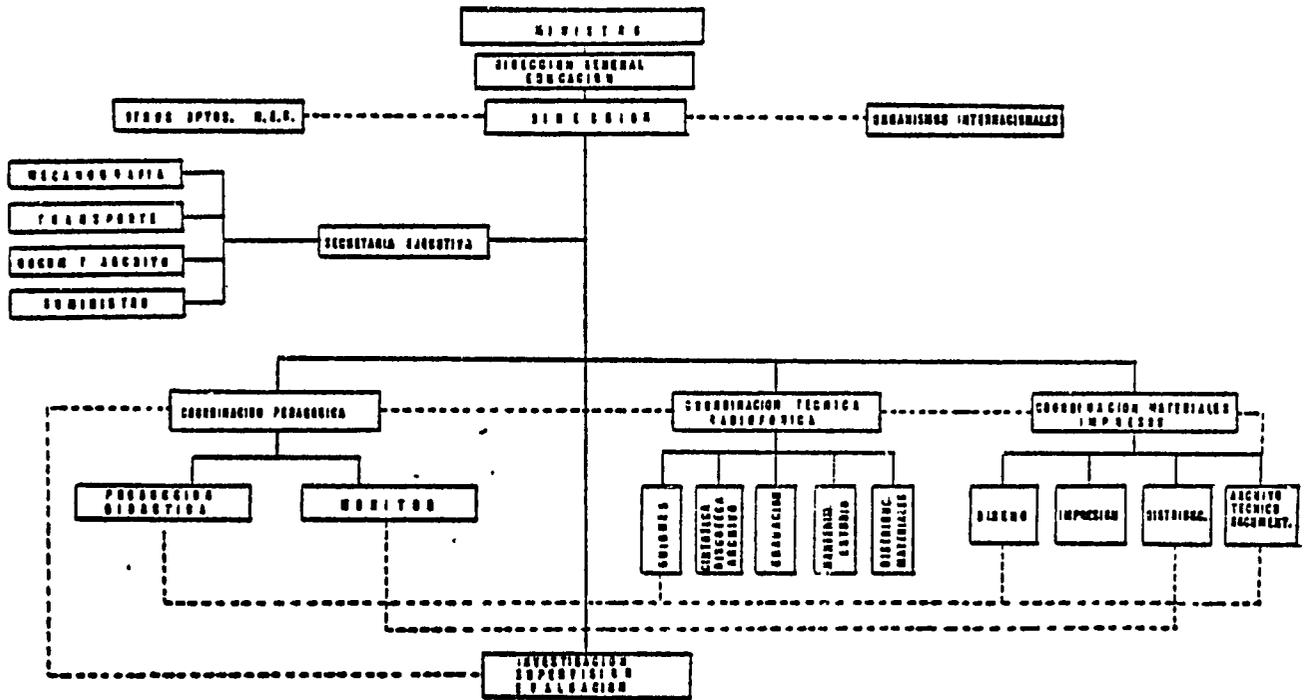
Amendment No. 7, signed December 20, 1978, extended the period of performance to April 30, 1979, with no change in the total estimated cost of the Contract.

Amendment No. 8, signed April 30, 1979, extended the period of performance to August 31, 1979, with no change in the total estimated cost of the Contract.

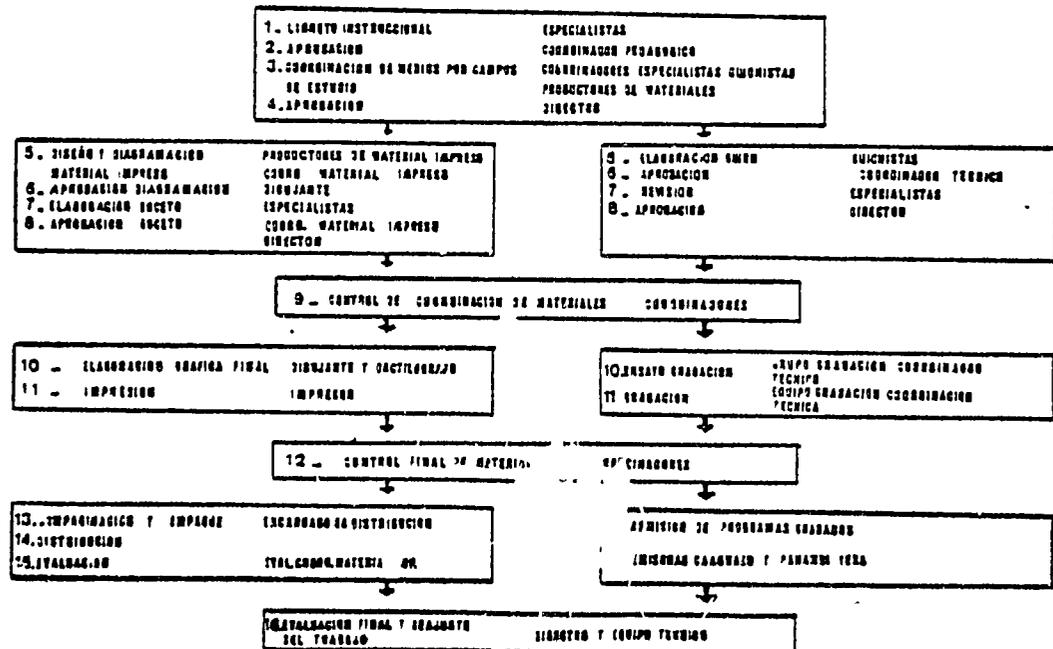
TELE-EDUCATION CENTER
RURAL RADIO EDUCATION PROJECT



**MINISTERIO DE EDUCACION Y CULTO
CENTRO DE TELEDUCACION
PROYECTO RADIO PRIMARIA RURAL**



**MINISTERIO DE EDUCACION Y CULTO
CENTRO DE TELEDUCACION
EDUCACION PRIMARIA RURAL POR RADIO
PROCEDIMIENTOS PARA DISEÑO Y PRODUCCION DE MATERIALES**



VI. Implications and Outreach: Lessons Learned

The Rural Radio Education Project in Paraguay is a viable educational development project. It has demonstrated that radio, coupled with print materials and monitors, using a rural Learning Center, can be an effective alternative to the regular rural primary school education. It does not replace regular rural primary school education, but can complement it and supplement it. There would appear to be little doubt concerning the general applicability of the results to other programs of similar nature.

The project was innovative, although it used little that was completely new. Radio, local monitors, print materials, and technicians have been elements of other education programs before. Part of the innovativeness of the project lay in these following factors:

- ° It used radio for a formal education in a rural area. Radio has been used widely in non-formal education, both rural and urban, and also in formal urban education. The system devised in Paraguay, to our knowledge, using radio, print materials, learning centers, and local monitors is unique.
- ° It used radio for inaccessible rural areas and where there were incomplete rural primary schools. The project had outreach to rural areas where regular primary school do not exist.
- ° It converted a regular primary school curriculum into a reformed rural radio primary school curriculum. Taking regular subjects of reading, writing, mathematics, social sciences, it converted them into relevant learning experiences for rural people under the three broad subject areas of Communication, Mathematics, and Natural Sciences. Subjects dealt with relevant learning needs in health, nutrition, agriculture, basic vocational education skills, and community organization.

Significant elements of the project were presented in summary form in Section II, and evaluation findings and their implications were discussed in Section III. These have been considered in developing the list of factors identified below which would appear to have significant implications for this project as well as other similar projects in different settings and/or sectors. Some items represent interpretations of the project while others confirm lessons learned from other programs. These then are lessons learned concerning the project.

1. Pre-Planning

The results obtained demonstrate considerable well-designed planning in this experimental stage. Project planners designed a rough draft of the project and presented it to international donor agencies for possible funding. Actual project design made in 1975 came fairly close to being accurate.

2. Bilingualism and Radio Education

Primary education in Paraguay must concern itself with second language learning. In the rural areas, communication is carried on in Guarani. Though Spanish is understood to some extent it is not considered an effective mode of instruction at the primary level. In preparing the instructional design for the Rural Radio Education Project the language component received careful study.

An ad hoc planning committee of the Ministry of Education and Worship decided that Spanish should be systematically introduced into lessons. This decision responded to the expressed needs of the rural student audience. Given the pedagogical constraints of mass media, the development of second language learning has been an instructional challenge.

Throughout the world, communications technologies are trying to cope with language variances. The Rural Radio Education project staff developed radio scripts in Guarani and included simple explanations in Spanish. Within a total radio program lesson of 60 minutes, Spanish is used for a 20 minute segment devoted to reading and writing. Spanish dialog drills are also included. The rest of the instructional broadcast uses Guaraní for motivational dramatization and basic teaching of mathematics and natural science. A basic Spanish vocabulary has been developed from words of common usage. Due to the lack of studies on the comparative linguistics of Spanish and Guarani, this vocabulary list is a pioneer effort.

Continual investigation of the audience's ability to repeat and retain Spanish language patterns is necessary to evaluate the impact of a second language component. The importance of effective communication in an instructional package is obvious. Therefore in order to plan a nationwide utilization of this project the bilingual aspect needs continual attention. The extent to which Spanish is understood but not used by the rural population is not known. When and how to mix Spanish and Guarani in order to have effective instruction is still in need of study. A basic vocabulary derived from a comparative study of the two linguistic systems is vital for the preparation of both audio and print instructional materials.

3. Formative Evaluation: A Continual Process

The project is gathering reliable data which can form the base-line of the formative evaluation. This data needs systematic documentation and cross filing. As observations, reports, tests and interviews are conducted the accessibility of this information grows in importance. The project staff is learning from experience but must appreciate the importance of a documentation system in order to utilize formative evaluation. One of the fundamental objectives of formative evaluation is the diagnosis of weaknesses in order to improve instruction through revision. This is dynamic not static. Therefore, accessibility and utilization of this information must be fed into the overall planning processes.

4. Self-instructional Techniques

In mass communication instruction the teaching methodology is generally deductive. With this methodology various techniques can be applied which lead the learner along in a series of simple programmed steps. In this way concepts build gradually one upon another. It also allows ample opportunity to clarify any possible errors. Due to the lack of conventional questioning techniques used in face-to-face instruction, the radio broadcast must anticipate the likely errors and either prevent the learner from making them or explain why an error could be made. This is similar to the branching technique in programmed instruction.

The motivational needs of young adults are directly related to their awareness that they are learning while listening to the broadcast. More than simple information distribution, a teaching broadcast must actively involve the listener in the learning process. For this reason it is necessary to investigate listening habits in order to pace radio lessons. Redundancy, rather than repetition, is another hallmark of good programming. The criteria learning objective needs to be stated, restated, tested and confirmed. The radio dialog can produce this effect through imaginative exercises.

5. Self-evaluation

A learning audience which recognizes the practical value of what is being studied can actively participate in their own evaluation. If it is made clear that learning is the goal of a broadcast the listeners can decide to what extent the broadcast reaches this goal. The important factor is that participants feel that the evaluation is designed to help them. In this way, the instructional objectives are being tested rather than the individual. If a person can reach the instructional objective this indicates that the teaching strategy was adequate. If not, a new

strategy needs to be designed. By including participants in evaluation decisions their motivational needs can be reinforced. It is found that one of the criteria in evaluating the learning output should be the participants' own judgement. This, coupled with objective measures, will provide an opportunity for responsible involvement.

6. Promotion Policy

It is important to clarify a promotion policy for project students. A first step would be to establish a paradigm of regulations which can serve to satisfy the social, instructional, and evaluative requirements of the Ministry of Education and Worship for this rural population and thereby grant the status of primary level equivalency graduate.

Elements of the paradigm might include: (1) years of schooling; (2) indicators of maturity; (3) test results; (4) performance outcomes. In an analysis of the output goals of this project it is necessary to consider that socialization needs of children in conventional primary education cannot be confounded with the adult behavior patterns of the radio audience. An ad hoc committee of the Ministry, including the Departments of Primary Education, Secondary Education, Planning, Curriculum and Evaluation, could study the question of promotion and the status of project participants within the total education system.

7. Primary School Radio Curriculum

The evaluation of a radio-oriented curriculum was a salient project component. Using as a base the regular curriculum of the primary schools, the adaptation to a radio-based curriculum passed through various stages. A first step was the preparation of a curriculum block which outlined objectives and content. This was then used to plan and develop daily instructional designs for each radio lesson. These lessons were analyzed in order to produce effective audio and written components. The instructional designs (known as libretos) became the curriculum. Through interviews, direct observation and tests, these libretos were revised. The final revision of these libretos formed the radio curriculum.

The group of instructional and curriculum specialists need to review each original lesson and plan the necessary revisions. These lessons would then be re-taped. This means that additional time must be spent in the curriculum development process. In order to revise the lessons originally produced, it is necessary to validate their effectiveness. Given the current work load and the size of the staff, revision cannot be anticipated

until the production of the original 1980 trial radio lessons have been developed. Nonetheless, without revision and editing the tapes of the radio lessons will only have passed through the first stage of curriculum development. It is important to refer again to formative evaluation which compels planning for editing and validation.

8. Field Site Orientation

There is a logistical difficulty in observing and supervising the learning centers from a central office in Asuncion. As the need for controlled experimentation is appreciated it becomes obvious that regional offices are necessary. As the number of centers increase, field visits from Asuncion will become more complicated. For overall project management a regional office in Caaguazú would appear to be required. Having a regional office would facilitate direct contact with the participants' cultural ethos. Agricultural practices and problems could be discussed with extension workers who have daily contact with the real situation. Public health officers could relate to the project staff and offer needed information for instructional planning. Additionally, instructional radio would be more effective if the target group could closely identify with the program characters. The dramatic format needs to use everyday situations which reflect the daily life style of a rural population. This is achieved through close contact with the target group, observing and listening to behavioral patterns.

9. Cost/Benefit Analysis

The objective of this project is to produce a product. Production is being carried out in an experimental plan. It is not until the end product -- that is, the radio lessons on tape and workbooks -- are produced and distributed to a nationwide audience that benefit can be considered. A cost analysis of the experimental plan is one component in the final accounting of cost/benefit. Production costs are analyzed in terms of consumption. Projections on the possible utilization (consumption) of the Rural Radio Education Project can be analyzed after there has been more assessment of the audience's reception to the experimental plan. Such projections should be further studied during the year 1979.

Also during this time, a study of the non-enrolled audience (open audience) could be conducted in order to determine possible future dissemination. Another interesting feature in studying the cost/benefit aspect of the project is the validity of having a student population which has had two previous years of regular schooling. This differentiates

this project from a basic literacy program and infers a different cost base line. Students enter this system with some fundamental skills which means that the output criteria must be specific and discrete. A comparative study between a basic literacy program and this program which requires some skills for entry would offer important research information on the valid use of radio in developing countries.

10. Communication Development Strategies in an Institutionalized Program

The project surveyed communication development strategies while planning to assure that it was using the most effective techniques and strategies available to design and implement a rural radio education program in a formal education setting. Studies of projects were reviewed as well as project documents. A well-organized institutional design system was planned. This included the best feasible instructional mix of radio, instructional materials, and monitors.

During project implementation, continual decisions were made to "fine tune" the design and to maintain certain flexibility and practicality in programming. Unlike a pre-determined experimental design, the project had a flexible yet pedagogically sound institutional design. This made for better overall effectiveness.

11. Project Funding Mechanisms

The Teleducation Center budget at the project outset in 1977 was quite low because it was a recently formed and relatively small unit within the Ministry of Education and Worship. Once major project activities began and grant assistance from the U. S. Agency for International Development started, the magnitude of activities increased considerably. Since the grant assistance was geared for a three-year project, there was considerable perceived need to make rapid expenditures. However, certain policy and study was required before these expenditures could be made effectively. In hindsight, it would have been more appropriate to extend the same amount of grant assistance over a longer period of time, perhaps as much as up to two years longer, to permit policy decisions and curriculum development to be made adequately before expending certain resources.

The Academy's technical assistance team, for example, began full operation in early 1977. Some advisors were intending to train Paraguayan counterparts in technical areas before certain groundwork was laid for policies, design, and curriculum. Therefore, the Teleducation

Center was not able to use this technical assistance properly because of inadequate timing.

A major lesson learned is to provide enough start-up time for planning and policy decisions before requiring certain financial resources. This would assure a longer but most likely more effective contribution over a longer period of time.

APPENDIX ALIST OF DOCUMENTS PROVIDED IN PREVIOUS ACADEMY REPORTSPROGRESS REPORT OF THE RURAL RADIO EDUCATION PROJECT IN PARAGUAY, JUNE 20, 1977

1. Centro de Teleducacion, "Memcrandum from Director of Teleducation Center to Director General of Ministry of Education, January 17, 1977"
2. Muller, Mary C., February 19, 1977, "Memorandum Outline of Planning Activities"
3. Centro de Teleducacion, February 28, 1977, "Memorandum to Director General of Ministry of Education, Report of Activities of Field Trip February 14-16, 1977"
4. Muller, Mary C., "February, 1977 Monthly Report"
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7. Swanson, Donald A., March, 25, 1977, "Report of Activities March 9-25, 1977"

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1. EDUCADES, "Brief Description of Base Line Study Findings"
2. Centro de Teleducacion, "Chronogram of Activities, November, 1976 to November, 1977"

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1. AED, "Characteristics of Caaguazu Test Sites"
2. Centro de Teleducacion, "Sample Radio Programs of the Rural Radio Education Project"
3. Centro de Teleducacion, "Entry Level Tests for Potential Radio School Students"
4. Nesman, Edgar, "The Process of Evaluation: The Rural Radio Education Project in Paraguay"
5. Siri, Carmen, "Final Report of the Support Materials Specialist", October 22, 1977
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1. Alvarez, Jose Vicente, "Support Materials Specialist Report," April 20, 1978
2. Muller, Mary C., "Visits to Rural Radio Education Learning Centers," April 10, 1978

3. Centro de Teleducación, "Como Organizar un Centro de Prueba"
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5. AED. "Descripción del Proyecto de Radio Educación en Paraguay"
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2. Dr. José Vicente Alvarez, "Notas Técnicas: Ed Material de Apoyo," July 19, 1978
3. Dr. Edgar Nesman, "Informe de Visita durante los días 10 al 29 de julio," July 29, 1978
4. Dra. Maria Susana Ruggiero, "Asesoría para le Realización de Guiones Radiofónicos," Informe General de Actividades, August, 1978
5. Dr. Donald A. Swanson, "Technical Notes: The Paraguay Rural Radio Education Project," August, 1978, draft
6. Centro de Teleducación, "Programación 1980-1982," undated
7. AED, Summary Project Accomplishments, undated

NOTE: All of these documents are available from the Academy for Educational Development