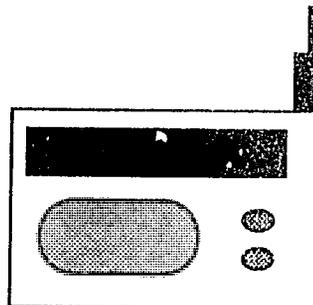


RADIO LEARNING PROJECT

Annual Report - Project Year 1

October, 1985 - December, 1986



February, 1987

Education Development Center, Inc.

In Consortium With:

Academy for Educational Development, Inc.

and

Friend Dialogues, Inc.

**Radio Learning Project
Annual Report - Project Year 1**

Table of Contents

| | <u>PAGE #</u> |
|---|----------------------|
| I. Preface | 1 |
| II. Introduction | 2 |
| III. Information Dissemination | 3 |
| A. What are we Disseminating? | 3 |
| B. Developing a promotional strategy | 3 |
| C. Efforts to promote Interactive Radio Instruction | 4 |
| D. Development of promotional materials | 5 |
| E. Network | 8 |
| F. Coordination with other institutions | 9 |
| G. Conferences | 10 |
| H. Publications | 10 |
| I. Orientation and Promotional Meetings | 10 |
| IV. Project Development | 11 |
| A. Efforts to develop new field sites | 11 |
| B. Materials to ease the adaptation process | 18 |
| C. Financial Models | 21 |
| D. Computer Utility Programs | 23 |
| E. Evaluation of new projects | 23 |
| V. Project Management | 25 |
| VI. Conclusion | 26 |

Appendices:

- A. The Radio Learning Project Brochure
- B. Outline for Face-to-Face Presentations
- C. Notes on Interactive Radio in the Classroom
- D. Why Radio?
Teaching Reading by Radio
Interactive Radio and Student Achievement
The Role of Classroom Teachers in Interactive Radio Instruction
Why Interactive Radio Lessons are Effective
Teaching Mathematics by Radio
- E. Levels of Adaptation for Existing Interactive Radio Instruction Programs
- F. Production of Radio Mathematics Programs -- Friend Dialogues, Inc.
- G. A Plan for the Evaluation of Interactive Radio Instruction
- H. Members of the Advisory Board

Figure 1: Framework of 5 Stages for basic promotion of Interactive Radio Instruction

RADIO LEARNING PROJECT:
ANNUAL REPORT - PROJECT YEAR 1
October, 1985 - December, 1986

I. PREFACE

This is the first annual report of the Radio Learning Project. Project Year 1 consists of the first fifteen months of the project from October, 1985 through December, 1986. The remaining project years will correspond to the calendar years 1987 through 1990. This report incorporates and expands upon the first interim report "Radio Learning Project: Report of the First Seven Months" printed in May, 1986.

The highlights of the first year include the following:

- Developed a promotional strategy and prepared and distributed promotional materials about interactive radio instruction to educators throughout the world. Materials included a brochure, audio tapes, video tapes, technical briefs, and a report in the form of a newsletter.
- Visited Yemen, Swaziland, Cape Verde, Bolivia, Honduras, Somalia, Egypt, Jordan, and Liberia in support of potential new field sites
- Prepared for new projects or pilot activities in Honduras, Somalia and Bolivia
- Established a worldwide network of over 200 educators and broadcasters
- Developed computer financial models for projecting costs of developing, implementing and maintaining new projects
- Completed several tasks to ease the adaptation of IRI materials to new countries
 - Developed preliminary version of computer-based lesson planning program
 - Prepared Radio Mathematics curriculum for adaptation in other countries

II. INTRODUCTION

The purpose of the Radio Learning Project is to disseminate information about interactive radio instruction (IRI) and to encourage and support the development of new interactive radio projects. This five-year project, begun in October, 1985, is funded by the Agency for International Development (AID) to a consortium comprised of the Education Development Center (EDC) as prime contractor and the Academy for Educational Development (AED) and Friend Dialogues, Inc.

The Radio Learning Project aims to improve the teaching of basic primary school skills through the use of interactive radio instruction. This project builds upon more than a decade of research and development resulting in effective, low cost, radio-based curricula for developing nations. Curricula are now available for primary school mathematics, reading and writing, and English as a second language. An upper primary school science curriculum is under development.

The request for proposal from AID presented the project in three parts -- information dissemination, project development, and project implementation. Information dissemination focuses on ways the Radio Learning Project can provide information about, and support for, interactive radio instruction around the world. Project development describes the activities designed to generate at least four sites for new radio projects and the necessary work to prepare for these new projects. In the project implementation phase, the Radio Learning Project will help adapt the instructional materials to the national curriculum, language and culture of each country and assist in the implementation and evaluation of the radio project.

This report discusses the activities to date on information dissemination and project development. Future reports will describe the implementation activities once new projects begin.

The activities in support of information dissemination and project development overlap. That is, we hope efforts to inform educational leaders around the world about interactive radio instruction will spark interest in some countries that will result in new projects. Likewise, project development activities will support efforts to widely disseminate information about interactive radio instruction. In this report we make the following distinction between these two phases of the Radio Learning Project: information dissemination focuses on activities to inform educational leaders about interactive radio instruction; project development concentrates on those activities designed to target specific countries where we believe a new radio project might be possible. We also include under project development the creation of materials designed to make the adaptation of past IRI curricula easier. Finally in this report, we comment on management issues.

The contract for the Radio Learning Project specifies many tasks to be completed. We made the decision to initially focus on project development activities, that is, those activities most likely to result in identifying new sites for IRI projects. We believe that the establishment of at least four new sites is the key component of the Radio Learning Project. This report begins with a brief description of our efforts to disseminate information about interactive radio instruction.

III. INFORMATION DISSEMINATION

Over the past twelve years, S&T/ED has demonstrated and reconfirmed the effectiveness of interactive radio instruction. Information on this new kind of educational radio has been disseminated through various professional organizations and publications. The Radio Learning Project will greatly increase the dissemination efforts. Our goals are to:

- inform educational leaders around the world about IRI programs and methodology
- describe how IRI can address urgent problems of quality of education, access to schools, and equity of educational opportunity.
- describe how this technology can be implemented

A. What we are disseminating

At the inception of the project, there was considerable discussion about the focus of the dissemination efforts. Our first priority was to adapt existing IRI curricula for use in new countries; however, we also realized that the success of the earlier projects derived from a methodology that could be adapted to new subjects and different audiences as well. Focusing on the latter approach would provide a wider potential audience, yet the lack of specificity might make "marketing our product" more difficult and introduce us to applications where we would not be sufficiently knowledgeable.

We decided to focus our attention where we have the most expertise -- the basic primary school subjects of reading, writing and mathematics, plus English as a second language and science. However, we also decided to keep open the possibility of responding to requests to use interactive radio instruction with new subjects and audiences.

B. Developing a promotional strategy

We hired Terry Baugh, a marketing consultant, for a few days to help us develop a promotional strategy. Her report included the following: promotion goals, target audiences, problems and opportunities, product, price, and promotion strategies. The main conclusions of her report are:

1. We need to build awareness and credibility of the benefits of IRI among AID missions and educational policy makers within the first year of the contract. The primary target audience is USAID; secondary audiences are educational leaders in AID-eligible countries, broadcast decision makers, and development planners in instructional radio.
2. The problems facing the Radio Learning Project include: a commitment among many educators to the traditional educational system in which priorities are teacher training and textbooks; lack of

understanding of the capabilities of interactive instructional radio; reluctance to use products developed in other countries; education not a high priority with AID; and the add-on cost of a radio project and the general shortage of funds.

3. There is, however, much to support new IRI activities: the Radio Learning Project does have funds for promoting the advantages of IRI and to initiate new projects; the technology can work within or outside of the formal school system; the programs support teachers; teachers respond favorably to IRI; there is a record of proven access; and there are "products" or existing curricula that can be adapted for use in new settings.
4. The cost for a new project is high, yet there are strategies to deal with this issue: we can target countries where modification of existing material would be minimal; we can seek additional funding sources such as the World Bank, corporations and foundations; and, we can promote cooperative ventures with other international

Specific promotional strategies can include the following:

- Identification of target countries most likely to be interested in a radio project based on previous interest by the country or USAID mission
- Determination of barriers to acceptance of radio programs in target countries
- Development of promotional tools that are easy to understand and will excite people. Materials might include a generic folder on IRI topics, a flip chart presentation, video tapes, the publication of articles, presentation at conferences, and a newsletter. We could also collaborate with other S&T/ED sponsored projects.

C. Efforts to promote IRI

Based on discussions with Terry Baugh and others, recommendations from our Advisory Committee, and our own work as presented in the original proposal, we completed the following activities to promote interactive radio

1. We sent a cable describing the Radio Learning Project to all AID missions. The cable was followed by a packet of materials describing IRI and the Radio Learning Project.
2. We have collaborated with other S&T/ED sponsored projects including IEES, BRIDGES, CSP, and RADECO. Our work with IEES has been particularly important.
3. We identified and initiated contact with specific countries and individuals who we thought would be particularly supportive of interactive radio instruction.

4. We have established contacts with other international organizations including the World Bank, the Voice of America, the Organization of American States, and URTNA (Union of National Radio and Television Organizations of Africa).
5. We have given presentations at several conferences and retreats including the World Bank, the CIES Annual conference in Toronto, Canada; the Annual IMTEC Seminar entitled this year "The Quality of Teaching in Lesser Developed Countries: Alternative Models" in Bali, Indonesia; and the World Congress on Education and Technology in Vancouver, Canada. A complete list of the presentations is presented on page 10.
6. We have developed materials including a video tape, audio tape, brochure, technical briefs, and a report in the format of a newsletter.
7. We have identified approximately 300 individuals and international organizations to form the nucleus of a worldwide network of radio educators, planners, and policy makers. We have sent to each member a packet of information about IRI and the Radio Learning
8. We have distributed special information about IRI to the USIS missions in Africa and Latin America.

D. Development of promotional materials

An important part of the past work on IRI has been the development of materials. Judy Brace, Director of the Clearinghouse for Development Communication, prepared a list of all materials available about interactive radio instruction. These materials include books, booklets, scripts, teachers' guides, worksheets, audio cassette tapes, video tapes, films, slide-tapes, and many documents.

We created a conceptual framework for placing all existing materials and those that need to be created. This framework assumes that there is need for materials for people with different levels of interest and background about interactive radio instruction. As Figure 1 shows, our framework has five stages ranging from basic promotion of IRI to in-depth information. At the first stage, the assumed audience knows little or nothing about IRI or the Radio Learning Project. By the last stage, we assume people know much about IRI and need detailed information on how IRI works, and what would be involved in adapting the IRI model to new settings. The attached chart also shows that the materials are divided among audio-visual, print, and audio formats. The status of materials development is as follows:

1. Video-tape (Stage 1/Audio-visual) - The first version of an introductory tape was created. This nineteen-minute, low-cost tape was a compilation of segments from tapes of the three previous IRI projects -- Radio Mathematics, Radio Language Arts Project (RLAP), and Radio-Assisted Community Basic Education Project

Audio-Visual

Print

Audio

| | | | | |
|---|-----------|--|---|--|
| <p>Promote</p>  | 1st Stage | <ul style="list-style-type: none"> • 19 minute overview* | <ul style="list-style-type: none"> • 8 fold brochure on Radio Learning Project* | <ul style="list-style-type: none"> • 9 minute overview of Interactive Radio Instruction and the Radio Learning Project* |
| | 2nd Stage | <ul style="list-style-type: none"> • 20 minute films/videos on each project with brochures | <ul style="list-style-type: none"> • Outline for standardized face-to-face presentations* • Newsletter* | <ul style="list-style-type: none"> • 18 minute, narrated, selected samples of RLAP to demonstrate interactive methods** |
| | 3rd Stage | <ul style="list-style-type: none"> • 14 minute segments of classroom activities of Radio Math and RLAP Projects* | <ul style="list-style-type: none"> • Technical briefs and pamphlets on the following topics* • Why Radio? • Teaching Mathematics by Radio • Teaching Reading by Radio • Interactive Radio & Student Achievement • Why Interactive Radio Lessons are effective • Radio Language-Arts Program (RLAP)*** • Radio-Assisted Community Basic Education Program (RADECO)**** • Costs*** | <ul style="list-style-type: none"> • Full-length, sample lessons, each project |
| | 4th Stage | <ul style="list-style-type: none"> • Slide/Tape or Video -- "What Makes Interactive Radio Instruction Work"***** | <ul style="list-style-type: none"> • How-to modules on project implementation • Scripts, teachers notes, worksheets, tests • Guides for adaptation of previous material* | |
| | 5th Stage | <ul style="list-style-type: none"> • Field Notes • Reports • Articles • Case Studies • State-of-the-Art Papers • Book***** | | |
| Inform | | | | |

* Produced by the Radio Learning Project

** Produced by the Clearinghouse on Development Communications

*** Produced by the Academy for Educational Development

**** To be Completed

Figure 1

(RADECO) -- plus a brief narrated introduction and conclusion with some titles. This tape would need to be revised, if it were to serve as an effective promotional tool. Because there are other promotional materials, it was decided not to invest more in the tape at this time.

2. Brochure (Stage 1/Print) - An attractive eight-panel brochure (Appendix A) with color photographs was created about IRI and the Radio Learning Project. Two thousand copies were printed.
3. Audio tape (Stage 1/Audio) - We produced a nine-minute audio tape that gives an introduction to IRI and states the major purposes of the Radio Learning Project. Approximately four hundred copies have been dubbed and distributed.
4. Video tapes and films (Stage 2/Audio-visual) - A film or tape was produced for each project summarizing the objectives, lessons in the classroom, and results.
5. Outline for face-to-face presentations (Stage 2/Print) - We created a brief outline (Appendix B) for people to use in making presentations about IRI.
6. Newsletter (Stage 2/Print) - The project completed its first occasional report in the form of a newsletter. The purpose of this newsletter is to provide members of our communications network with up-to-date information about IRI activities including country reports and technical advice.
7. 18-minute audio tape (Stage 2/Audio) - Under the Clearinghouse for Development Communication project, Judy Brace, the Director of the Clearinghouse, produced a tape demonstrating interactive techniques from the RLAP project. It includes a wide range of examples and explains the techniques.
8. 14-minute video tape (Stage 3/Audio-visual) - One tape was produced that includes 5 minutes of classroom scenes from the RLAP project in Kenya; the tape also includes 9 minutes total of classroom scenes from Grade 1 and Grade 2 from the Radio Mathematics Project. This video tape was created by stripping the narration from the existing video tapes of those projects and piecing together representative classroom scenes. Subtitles in English were added to the sections taken from the Radio Mathematics tape. In addition, written notes have been prepared to assist anyone using the

These tapes help people understand in just a few minutes what an IRI class is like. The tapes show the active participation of the children, the segmented approach to lesson design, and, to some extent, the role of the teacher.

9. Technical Briefs (Stage 3/Print) - We have prepared six "technical briefs" on various aspects of IRI. These materials provide a second level of detail about interactive radio and the Radio Learning Project. In addition to these briefs, AED also produced a pamphlet on the RLAP project. The materials are in Appendix D. The titles of these publications are:

"Why Radio?"
"Teaching Reading by Radio"
"Interactive Radio and Student Achievement"
"The Role of Classroom Teachers in Interactive Radio"
"Why Interactive Radio Lessons are Effective"
"Teaching Mathematics by Radio"

We have received several favorable comments on project materials and activities. Some of those responding include the National Council of Educational Research and Training in New Delhi; the English Teaching Division, USIA; Association of Educational and Training Technology; Plan International, Guayaquil, Ecuador; International Bureau of Education, UNESCO; and Accion Cultural Popular, Colombia.

Other materials are to be developed. Depending on available resources, we plan to prepare a slide-tape or video show on what makes IRI work. We also hope to prepare materials to ease the process of adapting existing IRI materials to new settings and for training specialists involved in the development of these new programs.

In addition, we have begun discussions on the preparation of a new book on IRI. An outline of the contents has been prepared, but other details, such as sponsorship, have not yet been worked out. This effort would be outside the initial scope of work of the Radio Learning Project.

E. Network

The Radio Learning Project has identified approximately 300 educational planners, broadcasters, and policy makers to form the core of an international information network. The objective of this network is to share on-going research about interactive radio instruction among key informants around the world. The focus of the effort is to engage people in considering the applicability of IRI as an important tool for addressing critical problems in

We have sent our first mailing to members of the network; the mailing included a specially designed Radio Learning folder, the new Radio Learning brochure, the 10 Years of Proven Success brochure, the new audio tape introducing IRI and the Radio Learning Project, the first issue of the newsletter (one of our periodic reports) designed to bring people up to date about IRI projects, and a letter of introduction from Tom Tilson. We anticipate a mailing

F. Coordination with other institutions

We have initiated contact with other institutions interested in instructional broadcasting. Our major contacts have been with the following

1. Voice of America (VOA)

We have worked with VOA through Harry Heintzen, Chief, International Broadcasting Training. VOA has been very supportive. They have sent to each mission in Latin America and Africa a list of all our materials plus a packet of information including a sample audio cassette tape.

2. CIESPAL

Michelle Fryer has visited the CIESPAL offices in Ecuador and worked out an agreement to co-sponsor a workshop in mid-1987 on interactive radio. The workshop would be designed for educators and broadcasters in Ecuador.

3. Union of National Radio and Television Organizations in Africa (URTNA)

Tom Tilson met Kassaye Demena, Director, URTNA Programme Exchange Center. URTNA is interested in increasing the exchange of educational programs among African nations and would like to involve the Radio Learning Project in that effort. URTNA has developed a proposal and invited us to participate. The extent of our involvement may be to jointly sponsor a workshop of instructional broadcasting in Africa.

4. Organization of American States (OAS)

We have had contacts with OAS through Osvaldo Kreimer, Chief, Communication for Education, Department of Education Affairs. We submitted to OAS an abstract of the major IRI publications which will be included in the bibliography they distribute. OAS has expressed an interest in supporting IRI activities through small grants. They have also expressed an interest in participating in the workshop we are planning with CIESPAL.

5. Futures Group

Tom Tilson visited the Futures Group to talk about their computer simulation models: the Demographic Projection Model; the Education Simulation Model; and the Manpower Planning Model.

G. Conferences

Presentations on the Radio Learning Project and IRI were made at the following meetings:

- IEES conference, Botswana - November, 1985
- OAS meeting, Washington - December, 1985
- RADECO conference, Dominican Republic - December, 1985
- World Bank retreat (exhibit only), Maryland - January, 1986
- Comparative and International Education Society (CIES) Annual Meeting, Toronto, Canada - March, 1986
- World Congress on Education and Technology, Vancouver, Canada May, 1986
- Distance Education Conference, Vancouver, Canada - May, 1986
- World Bank, Washington, D.C. - July, 1986
- Distance Learning Association meeting, Swaziland - August, 1986
- IMTEC conference, Bali, Indonesia - October, 1986
- CIES Northwest Regional meeting, Cambridge, Massachusetts - November, 1986

H. Publications

In addition to the development of the promotional materials including the technical briefs, newsletter and audio and video tapes, the project prepared several short articles for internal use:

- Teacher Training by Radio
- Hypotheses on changing effect size for Radio Mathematics
- Using textbooks with the Radio Mathematics programs
- Impact of eliminating teachers' guides from the second grade Radio Mathematics lessons
- Situations in which audio cassettes might be a better delivery option than radio

I. Orientation and Promotional Meetings

AED sponsored several orientation and promotional meetings on IRI for groups and individuals visiting the Academy. Groups included:

- Latin American higher education specialists
- European English inspectors
- Cornell University summer program in development communication
- Voice of America broadcast journalists workshop

- Kenya Institute of Mass Communication seminar

Individuals included:

- Kenneth Noyau, Chairman of Mauritius Broadcasting Corporation
- Ivan Williams, Director of Distance Education at the University of the South Pacific, Fiji
- Eduardo Gonzales, Bishops' Committee on Education, Bolivian Catholic Church
- Danielle Friedenbergl doing research at the World Bank on radio project

EDC also hosted several individuals including Iswer Upadhyah, Joint Secretary, Ministry of Education and Culture, Nepal.

IV. PROJECT DEVELOPMENT

The Project Development phase of the Radio Learning Project focuses on efforts to develop new field sites and activities designed to help ease the adaptation of existing IRI curricula to new sites.

A. Efforts to develop new field sites

1. Developing general guidelines

In creating guidelines for developing project sites, we have drawn upon the advice of others, especially members of our Advisory Board. Paul Spector, President of the Institute for International Research, has been particularly helpful. Some of the suggestions we have received include the following:

- We should seek to find an advocate for IRI in each country and give this person support. A local advocate can do a great deal to generate support for a new project.
- In developing a pitch to capture the imagination about IRI, we should be in a research mode of thinking; we need to try a variety of approaches and assess the responses, e.g the widening gap between the first and third worlds; the inability of closing that gap by conventional educational means; the low cost of radio intervention; the uniformity of high quality instruction, etc.
- In approaching educational leaders, we should be less of an advocate of radio as questioning whether it might be the best alternative in their situation. Listen to their ideas.

- We should specify a series of hypotheses about why people are opposed or indifferent to radio. Bring out the fears, yet also be prepared to counter the negative arguments. Be positive but reasonable.
- In negotiating a new project, we should be firm about what the host country is offering. Of particular importance is the quality of the people they are proposing to work on the project.
- In establishing a project, we should try to create support from as many interest groups as possible; generate a stake among a number of individuals in the ongoing success of the project. At the end of the AID phase, the only decision that would have to be made would be not to continue the project. We need to start as part of the system, not as a separate project.
- We should not overly emphasize the cost factors at the beginning. The perceived value of the radio project may increase as the project develops.
- The host countries should be expected to contribute to the project from the beginning.
- We should describe potential IRI projects as a way to strengthen existing programs rather than bringing in something totally new.

The Radio Learning Project has given special attention to the development of potential field sites. Whereas the information dissemination phase of the project takes a broad approach to informing educators about IRI, the project development phase focuses on specific countries where we think the mix of interest, need, and available resources might result in new projects.

The task of developing potential sites is challenging. Not only must there be a need to improve the quality of primary school education or to expand the access to primary education, but other conditions must be present as well:

- The country must place a high priority on improving primary education.
- Key decision maker: must be willing to consider alternative approaches to improving education.
- There must be a USAID mission in the country with interest in the educational sector, particularly primary education, and they must have resources available to contribute to a new effort. Given that education within AID is not the highest priority and that there is increasing pressure to reduce budgets, there are not many potential countries.

- If USAID mission resources are not available, there must be other potential donors such as the World Bank, UNICEF, or the private sector. The logistics of working out loans or grants when we do not have a representative in a country are enormous.

Thus, in contrast to the mass mailing approach that is appropriate for information dissemination, we have sought to build upon our personal knowledge about specific countries and our acquaintances with individuals who might have knowledge about potential field sites. We have drawn upon our contacts in AID as well of other S&T/ED contractors represented on our Advisory Board. Within AID/Washington, we have given particular attention to working with the regional bureaus in order to gain a better understanding of mission needs and to identify potential sites.

The following is a summary of contacts with some of the potential sites:

2. Potential sites to begin in 1987

Bolivia

The Radio Learning Project will conduct a pilot project in Bolivia during the first half of 1987. This project is supported by the AID mission and would be administered by Fe y Alegria, a Catholic organization contracted by the MOE to administer some of the public schools. The pilot project will try out first and second grade lessons from the Radio Mathematic Project developed in Nicaragua. The trial period will be for one month. The scripts of these lessons will be modified in accord with differences in the culture and language and then recorded in La Paz.

If the pilot project is judged to be successful, an implementation plan will be developed for wide implementation beginning in 1988.

The AID mission in Bolivia made a buy-in of \$9,500 to our project to enable Michelle Fryer to work in Bolivia to design a proposal for a radio project. The buy-in for the pilot project is expected to be about \$60,000.

Honduras

The mission has completed a Project Paper for a large educational project. A major component of that effort is an Educational Media Project consisting of an IRI activity for teaching math and reading. Other components include print media and social marketing, both of which have as a goal the support of IRI activities. The AID mission has decided to buy into the Radio Learning Project to provide the technical assistance for these activities. Final negotiations should be completed in early 1987. The total amount of

the buy-in is expected to be about \$2,000,000.

This project is unique in terms of previous IRI projects because it is being administered by a PVO called AVANCE rather than the Ministry of Education. The MIOE endorses the effort, but it will be up to the project to convince teachers to use the radio programs. Thus, an important component of the project will be to market the programs to communities and teachers. One idea is to develop a "kit" possibly consisting of a radio, instructional materials, and a subscription to El Agricultor, the popular newspaper produced by AVANCE. This kit would be subsidized.

Jamey Friend and Dave Edgerton both worked with the mission in designing the Project Paper. Tom Tilson also visited the mission to work on the details of the PIO/T.

The Chief of Party is expected to arrive in Honduras by April,

Lesotho

In February, 1987, twenty lessons of the RLAP program will be modified, rerecorded and tried out in five schools in Lesotho. The work is being undertaken by Phil Christensen as part of his activities under the BANFES project. Should the pilot project be successful, the English Panel there may recommend that the radio lessons for standards 1 - 3 be implemented on a national basis beginning in 1988. Funding for the implementation of the project would be through increased funding of the BANFES project.

Liberia

Liberia is considering a proposal to use radio to support the Improving the Efficiency of Learning (IEL) primary school curriculum. The radio lessons, perhaps daily 15-minute broadcasts, would support the English language curriculum by focusing on listening and speaking skills. The lessons would be based on the IEL curriculum, but would draw upon the materials of the Radio Language Arts Project which was developed in Kenya. A pilot activity is tentatively planned for mid-1987.

There is also interest in incorporating the IRI methodology in developing radio programs for teachers. These programs would provide a distance education component of the in-service training program for IEL teachers. Financing would come, in part, from the Phase II IEL project which should begin in 1987. That project already includes the use of radio for teacher training.

An interactive radio project would benefit from the new facilities, including broadcasting studios and three rural transmitters, which are part of the AID-financed Liberian Rural Communication Network (LRCN). There is a great opportunity for collaboration

between the MOE and the LRCN.

Tom Tilson paid two brief visits to Liberia as part of his trip to Somalia. On both trips he met with representatives of IEL and the LRCN projects.

Somalia

The Minister of Education has agreed to a radio project in Somalia and the project has been incorporated into the five-year plan. This action was a result of three visits by representatives of the Radio Learning Project during 1986. There has not yet been a formal agreement between the governments of Somalia and the United States, nor have the necessary local currency funds been obtained. It is hoped that both of these details will be worked out in early 1987.

The target audience of this project is the large majority of children who do not attend primary school. The MOE estimates that only 18% of primary-school age children attend school and that, in recent years, the number of children in school has been declining. The purpose of the radio project is to teach these out-of-school children reading and writing in Somali and basic mathematics. The children will meet in specially created learning groups to be

In 1987 we will collaborate with the IEES project, which is developing a program to improve the effectiveness of teachers in the formal school system, by submitting a joint proposal to the USAID mission for local currency funds.

Tom Tilson visited Somalia twice in 1986, the first time with Phil Sedlak, formerly of the RLAP project and now working on the RETT II project in Nepal. Klaus Galda, former Director of the Radio Mathematics Project, also visited Somalia late in 1986.

3. Other potential field sites

Belize

The mission has cabled interest in the RLAP materials.

Cape Verde

The Radio Learning Project sent Klaus Galda to participate on a World Bank team to design an education project. It is likely that a small pilot activity using radio will be a part of the resulting Project

Costa Rica

We asked Raul Ochoa to consult for us on opportunities for disseminating our tapes to Latin American radio stations. The most

promising response came from the Association of Radio Station Owners. They expressed considerable interest in possibly using our lessons. We will follow up in 1987.

Dominican Republic

The Ministry of Education has officially accepted the RADECO project; the project is located in new offices and the construction of a new studio is about to begin. The MOE will continue to support the existing radio communities and will draw upon the scriptwriting and radio production expertise for producing new radio programs.

The Radio Learning Project helped support the RADECO project during the last few months of 1986 when funding ran out for the AID contractor. The Radio Learning Project hired the Project Director and the Radio Producer, thus enabling a smooth transition and the completion of the remaining Grade 4 lessons.

John Helwig, former Project Director of RADECO, has inquired about the Radio Learning Project assisting with a proposed civics course for seventh graders to be offered in the Dominican Republic. Radio will be the principal medium of instruction. We will work with Helwig on this in 1987.

Egypt

Both Tom Tilson and Maurice Imhoof visited Cairo to talk with the mission about their plans for new programs in teaching English. The mission will support a needs assessment in 1987. There may be a possible role for the Radio Learning Project once new programs and priorities are established. Given the need for good English language instruction in Egypt and the existence of AID funds, we will give special attention in 1987 to developing interest in a radio

Grenada

The AID mission in Grenada expressed an interest in using radio to support their program in education. A representative of the Radio Learning Project will visit there in early 1987.

Haiti

Tom Tilson met with Barry Heyman, HRDO in Haiti. The mission's Project Paper for an education project includes a component to examine low-cost instructional alternatives, perhaps in 1988. The Radio Learning Project may be asked at that time to participate.

Indonesia

At the request of the AID mission, we sent evaluation materials on past IRI projects to Indonesia. Although it seems unlikely that a project will develop, we pursued the possibility of using radio in support of Project Pamong, and discussed the possibilities of a collaborative effort with the Institute for International Research.

Jordan

The mission cabled interest in an IRI project. Maurice Imhoof visited the mission in May and had extensive conversations with mission and Ministry of Education personnel. There seemed to be interest in using radio to support a health education curriculum starting in primary grades, but there has been no follow-up action from the Ministry.

Kenya

The RLAP has completed its work in Kenya. We have tried to offer encouragement and support for the MOE to implement the RLAP programs on a wide scale. The ministry has not shown an interest in using the materials.

Nepal

The RETT II teacher training project began to broadcast the first English lessons in mid-1986. Near the end of 1986 the mission requested that the Radio Learning Project provide two people to help evaluate that project. (At the last moment the people were sent under an IQC.) One of the two people was David Edgerton, former Project Director of RADECO. There has been more discussion about the possibility of using radio for direct instruction to children. Perhaps such an activity might be recommended as a result of the evaluation to be completed in March, 1987.

Maurice Imhoof, the AED coordinator of the Radio Learning Project, consulted for a month on the RETT II project in 1985 and will return for another month in early 1987.

Rwanda

The mission asked if we might assist their efforts in a family planning program aimed at primary and secondary schools. Although this subject is not a natural extension of IRI work to date, we will explore the possibilities with the mission.

Swaziland

The Radio Learning Project sent Peter Coombes to assess the possibilities for educational programming by the Schools

Broadcasting Service. His main recommendation was for a replication of the RLAP project. Although there seems to be substantial interest in such a project, no action is likely until at least late 1987. Esta de Fossard has been developing support for IRI through her work there on the Development Communications Project.

The Radio Learning Project also sent Phil Christensen to attend the Distance Learning Association meeting in Swaziland in August.

Yemen

Phil Christensen, former Chief of Party of the RLAP project and now with the BANFES project in Lesotho, was a member of the team to prepare the Project Paper for a major education project in Yemen. He generated interest in the use of radio. The Radio Learning Project may be asked initially to provide some assistance in designing a mathematics curriculum; some trial activity with radio

Zimbabwe

During a visit to Zimbabwe by Steve Moseley, interest was expressed for a radio project at a later date. The Minister of Education seems quite interested in a project.

The Radio Learning Project is pleased with the number of missions expressing interest in a possible IRI project. However, there remain serious financial obstacles in most places and, with the exception of Honduras, development of new projects is not yet assured in any country. The Radio Learning Project will continue to give top priority to developing new sites.

We will also give attention as funds permit to consider the application of IRI in other areas. For example, there seems to be interest in several countries for a radio-based curricula to support health education. There is also particular interest in the possibility of using radio to support inservice teacher training. In addition there is support for an ESL program designed for adults.

B. Materials to ease the adaptation process

1. Adaptation model

The Radio Learning Project will assist with the adaptation of IRI curricula and methodology to new countries. In recognition of the importance of this function, the Radio Learning Project consortium presented the first part of an adaptation model in its project proposal. The purpose of a model is to assist decision makers in determining the level of effort required to adapt an IRI curriculum to a new setting. The level of adaptation will determine the project cost, taking into account factors such as the size of the staff, the kinds of

skills required, the amount of training needed, and available facilities.

The Radio Learning Project has continued to work on an adaptation model for the mathematics, reading and ESL curricula. In each case the level of effort depends on which of the following needs to be done:

- rerecord tapes
- translate scripts
- edit scripts
- redraw worksheets
- modify the curriculum by adding or deleting some parts
- make major changes in the curriculum

Using the above factors, we have outlined for each course up to five different levels of adaptation. Within each level we have included a summary of the country characteristics that would be appropriate for that level and the kind of adaptation needed.

We have also described some of the changes needed to use the mathematics and ESL curricula with an adult audience, and asked some questions about this kind of application of IRI. For more information about the adaptation model, see Appendix E.

2. Efforts to ease the adaptation of materials

A goal of the Radio Learning Project is to ease the difficulties of adapting IRI materials. Much work has been done to make it easier to adapt the mathematics curricula to new settings. The following actions have been taken:

a. Radio Mathematics files

- All the Radio Mathematics files were reorganized and a complete year-by-year inventory of all materials was done.
- A preliminary estimate was done on the time needed to enter into the computer the Spanish scripts.
- A list was created of the materials to be copied for any other project wishing to adapt the lessons from either Spanish or English.
- A three-year scope and sequence chart of the math content was completed.
- All versions of the scripts were rewritten to ease the translation task. Scripts were reformatted to add line numbers for all the first and second grades and for third

grade to lesson 38. Segment markers were added to all the first grade scripts and 20 of the second grade scripts. Scripts were checked against outlines and corrections in the outlines were made for all the first grade lessons and 20 of the second grade lessons.

- First grade teachers' guides were translated from Spanish to English up to lesson 42. Exercise classes documents for all four grades were translated into English and accompanying notes were written for them. The second and third grade master plans were translated into English and the outlines for these grades were proofread.
- All preliminary work necessary to begin putting together the missing first grade master plan was completed.
- Work has begun on developing a computer model for generating mathematics lessons. Of particular interest is the potential application of this model to other curricula as well. The program will develop a prerequisite map for each learning objective and create a series of lessons based on the longest critical path. In generating the lessons, the program will take into consideration factors such as the number of segments in a lesson, the length of each segment, the total time of each lesson, the time delay needed or desired between segments containing specified topics, the distribution of activities and materials (oral responses, worksheets, etc.), and whether each segment is part of the radio broadcast or postbroadcast period. Once a master plan is generated by the computer, curriculum specialists can introduce changes; the program will assess the impact of those changes in terms of prerequisites and the other variables

b. Book

The Spanish translation of Producing Radio Lessons for Children by Jamesine Friend has been improved and is ready for publication.

c. Expert Lesson Planne

Extensive work was done on the design of a computer-based lesson planning program. This program is intended to aid curriculum specialists produce a well structured master plan and then automate the selection of segments to go in each lesson. Many of the additional features such as the ability to remove, add, and move segments from lessons and then show violations of the master plan should greatly enhance the program's usability. Work on the design centered around several subtasks as listed below:

- The design, implementation, and evaluation of a pilot program to determine the feasibility of the entire project.
- Extensive study of the hardware and software. Several reports were written on this work including computer compatibility, display adapter compatibility, printer compatibility, and memory and disk requirements.
- Design issues such as the user interface, screen display design, windowing routines, data structure design, low level data structure access routines, menu system, help subsystem, macro subsystem, tutorial system, master plan display, master plan creation, modification options, lessons display, lessons creation, modification options, printing options, and error handling mechanism.

C. Financial models

The potential costs for the development, implementation, and maintenance of a radio project is a major factor for a country considering this type of instructional intervention. The Radio Learning Project developed financial models to assist decision makers in making cost estimates. The first set of models is specific to the radio math curriculum, with options to modify it for other curricula. The cost modeling programs were implemented in three

1. Development

This model isolates all the costs to convert the radio math lessons to another language and culture, as well as a small amount of curriculum modification. It shows all costs associated with developing the radio lessons.

2. Dissemination

The model shows all costs incurred to run the project over several years. It allows for a gradual phase in of the student population over several years. Inflation and population growth are also taken into account in this model. It will show all costs for each year. It also gives cost breakdowns by grade and major items. The total costs per student are shown.

3. Steady State

The model shows the cost of the project at any given year after the initial dissemination. It is intended to be less complex than the "dissemination" model. It also gives cost breakdown by grade and major items. The total costs and per student costs are shown. This model is used to emphasize the attainable per student cost of the radio project.

The three models were implemented in the financial modeling computer program Javelin. As an aid to others that may wish to run the model in the more popular Lotus 123 spreadsheet software, the "steady state" model was converted to Lotus. Also a Spanish version of the Javelin "steady state" model was created.

A brief users manual was prepared. A more detailed manual is nearly complete.

Some details of each of the "development" and steady state models are given below. For printouts of the models, see Appendix

a. Details of the "development" model

The cost categories in the model are listed below. Under each heading there are many lines of detail.

- Personnel
 - Host country
 - Technical assistance
- Furniture and Equipment
 - Recording studio
 - Furniture
 - Equipment
- Operational costs
 - Office
 - Supplies for lesson preparation
 - Field trials
 - Maintenance
 - Vehicle operation
 - Other travel

The model provides total costs for each line item and each category. Total yearly costs and total cumulative costs are

b. Details of the "steady state" model

This financial model estimates the cost for maintaining a radio project once the materials have been developed and implemented on a national basis. The model has several parts:

- Assumptions about the school system

This section takes into account factors such as the number of students in each grade, the number of teachers, the number of schools, and the availability of basic furniture and supplies.

- Characteristics of the radio curricula

This section includes information about the courses such as the number of lessons per grade, the number of worksheets and sheets of paper required, the number of posters, and the days of teacher training needed.

- Assumptions about the implementation

This section focuses on factors such as the administrative personnel needed, the number of radios, the service life of the radios, the life of posters and teachers' guides, and the life of the radio lessons before

- Estimated prices

The final section on data includes the costs of materials such as radios, batteries, and paper; salaries of administrators; cost of printing; and cost to deliver the materials.

The program calculates the total annual cost for each factor such as worksheets, radios, and power supply. The program also calculates the annual per student cost for each item.

D. Computer Utility Programs

A small auxiliary program was written for the Wicat computer that estimates the broadcast time for scripts by counting the number of words in actors' lines, multiplying by the estimated speed of speech, and adding time specified for student responses and for musical interludes.

A small script formatting program was prepared to aid in changing the width of the scripts.

E. Evaluation of new projects

The Radio Learning Project has considered alternative approaches to evaluating new radio projects. Dean Jamison of the World Bank and Robert Hornik of the Annenberg School of Communications have participated in the discussions. A summary of our evaluation plans is presented below. For more detailed information, see Appendix G.

The evaluation efforts will be on a smaller scale than past IRI projects. We know the IRI curricula are effective. Thus, we need not duplicate some of the earlier studies that have used elaborate experimental designs and sophisticated statistical procedures to compensate for confounding variables.

We will use an integrated approach; that is, the evaluation will be planned and carried out from a central location so that one evaluation expert

can plan all studies and travel regularly to each site to oversee the collection of data. We will try to find or develop "internationally standardized" tests that can be used in all countries.

1. Learning gains

Of primary importance in the evaluation will be the investigation of the learning gains produced by interactive radio instruction. These studies, modeled after similar evaluations in previous AID projects, will compare the test scores of students who take radio lessons with scores of students who have been given conventional instruction.

2. Cost studies

The cost of achieving the learning gains will be studied in detail. The Radio Learning Project will provide economic forecasting information for each site, using a standardized set of economic modeling programs. The Project will also carry out actual cost studies using standard forms for the ongoing collection of cost data, analyzing the results, and comparing actual incurred costs to previous cost projections.

3. Cost-effectiveness studies

In addition to determining the learning gains and establishing the costs for a radio project, we will also seek to demonstrate the relationship between the effectiveness of the programs and their costs. We will try to answer the following question: Is the added value of the programs worth the cost?

To answer this question, it is necessary to compare both the costs and the achievement gains of interactive radio to other methods of instruction, which might be conventional instruction or other interventions such as teacher training or textbooks. In making cost projections for differing interventions, similar assumptions about printing costs, delivery costs, number of students, etc. must be used. In measuring achievement gains, there are two viable alternatives. One is to use normed tests so that achievement can be measured in terms of changes in grade equivalents. The other is to use criterion-referenced tests in which the criteria are set to reflect prevailing standards of pass/fail grading. The first is a more sensitive measure and is the one we are likely to pursue in most sites. The second is more difficult and, therefore, more costly to implement; it may be carried out only in selected sites.

If funds permit, we will also carry out several other evaluation studies including the following: attitudes of teachers, teaching methods of the teachers, behaviors of children, change in teachers' knowledge, causes of dropouts, IRI management issues, audience surveys, and other studies as may be appropriate in a given country.

We would also hope to conduct longitudinal studies with children who have used the IRI curricula.

V. PROJECT MANAGEMENT

The three organizations of the consortium have worked well together. There is regular contact among the individuals within each organization responsible for the Radio Learning Project, and between EDC, the prime contractor, and Cliff Block, the Project Officer at AID/ST/ED.

The Steering Committee, comprised of officials of the three organizations of the consortium, met four times--in October, 1985; December, 1985; March, 1986; and December, 1986. These meetings provided time for focused discussion on a variety of important topics.

The Advisory Board (See Appendix H for members) held a meeting in January, 1986, attended by twenty-one people. An introduction and an overview of the Radio Learning Project were presented. Discussions were held on our promotional strategy, the development of computer models, the adaptation of radio curricula, evaluation of new projects, ways to strengthen the prospects of institutionalizing a new project, how the S&T/ED contractors might collaborate, alternative funding sources, and comments on potential countries for new sites. Of special note was the support of all participants, particularly the other S&T/ED contractors.

Communication has been improved with the use of MCI Mail. In addition, EDC prepares a weekly report for Cliff Block and the other members of the consortium. A representative from EDC is in Washington on a regular basis in order to help insure full communication with S&T/ED and with AED, one of the subcontractors.

Two aspects of financial management have been initiated. First, EDC has developed a large spreadsheet for budget planning and control. This spreadsheet takes into account the following:

- budgets for EDC, AED and Friend Dialogues
- budgets for U.S. costs, project development for each country, and project implementation for each country
- different levels of budget detail
- pipeline analysis
- mission buy-in by country
- monthly disbursement by project site and institution

The second financial management tool is a system in which each major discrete task is given a priority and an estimated budget. Based on this information, priorities are established and the work is approved for each institution. This process is particularly important given the increasingly limited funds for the project.

VI. CONCLUSION

The consortium is pleased with the results of the Project to date. The most important promotional materials have been developed. We have been in contact with all AID missions and have received a positive response from many of them. We are encouraged by the number of possibilities that may result in the development of new projects over the next six to twelve months. We are also pleased with the working relationship among the members of the consortium, the support from other S&T/ED contractors, and the communication and support from S&T/ED.

During the next year, we will give particular attention to the establishment of new projects. We also need to consider expanding the scope of our work by applying the IRI methodology to areas such as health education, teacher training, and ESL for adults. We will also complete most of the preparation work for adapting the radio curricula to new settings. In addition we will examine more carefully the possibility of new funding sources to supplement what might be available from AID missions. We will expand and support our information network and, in other ways outlined in our proposal, disseminate information about interactive radio instruction.

APPENDICES

A. The Radio Learning Project Brochure



Kurt Hein



Thomas Tilson



Thomas Tilson

**THE
RADIO
LEARNING PROJECT**
A New Approach to Teaching
Basic Primary School Skills

A Program of the:
U.S. Agency for
International
Development
Bureau for Science
and Technology
Office of Education

Services Provided by:
Education Development
Center, Inc.
Academy for
Educational
Development, Inc.
Friend Dialogues, Inc.



Thomas Tilson



RADIO LEARNING PROJECT

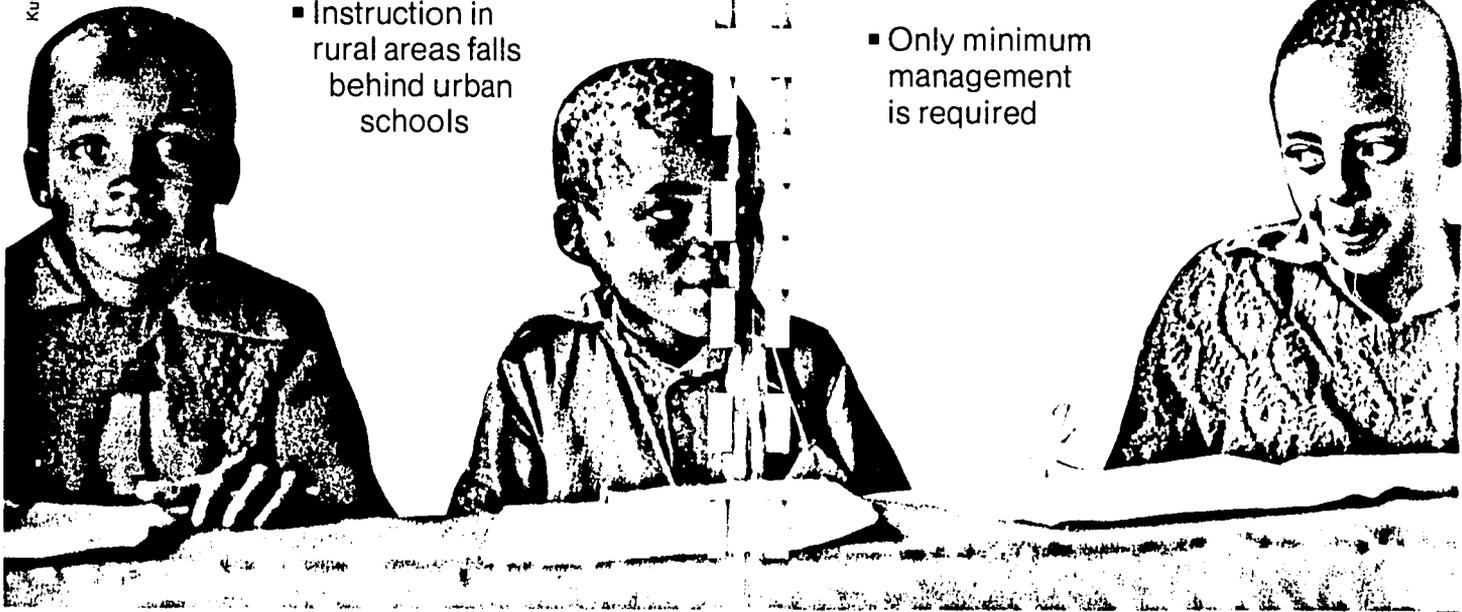
The Radio Learning Project aims to improve the teaching of basic primary school skills in developing nations through the use of interactive radio instruction.

BASIC SKILLS ARE BASIC

National development depends on a population able to read, write and compute. A strong program to teach these fundamental skills is crucial to any nation. Basic primary school skills really are basic! Interactive radio instruction addresses these educational needs where:

- Quality of instruction in basic skills is inadequate
- Instruction in rural areas falls behind urban schools

Kurt Hein



- Budgetary constraints are severe
- Textbooks are scarce

INTERACTIVE RADIO INSTRUCTION

Interactive radio instruction provides a way to teach the basic skills of reading, writing, arithmetic and more, including science and a second language. Further, this instructional approach can be used within traditional schools or in communities where there are no schools, with children or with adults. These proven curricula and methodology have shown that:

- Children learn more
- Rural and urban disparities are reduced
- Children become active learners
- Teachers welcome radio assistance
- Cost is low
- Only minimum management is required

Thomas Tilson



WHY IT WORKS

Interactive radio works because it incorporates the sound educational principles of:

- Rigorous instructional design
- Controlled introduction of new topics
- Systematic review
- Feedback to students to reinforce learning
- Fast-paced lessons, varied activities
- Active participation of students

PREVIOUS EXPERIENCES

Interactive radio has been used for more than a decade to improve the teaching of basic skills in Latin America, Africa and Asia.

- Kenya—English as a second language
- Nicaragua—mathematics
- Thailand—mathematics
- Dominican Republic—reading, writing and arithmetic in communities where there are no traditional schools
- New site—science

MATERIALS AVAILABLE

Complete sets of instructional materials are available through the Radio Learning Project. Materials include, for each of the subject areas below, the

curriculum design, all scripts, taped lessons, pupil worksheets, achievement tests and teachers' guides.

- Mathematics curriculum—
Grades 1-4
- Reading and writing curriculum—
Grades 1-4
- English as a second language—
Grades 1-3
- Science curriculum under
development

In addition, there are films on each project, evaluation studies, and other reports. The project also has computer programs available to facilitate the adaptation of the curricula and to project cost of implementation.



Peter Combes



NEW APPLICATIONS

Interactive radio instruction can be adapted to the specific needs of national educational programs. Adaptation of existing materials can be made to teach:

- In countries with different cultures, languages, and curricula
- Learners in school and out of school
- Adults as well as children

Extensive adaptation may be required to teach new subjects. Only minor changes may be necessary where curricula and cultures are similar.

SERVICES AVAILABLE

The Radio Learning Project offers special services to developing countries through A.I.D. missions. The project will:

- Provide materials on interactive radio instruction, including curricula, evaluation reports, case studies, sample lessons and video programs

- Provide specialists to:
 - discuss the feasibility of a radio project
 - conduct workshops on interactive radio instruction
 - assist with adapting the curriculum
 - assist with planning the implementation
- Provide financial resources to assist with new project activities
- Maintain an active information network among interested users, researchers and policy-makers

INQUIRIES AND REQUESTS

All inquiries, including requests for technical and financial assistance, should be directed to:

Radio Learning Project
Dr. Clifford Block
U.S. Agency for International
Development
Bureau for Science and Technology
Office of Education
Washington, DC 20523
Telephone: 703-235-9006

or

Dr. Thomas D. Tilson
Project Director
Education Development Center
55 Chapel Street
Newton, MA 02160
Telephone: 617-969-7100
Telex: 922476

B. Outline for Face-to-Face Presentations

APPENDIX B

OUTLINE FOR FACE-TO-FACE PRESENTATIONS

- I. Aims of the Radio Learning Project
 - A. Improve the teaching of basic skills
 - B. Cost-effective way to solve educational problems
 - C. Introduce new radio methodology
- II. National development and basic skills
- III. IRI helps solve educational problems
 - A. Quality of instruction is inadequate
 - B. Access to schools is limited
 - C. Inequities between rural and urban schools; male and female
 - D. Budgetary constraints are severe
 - E. Textbooks are scarce
- IV. IRI works
 - A. Children learn more
 - B. Rural and urban disparities are reduced
 - C. Children become active learners
 - D. Teachers support programs
 - E. Cost is low
 - F. Only minimum management is required
- V. 10 years experience and results
 - A. Mathematics - Nicaragua, Thailand
 - 1. Pupil gains
 - 2. Teacher acceptance
 - B. English - Kenya
 - 1. Pupil gains
 - 2. Teacher attitudes
 - C. Reading, Writing, Arithmetic - Dominican Republic
 - 1. Pupil gains
 - 2. Instruction where there are no schools
 - 3. Community acceptance
- VI. What makes it work
 - A. Rigorous instructional design
 - B. Controlled introduction of new topics

- C. Systematic review
- D. Feedback to students to reinforce learning
- E. Fast-paced lessons, varied activities
- F. Active participation of students
- G. Direct, ongoing instruction (not optional supplement)

VII. New applications

- A. In countries with different cultures, languages and curricula
- B. Learners in school and out of school
- C. Adults as well as children
- D. Other second languages

VIII. Materials available

- A. Math curriculum
- B. Reading curriculum
- C. English as a second language
- D. Science curriculum under development

IX. Services available

- A. Instructional materials
- B. Specialists
 - 1. Discuss feasibility
 - 2. Conduct workshops on IRI
 - 3. Assist adapting the curriculum
 - 4. Assist planning implementation
- C. Financial resources to assist with new project activities
- D. Maintain an active information network among users, researchers and policy makers

X. For further information contact:

- A. Dr. Clifford Block
Radio Learning Project
Bureau of Science and Technology
Office of Education
U.S. Agency for International Development
Washington, D.C. 20523
Telephone: (703) 235-9006

- B. Dr. Thomas D. Tilson, Project Director
Radio Learning Project
Education Development Center, Inc.
55 Chapel Street
Newton, MA 02160
Telephone: (617) 969-7100
Telex: 922476
Telefax: (617) 332-6405

- C. Clearinghouse on Development Communication
Academy for Educational Development
1255 23rd Street, N.W.
Washington, D.C. 20037
Telephone: (202) 862-1900
Telex: 197601

NOTE: Also available for presenters:

1. Films on each project
2. Audio Introduction to project
3. Video tapes showing classroom scenes
4. Audio tapes on methodology, with examples from lessons (under production)
5. Various reports, field notes, articles, etc.

C. Notes on Interactive Radio in the Classroom

APPENDIX C

NOTES ON INTERACTIVE RADIO IN THE CLASSROOM

The video you are about to see illustrates what we mean by interactive radio instruction. We have selected a few examples that illustrate this methodology in the teaching of English as a second language. This kind of radio instruction is characterized by frequent pupil participation in the lesson. The students respond to the radio characters once every few seconds -- seconds, not minutes -- by speaking, reading, writing, performing physical actions, and singing. This interaction between the radio, the children and the classroom teacher is one of the reasons this kind of radio instruction works.

The examples of interactive radio you are about to see are from the film **RADIO: THE INTERACTIVE TEACHER**, produced for the Agency for International Development by Iris Film & Video and the Academy for Educational Development. The children are Kenya Third Graders. All of the examples are taken from one lesson.

| Segment Description | Interactive Characteristics | Segment Length |
|---|--|----------------|
| 1. Singing: Good morning song | Gets children involved and active immediately | 1'9" |
| Listening & speaking: Going to the coast to | Provides context for introduction of new language, e.g. grandparents, grandmother, grandfather, etc. Everyday, relevant speech, but in English. Radio characters introduce and model language, ask children to respond and practice the model. Includes individual pupil responses; pupils are selected by the classroom teacher. Radio characters reinforce pupil responses, usually by repeating or confirming the correct response. In open-ended questions they may say things like, "That was good." | |
| 2. Listening & speaking: question with open-ended response | Pupil responses are not just repetition, although most are carefully guided. | 2'4" |

| | |
|--|--|
| Reading from worksheet | The radio directs the students. By third grade usually tells students where to read and how (silently or aloud). The radio reinforces correct pronunciation when reading aloud is done. |
| Spelling | Some attention to spelling is given by calling attention to particular words and having children spell aloud. The radio reinforces correct spelling while children look at the words on worksheet. |
| Silent reading from worksheets | Silent reading is emphasized for comprehension. The radio then poses comprehension questions ranging from factual to inferential. Correct answers are always given by the radio after children have a chance to answer. |
| Reading aloud | The radio directs children to read aloud, usually as a group. Reading aloud is used sparingly by the Third Grade, mostly to provide variety and to model pronunciation. |
| 3. Language context (about family) is presented by radio | The language is natural, real and relevant. Children are expected to be able to talk about families. |
| | More family terms are introduced. The radio characters become "real" people to the children. Over time their personalities are developed and the children find it natural to speak to them in English. It is the only language the radio characters speak. |
| Singing: Instructional | Most songs are both instructional and entertaining. This one reinforces the vocabulary of family members. |
| 4. Reading from the blackboard | Teachers help direct children's behavior. Reading reinforces oral work. |
| | Special linguistic features may be emphasized on board. Parallel sentence structure in this case: 1) I |

was tired, but I couldn't sleep. 2)
Although I was tired, I couldn't
sleep.

5. Listening & Speaking:
Traveling on the bus

Reinforcement of pupil responses.

Individual responses.

Children are expected to understand more language than they can speak. Radio characters, as real adults do, provide many examples of more complex language than the children are expected to produce. The children's comprehension level is much higher than their speaking or writing level. E.g. "Will the Ham-isis be able to travel by bus?" is understood by the students, but they only have to say, "Yes, they will."

6. Children play roles: (Juma walks around chair) Children give directions

Demonstrates difficult language language concepts with concrete examples.

36"

Grammatical concepts illustrated with actions and sounds.

Provides additional physical activity and participation.

7. Child gives individual response after group response

Language is modeled by radio radio characters. This is followed by group practice, then by individual responses.

10"

TOTAL: 5'24"

- D. Why Radio?
 - Teaching Reading by Radio
 - Interactive Radio and Student Achievement
 - The Role of Classroom Teachers in Interactive Radio Instruction
 - Why Interactive Radio Lessons are Effective
 - Teaching Mathematics by Radio



WHY RADIO?

Radio Learning Technical Briefs

Because radio is widespread. There are now some 5,500 radio stations in the developing world and over two hundred million receivers. Radio's effective reach, or the number of people who own and listen to radio, is also impressive. Studies in developing countries show access to radio, in the number of radio programs heard, in listening times, and in the credibility of radio as a source of information on various topics, and all studies show significant radio ownership and listenership among all social classes even in the world's poorest nations. Typically, there is no other method for providing large amounts of instruction to rural people.

Because radio instruction can establish a uniform standard of excellence. The untrained teacher may lack knowledge and skills in the content areas, for example math, science, or English. Radio can bring expert instruction into the classroom in support of the inexperienced teacher. Radio lessons can be designed and produced to take advantage of the most qualified teachers available for planning, writing, and teaching. Because of the numbers reached, more effort can be put into planning. A standardized, high-quality instructional program is then available to all students irrespective of the quality of the particular classroom teacher.

Equally important, radio can be used to pace the lessons, providing variety, enthusiasm, intensity, and structuring the sequence of learning activities. Although radio cannot adjust to the moods of individual students, it brings organization and intensity to a lesson that in the hands of an inexperienced teacher may be otherwise chaotic and ineffective.

Because radio instruction can be based on the best of educational methods. Radio programming lends itself well to the use of instructional design principles, with very clear objectives and instructionally effective techniques. Equally important, it permits programming to be tested and revised on the basis of student learning until it works. This is the design key to the success of interactive radio.

Although television has many of the instructional advantages of radio, it is far more costly to develop and broadcast lessons.

Because serious use of radio is still a novelty in most classrooms. While widely available in homes and villages, radios are not typically present in most schoolrooms. Only a few countries have regular classroom instruction by radio. Radio in the classroom still retains the attraction of novelty. Quality radio programming which is both entertaining and educational can create excitement and innovation in even the most isolated rural school. General familiarity with the technology, coupled with ease of maintenance, relative reliability of battery supplies, and the attractiveness of the medium make radio an ideal choice for classroom instruction.

Because radio can reach places where there are no schools. Basic education and information can be delivered in nonformal settings for children and adults. In the Dominican Republic, children learning by radio--but without schools--are keeping pace with their peers in schools.

Because radio can entertain and teach at the same time. During a typical radio lesson in Kenya, for example, children are asked to sing a song:

"We have done it!
We do it every day.
We have done it!
We did it yesterday.

What are we doing?
We are growing, so are you.
We are growing, growing, growing,
And we're learning English too!"

While singing, they are reinforcing an important lesson--the contrasting verb forms of do, did, are doing, and have done. The program switches immediately to a reading exercise in which pupils read from the blackboard and from their worksheets. Radio is fun but behind the entertainment is a carefully orchestrated plan for introducing new concepts, practicing new skills, and reviewing old lessons.

Most importantly, radio stimulates the children to act--talk, sing, move, think, interact with the familiar voices of the characters they come to love.

Because radio is cost-effective. Interactive radio programming requires fewer print materials and textbooks, and reduces the need to maintain cumbersome distribution systems for these materials. Teacher training, particularly in-service, can be made less costly. Quality radio lessons can provide regular orientation to teachers and headmasters in order to maximize effective use of the broadcasts.

Once radio lessons have been developed the cost per student per year is very low because the same lessons can be transmitted to thousands--even tens of thousands--of new students at minimal additional costs. In Nicaragua and Kenya this cost was determined to be between \$.40 and \$.75 per student per year.

Analyses of the Nicaragua Radio Mathematics Project further suggest that using the radio instructional program may decrease the rate at which students repeat first grade, and by implication, other grades. Calculations show that if the repetition rate decreases by only two students per classroom, the radio program pays for itself.

Because radio broadcast facilities are already available. No country on earth is without a radio station. In most developing countries, radio is considered the primary contact with urban and rural populations. Unlike other technology transfers, investments in radio programming do not require significant training on radio equipment. Emphasis can be placed immediately on program development where the largest educational pay-offs are possible.

Because teachers value the support from radio. In the classroom, teachers are familiar with radio. They feel in control and accept radio programming more willingly than other technology innovations, finding it easy to support and to supplement with their own personal instruction. In country after country, the enthusiasm of children in these classes has fueled the excitement of teachers.

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Radio Learning Technical Briefs

The Dominican Republic RADECO project addresses the problem of providing an education to the many children in that country who do not have access to public schools. Children learn by radio at informal learning centers in remote rural areas. Facilities are minimal, and volunteer paraprofessionals supervise the classes. Lessons contain instruction in mathematics, reading, writing, and some social studies and science.

Radio Lessons

The Radio Reading course, designed in the Dominican Republic, is equivalent to reading ordinarily taught in first through fourth grades. For each of the four grades there are 175 half-hour lessons, one for each day of the school year. The lessons include instruction in reading, writing, and language development. At the time the children begin in first grade, they know nothing about reading and writing--many of them have never seen a book, and most have never used a pencil and paper--so the lessons start with the most fundamental skills. At the end of fourth grade, the children read with considerable facility; evaluations of the effectiveness of the lessons show that the children in these learning centers learn as much as children in public schools even though they do not attend classes for as long each day and do not have qualified teachers.

Materials

Each radio lesson is supplemented with worksheets for the children. These contain printed letters, words, sentences, and short stories, with many illustrations. Besides providing reading practice, the worksheets also provide places for the children to write. At first, they circle drawings, copy letters, and do other simple tasks appropriate for beginners. Later they learn to write words and entire sentences from dictation, fill in blanks in incomplete sentences, and do other written activities of the sort commonly used in language classes.

Besides the individual worksheets, the project also supplies other equipment and materials to the learning centers: guides for the paraprofessional teachers, radio receivers, batteries, inexpensive blackboards, chalk, clipboards as desk substitutes, pencils, pencil sharpeners, and flags.

Methodology

The reading course teaches the children to read Spanish, which is their native tongue. As Spanish is orthographically very regular, the instruction in basic reading skills uses the "linguistic" approach in which children are taught to sound out each word rather than learn entire words by sight (as is often done in teaching reading in English and other irregular languages). Once the simple decoding skills are mastered, the children move on to the more complex tasks that constitute reading for meaning.

The course contains a strong language development component. Language development starts with the first lesson of first grade and is aimed at increasing the children's vocabulary, improving their pronunciation, increasing their grasp of grammatical structures, and improving their listening skills. The strong emphasis on oral language development is unique because most first-language reading curriculums, which are textbook centered, use reading as a means to language development. In the Radio Reading course the opposite principle is used: oral language, which is more natural for young children, especially those reared in a community with a strong oral tradition, is used to improve reading skills.

Writing

Writing, which is an important component of any reading course, is more difficult than reading to teach by radio. From the simple skills of holding a pencil correctly and forming a printed letter with the correct strokes up to the exceedingly complex skills involved in creative writing, writing can be well taught only if there is adequate help from a classroom teacher. The paraprofessionals assist in the radio lessons by providing models for the children of how to form letters, how to write from left to right, how to position words correctly on the guidelines on their paper, and so on. They also provide encouragement for children who want to go beyond the simple exercises provided by the radio, children who want to write letters to their relatives, write their own stories, and so forth.

Adaptation

Although the Radio Reading lessons used in the Dominican Republic were developed for use in a nonformal setting, they are appropriate for all children, either in nonformal classes or in conventional public schools. The Radio Reading lessons have not yet been used in conventional schools, but we anticipate that they would not only work well, but would achieve even greater learning gains because the children would have the advantage of studying under trained and experienced teachers.

The Radio Reading course is specific to Spanish and cannot be directly translated to other languages. The methodology, however, is directly transferable, especially to other orthographically regular languages. This methodology includes not just the style in which the radio lessons are written but also the steps involved in developing the content and sequence of instruction.

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The interactive radio instruction methodology has produced positive results in students' learning of mathematics, language, reading, and writing. Field tests have proven that in the formal school environment, interactive radio students outscore traditionally schooled children on achievement tests. In the nonformal environment, interactive radio students have learned the core curriculum as well as their counterparts in conventional classrooms.

Radio Mathematics

Between 1974 and 1979, the Radio Mathematics Project developed and field tested interactive radio programs for primary grades 1-4 in Nicaragua. Comparisons of posttest scores for experimental and control classes demonstrate that students in the radio classes consistently outscored students in conventional classes on tests of mathematics achievement.

Comparison of Achievement Test Mean Scores: Math

| Grade | Radio | Control |
|-------|-------|---------|
| 1 | 65.5 | 40.6 |
| 2 | 65.9 | 59.3 |
| 3 | 56.5 | 44.3 |
| 4 | 34.5 | 34.1 |

Adaptation of these radio programs in Thailand, despite the cultural and language difference, also produced significant improvements in student performance.

Radio Language Arts

From 1979 to 1985, this project adapted the interactive methodology to teach English as a second language to lower-primary students (Standards 1-3) in Kenya. Evaluations in the areas of listening, reading, speaking, and writing demonstrate that children in radio classrooms consistently outscored children in regular classrooms.

Comparison of Achievement Test Mean Scores: English

| Grade | Reading | | Listening | | Writing | | Speaking | |
|-------|---------|---------|-----------|---------|------------|---------|------------|---------|
| | Radio | Control | Radio | Control | Radio | Control | Radio | Control |
| 1 | 41.5 | 36.3 | 68.0 | 51.8 | No testing | | No testing | |
| 2 | 47.1 | 41.7 | 49.7 | 34.3 | 36.0 | 29.0 | 31.8 | 26.9 |
| 3 | 52.4 | 42.4 | 55.4 | 46.0 | 34.0 | 25.0 | 37.7 | 31.8 |

Radio-Based Primary Education (RADECO)

The Dominican Republic RADECO Project is using the interactive radio methodology to deliver basic primary education to out-of-school youth in rural communities. Results of first and second grade evaluations indicate that RADECO students are learning as much the core curriculum (mathematics, language, reading, and writing) in a daily one-hour broadcast as students are learning in conventional classes.

Comparison of Achievement Test Mean Scores: Basic Skills

| Grade | Math | | Language, Reading, Writing | | Language, Reading | | Writing | |
|-------|-------|---------|----------------------------|---------|-------------------|---------|---------|---------|
| | Radio | Control | Radio | Control | Radio | Control | Radio | Control |
| 1 | 65 | 41 | 55 | 47 | -- | -- | -- | -- |
| 2 | 70 | 53 | -- | -- | 83 | 78 | 46 | 50 |

Comparisons

Average effect-size scores for several projects involving educational innovation demonstrate radio's strong contribution.

Comparisons of Effect Sizes and Percentiles

| Program | Effect Size ¹ | Percentile ² |
|------------------------------------|--------------------------|-------------------------|
| Nicaragua Radio Math | .52 | 70th |
| Thailand Radio Math | .41 | 66th |
| Kenya Radio Language Arts | .47 | 68th |
| U.S. Computer-Assisted Instruction | .47 | 68th |
| Nicaragua Textbook | .36 | 64th |

¹Effect size is the Radio minus Control mean score over the standard deviation.
²Control students are at the 50th percentile.

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THE ROLE OF CLASSROOM TEACHERS IN INTERACTIVE RADIO INSTRUCTION

Radio Learning Technical Briefs

Teachers Are Essential

Although radio lessons are the central component of interactive radio instruction, classroom teachers play an essential role, too. They have three levels of responsibility. First, they **manage** the radio instruction, preparing materials and the classroom, especially the blackboard, before the broadcast. Second, they **co-teach** with the radio, following its cues to give directions, explanations and corrections to students during the broadcast. Third, they **extend the radio lessons** beyond the medium's limits, during the lesson with additional prompts and explanations to the children and, most important, after the broadcast during special "complementary lessons" without the radio.

Managing

The teachers' role may be somewhat different in each subject. There is also a difference between the role of a teacher using broadcasts in the formal school system and the role of the community monitor where the radio lessons are used in the nonformal setting. There are similarities in the overall design, however.

Teachers' notes or guides prepared by the staff in each interactive radio project help prepare teachers for the radio lessons. The notes summarize the lesson objectives and content, and list any necessary materials. Also, special material is included to assist teachers with specific parts of the lesson, such as words to new songs so that teachers can become familiar with the words before the songs are introduced. Teachers are guided to do some of following for each lesson:

- Make sure radio is in operating condition and tuned properly
- Bring specific objects to class, e.g. bottle caps, beans, stones for counting or marking
- Bring objects to demonstrate concepts, e.g. big, little; long, short; colors; shapes
- Distribute and collect student worksheets
- Write specific examples on the blackboard, e.g. math problems, vocabulary and sentences, the day and date
- Identify individual children to act out instructions given by the radio, e.g. "Juma, walk around the table."
- Identify groups to respond to instructions given by the radio, e.g. "Blue group, count to five."

Co-teaching

The most important role of teachers during the broadcast portion of the lesson is to assist the children. They make sure children are attentive and check comprehension of the radio instructions by observing how well the children follow along.

Where teachers are expected to participate in the lesson, the radio clearly directs them:

- o "Teacher, tell the children in mother tongue the meaning of excited."
- o "One child, where did Juma go?" The teacher calls on a child to answer.
- o "Teacher, make sure the children have their fingers on number 6."

Many other teacher-led activities facilitate learning by radio:

- o Ensure that worksheets or exercise books are ready.
- o Ensure that any other equipment necessary is in the right place, e.g. pencils, clipboards, bottlecaps.
- o Answer the radio along with the children. Participate in all the exercises.
- o Help the children sing along.
- o Monitor how well each child is progressing and provide help as needed.

Extending the Lesson

The primary vehicle for the teachers to extend the broadcasts is the complementary lessons. Activities for each complementary lesson take into account what material is covered in the radio broadcasts. They suggest what should be accomplished and how it might be achieved. Their objectives emphasize aspects of the curriculum that cannot be taught easily by the radio alone, for example:

- o Extensive practice in reading and writing.
- o Individualized assistance for slower or faster children.
- o Feedback to children on their special needs.
- o Developing classroom interrelationships for greater use of the language.

The more effective teachers are during these complementary lessons, the more the children progress beyond the bounds of the radio lesson. However, the system is designed so that even if complementary lessons are not offered at all, the radio lessons themselves offer adequate basic instruction on every part of the syllabus.

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Radio Learning Technical Briefs

The dramatic learning gains of interactive radio instruction are the result of a methodology based on important learning principles, carefully designed instruction, and effective formative evaluation during program development. Each of these three components is briefly discussed below.

Methodology

- **Active participation of children**

Children learn best when they are actively engaged in the learning process. A distinctive feature of interactive radio instruction is the active involvement of children during the lessons. The children respond every few seconds to directions or questions of the radio. They speak often; they write; they read, both aloud and silently; and they respond physically, sometimes moving their bodies, counting with their fingers, or using materials.

- **Interesting lessons**

First, the lessons stimulate lively and frequent participation. Second, the lessons are divided into short segments, each on a different topic or activity. Third, lessons include entertaining songs, physical exercises, stories, and jokes, conveyed in a language readily understood by children.

- **Distributed learning**

Skills are learned more effectively when they are distributed over many sessions. This is one reason for the segmented script organization. A new concept may be given an intensive introduction, but the development and maintenance of the topic are spread over many lessons.

- **Immediate feedback**

Learning is enhanced by immediate feedback to the learner. Typically the radio provides a stimulus (often a question), pauses for the proper number of seconds for the pupil response, then gives the appropriate answer. In the language classes, children may be asked to repeat the response again.

- **Sufficient practice**

Children need to practice skills in order to master them. Interactive radio requires intensive, sustained practice. Formative evaluation of lessons indicates when enough practice has been given.

Instructional Design

The second major factor accounting for the success of the radio lessons is the instructional design founded on principles derived from research on how children learn. The process of constructing the curriculum begins with a detailed analysis of the curriculum of the Ministry of Education. A master plan for each grade is prepared in which the material to be taught is divided into the major topics, for example, in mathematics, column addition, integer comparison, and measurement in lengths. Next, specific objectives are established for each topic. For example, in the second-grade mathematics curriculum, an objective for column addition is to add two two-digit numbers with carrying. Then, most importantly, the prerequisites for each objective are established and put into proper order. This carefully developed plan provides the basis for creating the daily lessons.

Formative Evaluation

Formative evaluation is used during the production of lessons to adapt the lessons to the ever-changing needs of the students. The rate at which the students are learning is continuously monitored so that the pace of the lessons can be adapted to the children. The amount of further practice needed by the children is determined by the results of formative evaluation, as is the speed of speech, the amount of time allowed for students' responses, etc. Thus, lessons incorporate recommendations based on classroom observation and testing.

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TEACHING MATHEMATICS BY RADIO

Radio Learning Technical Briefs

The Radio Mathematics Project in Nicaragua was the first AID-sponsored interactive radio project. From 1974 to 1978, lessons for grades 1 through 4 were developed using a highly effective methodology for teaching the core mathematics curriculum directly to children using daily radio broadcasts. The methodology was developed by instructional researchers at Stanford University. The basic instructional design that proved so fruitful in Nicaragua has subsequently been applied in other projects to teach reading and writing in Spanish, English as a second language, and science.

Needs

The Radio Mathematics Project was created in response to the need to teach primary school mathematics effectively. In many countries the primary school population is expanding dramatically, thus making it difficult to recruit and adequately train a sufficient number of primary school teachers. Also, even well-prepared teachers often have difficulty teaching mathematics and seek ways to enhance their ability to provide high quality mathematics instruction. Finally, because mathematics is a universal language, a mathematics curriculum, appropriately modified, can be used in many countries.

Lesson Format

The curriculum is divided into two parts, the radio broadcast, which ranges from 20 to 30 minutes everyday, and the postbroadcast activities, which are presented by the classroom teacher. Although the radio presents the core instructional material, the teacher has an important role during the postbroadcast period, reinforcing the broadcast material and introducing new topics not covered by the radio lesson.

Every radio lesson is divided into about 10 segments, each carefully sequenced with new and review materials. The children find the mathematics activities inherently interesting, but there are also short entertainment segments to help sustain the children's interest. The mix of new and old concepts is based on a carefully conceived and developed master plan that specifies the sequence of all learning objectives throughout the year. The children greatly enjoy the lessons because they remain actively involved, there is considerable variety of activities, and the lessons move quickly. Through constant reinforcement of correct answers by the radio, the children also gain satisfaction from their accomplishments.

67

Results

The Radio Mathematics programs dramatically increased the learning of mathematics by the children in grades one through three. The most striking difference occurred in the first grade, where the experimental group outperformed the control group by a score of 65.5% correct to 40.6%.

Adaptation

The Radio Mathematics curriculum has been adapted and used successfully in the Dominican Republic with the AID-sponsored Radio-based Community Education Project and in Thailand through a World Bank loan. In the Dominican Republic the Radio Mathematics curriculum was adapted for use in communities where there are no schools. In this setting the children come together under the direction of an adult monitor in the community to participate in a one-hour radio program each day. The children have a half-hour math lesson and another half hour of reading and writing. Evaluations show that the children in this nonformal setting learn even more mathematics than children in comparable formal schools.

In Thailand the evaluations show that in both Bangkok and the rural areas the radio students scored much higher on mathematics achievement tests than students in traditional classes. As in Nicaragua, the differences between experimental and control groups were most striking in the rural areas. It is particularly noteworthy that the radio students in the rural areas did almost as well as the traditional classes in the urban areas.

Low-cost

To keep the cost of the program low, few materials are necessary. There are teachers' guides for all grades. In grade one, children are provided a worksheet each day during most of the year. In addition, some lessons require bottlecaps or other readily available objects to help children learn basic concepts of addition and subtraction. In grade two there are a few posters, but children rely on their own notebooks for most of the work. The lessons in grades three and four do not rely on materials beyond the teachers' guides and the children's notebooks.

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E. Levels of Adaptation for Existing Interactive Radio Instruction Programs

APPENDIX E

LEVELS OF ADAPTATION FOR EXISTING INTERACTIVE RADIO INSTRUCTION PROGRAMS

A. Introduction

There are three series of IRI lessons that could be adapted to other countries:

ESL
Reading
Mathematics

The cost of adaptation of these materials will depend upon the level of effort required. For each of the three existing courses, several levels of adaptation are possible. The level of effort depends on a number of factors:

1. Tapes need to be re-recorded. We assume this will be done almost everywhere except perhaps for small pilot studies like the one conducted in Honduras to determine the suitability of the style.
2. Scripts need to be translated. Translation applies only to math, not to reading or ESL, since in both ESL and reading the content of the course is the language; any change in language implies that a completely new course need be written. Although translation itself is a major task, other large efforts, such as instructional design and complete formative evaluation, will not be needed.
3. Scripts need to be edited to make minor, non-curricular changes. These will be changes mostly in wording including:

names of cities, mountains, lakes, etc.
names of people
common foods, animals, methods of transportation, etc.
jokes, stories, riddles, etc.
songs and games
units of measure including money, length, etc.

These "editorial" changes should not affect the content or the length of scripts; no reordering of segments between lessons would be needed. Changes of this type would be necessary for all scripts, but the number of changes needed would vary somewhat. Large-scale formative evaluation would not be needed; it would suffice to field test 5-10 lessons using cassette tapes.

4. Worksheets need to be redrawn. Any time changes are made in the names of common foods, animals, etc., there will probably be a need to make corresponding changes in the worksheets. Oxen may be changed to water buffalo, pineapple palms to breadfruit trees, etc. Worksheets will need to

be field tested with a representative sample of students, but no major formative evaluation effort will be required.

5. Minor curriculum deletions are needed, not involving more than one segment every three or four lessons. This would require a careful study of the lesson outlines to determine what segments need to be deleted or changed. In order to prevent major reordering of the segments between lessons, deleted segments should be replaced with other material; this can be additional instruction (if it does not damage the sequence) but is more likely to be "filler" materials such as songs or stories. These changes would probably involve peripheral topics; in math, for example, these might be segments on telling time, recognizing and naming geometric figures, etc. No formative evaluation will be required.
6. Minor curriculum additions are needed. In general, additional content should be added to the postbroadcast activities, not to the broadcast segments. If additional material must be added to the broadcasts, something will have to be deleted. If these additions are no more than, say, one segment every three or four lessons, then space can be made by deleting or compacting non-instructional segments (jokes, riddles, songs, physical exercises). Some formative evaluation will be needed to verify the effectiveness of the added materials but this need not be a complete, large-scale formative evaluation; simple classroom observations of the lessons affected by the changes will probably be enough.
7. Additions or deletions that require moving large numbers of segments from one lesson to another, where the added or deleted material is not closely connected to the main curricular objectives. This will require a large effort in script writing and editing, and will require substantial formative evaluation, but will not involve as much effort as changes made in core material.
8. Core material needs to be changed, either in pedagogical approach or in sequence. This will require a full scale effort involving curriculum design, writing new scripts, and major formative evaluation. The methodology used in previous projects will apply however, and some of the curriculum development tools (such as computer programs for analyzing text) may be useful.

B. Levels of adaptation for Reading Course

Level 1

Country characteristics:

- Spanish is first language of nearly all children
- Culture, geography, and economy are quite similar to Dominican Republic

Kind of adaptation needed:

- Some vocabulary items will be changed to reflect local usage
- Minor cultural and geographic changes will be made, e.g. names of cities and foods will be changed.

Level 2

Country characteristics:

- Spanish is first language of nearly all children
- Culture, geography, and economy are quite similar to Dominican Republic
- Substantial content changes are required but basic instructional design is acceptable

Kind of adaptation needed:

- A new course will be needed but the same tools and philosophy of design can be used

Level 3

Country characteristics:

- Language is not Spanish but is as phonetically regular as Spanish
- This language is spoken as a first language by nearly all children

Kind of adaptation needed:

- A new course will be needed but the design of the materials can use the same system

Level 4

Country characteristics:

- Language is Spanish
- Method of teaching reading used in existing course is not acceptable

Kind of adaptation needed:

- A new course will be needed and a new instructional design system; some of the instructional techniques and research findings will apply

Level 5

Country characteristics:

- Language is quite different from Spanish, i.e. not phonetically regular
- This language is spoken as a first language by nearly all children

Kind of adaptation needed:

- A new course will be needed and a new instructional design system

Comments: If the reading course is to be used in schools, not nonformal learning centers, we would not recommend Level 1 adaptations since the quality of existing materials is not high enough.

C. Levels of adaptation for Mathematics

Level 1

Country characteristics:

- Spanish is teaching language and first language of nearly all children
- Scope and sequence of existing lessons are acceptable

Kind of adaptation needed:

- Minor cultural changes, e.g. songs
- Minor language changes to reflect differences in places, names of foods, etc.

Level 2

Country characteristics:

- Spanish is teaching language and first language of nearly all children
- Minor curriculum changes needed, not affecting main body of instruction in numeration and arithmetic algorithms

Kind of adaptation needed:

- Small changes in sequencing or content not affecting more than 10% of lessons
- Minor cultural changes, e.g. songs
- Minor language changes to reflect differences in place names, monetary units, names of foods, etc.

Level 3

Country characteristics:

- Spanish is not the teaching language but nearly all children speak the language that is used in the classrooms
- Scope and sequence of existing lessons are acceptable

Kind of adaptation needed:

- Translation of existing scripts
- Cultural changes, e.g. songs
- Minor language changes to reflect differences in place names, monetary units, names of foods, etc.

Level 4

Country characteristics:

- Spanish is not the teaching language but nearly all children speak the teaching language that is used in the classrooms
- Minor curriculum changes needed, not affecting main body of instruction in numeration and arithmetic algorithms

Kind of adaptation needed:

- Translation of existing scripts
- Cultural changes, e.g. songs
- Minor language changes to reflect differences in place names, monetary units, names of foods, etc.
- Small changes in sequencing or content not affecting more than 10% of lessons

Level 5

Country characteristics:

- Major curriculum changes needed
- Children speak the teaching language

Kind of adaptation needed:

- Almost all scripts rewritten
- Major efforts in formative evaluation

Comments: We do not recommend the math course for countries in which the children do not speak the teaching language unless a major effort is made to incorporate instruction in the teaching language.

D. Levels of adaptation for ESL

Level 1

Country characteristics:

- English is taught as a second language in the primary grades so it can be used as a teaching language
- Scope and sequence of linguistic items are acceptable
- The country is culturally, geographically and economically similar to Kenya

Kind of adaptation needed:

- Some vocabulary items will be changed to reflect local usage
- Minor cultural and geographic changes will be made e.g. names of cities, people, and foods will be changed

Level 2

Country characteristics:

- English is taught as a second language in the primary grades so it can be used as a teaching language
- Scope and sequence of linguistic items are acceptable
- Culture, languages, geography, and economy are quite different from Kenya

Kind of adaptation needed:

- Substantial content change is required but basic instructional design is acceptable, e.g. greater attention to a single native language
- Changes could plug in as replacement segments

Level 3

Country characteristics:

- English is introduced at later stage, e.g. 4th or 7th grade
- Minor curriculum changes necessary, not affecting instructional design

Kind of adaptation needed:

- Minor changes in activities reflect interests of older learners
- Greater use of other curricular content in language lessons, e.g. health, history

Level 4

Country characteristics:

- English taught as a foreign language, i.e., not used as a medium of instruction, perhaps fewer hours
- Major curriculum changes needed, but interactive model valid and core material remains

Kind of adaptation needed:

- Almost all scripts rewritten
- Major effort in formative evaluation

Level 5

Country characteristics:

- English is taught in nonformal settings to adults
- Major curriculum changes needed, emphasis on literacy not schooling

Kind of adaptation needed:

- Almost all scripts rewritten
- Major efforts in formative evaluation

Note: A 6th level would be to teach a different language, e.g. French as a second language.

E. Adaptation of Radio Mathematics Curriculum for Adults

We know that many adults have listened to the Radio Mathematics lessons. However, if one wanted a course specifically for adults, there are some changes that could be made to make the course less childish (and possibly offensive) and to make it progress at a faster pace.

We would remove nearly all non-instructional segments taking out the songs, stories, and jokes that are obviously written for children. This would reduce the instructional time about 15 minutes per lesson so two lessons could be combined in one to cover the material faster.

Most of the content of the Radio Mathematics lessons would be suitable for adults. However, we would try to collect data on incoming skills before going too far with the adaptation. We would especially check on skills in counting, reading and writing numbers, and oral arithmetic. If the adults demonstrate knowledge of these topics, we could eliminate many segments from the first-grade lessons.

Although the content is probably suitable, for the most part, the exercise formats and types of responses may not be so suitable for adults. For example, the choral responses, which work quite well with young children who seem to derive satisfaction from answering loudly and as a group, may not be appropriate for adults listening at home. Even in nonformal listening groups, adults may not want to give oral answers. A study

would be done to test adult reaction to oral responses and to see what changes would be appropriate; in some, but not all cases, they could be changed to written responses.

It would be worthwhile to do some systematic formative evaluation, if the course would be used for a large number of adults over a period of many years. If the potential audience is quite small, it might be worth the effort to get into a serious formative evaluation.

If a country wants to develop lessons for both children and adults, we would recommend recording the lessons for children in segments to be assembled later into lessons so that the lessons for adults could be assembled from a subset of those instructional segments. Some care would need to be taken in the writing of instructional segments to be sure they were appropriate for both children and adults, e.g. don't address the students as "children".

One would need to take care with the supplementary printed materials. For first-grade math, the worksheets could simply be printed and distributed, perhaps commercially. For second grade, the adult students (if they were listening at home) would need some kind of textbook that had the same exercises the classroom teachers put on the blackboard; if adults listen in groups with a group leader then the blackboard can be used the same way it is in children's classrooms. Third and fourth grade math, as they are written now, would cause no problem since they were designed for simultaneous use with in-school and out-of-school audiences.

F. Adaptation of the ESL Curriculum for Adults

We would like to know more about how adults might respond to the interactive quality of the ESL lessons. Will they respond in groups to such activities? Will listeners at home speak aloud to a radio? For language this is a very serious question. We have based our whole approach to teaching the second language on listening and speaking skills building a base for reading and writing. We need to know whether adults will do any of this.

Although the ESL lessons are designed for kids, the radio characters are adults and children, in fact there are more adults than children. The children are members of a larger family and most of their talk is within the context of the family. This would transfer well to adult learners.

Some of the content is childish. We wouldn't want to throw it out either without some testing of what adults in developing countries will tolerate or enjoy. The songs, which are both entertaining and instructional, may be appealing to adults.

The beauty of teaching is that everyone starts with the same clean slate. The instructional content can be the same. The main thing to check would be whether activities (and some of the content) might seem demeaning to adults. In addition, the content is geared to school or academic language. Changes in the lessons to make them more directly relevant to everyday life in the community -- or at least in dealing with government officials -- could replace some of the more childish games and songs.

F. Production of Radio Mathematics Programs -- Friend Dialogues, Inc.

APPENDIX F

PRODUCTION OF RADIO MATHEMATICS PROGRAM
Prepared by Friend Dialogues, Inc.

- General note: 1. See task analysis and production schedule. This worksheet is to be used to calculate costs generated to fulfill their requirements.
2. Data can be entered for each year from 1986 to 1990.

Fill In Table To Give Data Needed To Calculate Personnel Costs

1. Fill in the Inflation Factor. (1.05 = 5% inflation/year)
The Monthly Cost used in any year will be the 1986 monthly cost adjusted by the inflation rate.
2. Monthly Cost equals one month's salary plus cost of fringe benefits, allowances & insurance. Fill in this monthly cost at 1986 rates.
3. Fill in Months Required for each year.

| Personnel Cost Data ***** | Inflation Factor | Monthly Cost As of 1986 (see 2.) |
|-----------------------------------|---------------------|--|
| Host Country Personnel | | |
| Coordinator | 1.000 | \$0 |
| Instructional Designer/Researcher | 1.000 | \$0 |
| Curriculum Assistant | 1.000 | \$0 |
| Scriptwriter | 1.000 | \$0 |
| Writer: Teachers Guides | 1.000 | \$0 |
| Lay-out Artist | 1.000 | \$0 |
| Producer/Director | 1.000 | \$0 |
| Actor | 1.000 | \$0 |
| Studio Production Technician | 1.000 | \$0 |
| Musician | 1.000 | \$0 |
| Test Designer | 1.000 | \$0 |
| Test Administrator/Data Analyst | 1.000 | \$0 |
| Psychologist | 1.000 | \$0 |
| Teacher Trainer | 1.000 | \$0 |
| Computer Technician | 1.000 | \$0 |
| Bilingual Secretary | 1.000 | \$0 |
| Secretary | 1.000 | \$0 |
| Accountant | 1.000 | \$0 |
| Janitor | 1.000 | \$0 |
| Driver | 1.000 | \$0 |
| Other | 1.000 | \$0 |
| Technical Assistance | | |
| Project Management | 1.000 | \$0 |
| Curriculum Design | 1.000 | \$0 |
| Script Writing | 1.000 | \$0 |
| Test Design & Analysis | 1.000 | \$0 |
| Anthropological Studies | 1.000 | \$0 |
| Other | 1.000 | \$0 |

Fill In Table To Provide Data Needed To Calculate Furniture & Equipment Costs

1. Fill in the Inflation Factor. (1.05 = 5% inflation/year)
The Unit Cost used in any year will be the 1986 unit cost adjusted by the inflation rate.
2. Unit Cost equals cost to buy or build one unit or set at 1986 prices. Fill in this unit cost at 1986 rates.
3. Fill in Units Required (each or sets) for each year.

| Furniture & Equipment Cost Data ***** | Inflation Factor | 1986 Unit Cost |
|--|---------------------|-------------------|
| Recording Studio | | |
| Build Studio | 1.000 | \$0 |
| Studio Equipment | 1.000 | \$0 |
| Other | 1.000 | \$0 |
| Furniture | | |
| Desk | 1.000 | \$0 |
| Desk Chair | 1.000 | \$0 |
| Visitor Chair | 1.000 | \$0 |
| Conference Table & Chairs (per set) | 1.000 | \$0 |
| Terminal Table | 1.000 | \$0 |
| File Cabinet | 1.000 | \$0 |
| Storage Cabinet | 1.000 | \$0 |
| Book Case | 1.000 | \$0 |
| Chalk Board | 1.000 | \$0 |
| Other | 1.000 | \$0 |
| Equipment | | |
| Copying Machine | 1.000 | \$0 |
| Typewriter | 1.000 | \$0 |
| Computer | 1.000 | \$0 |
| Printer | 1.000 | \$0 |
| Calculator | 1.000 | \$0 |
| Telephone | 1.000 | \$0 |
| Artist's Equipment | 1.000 | \$0 |
| Lamp | 1.000 | \$0 |
| Air Conditioner | 1.000 | \$0 |
| Camera | 1.000 | \$0 |
| Slide Projector & Screen | 1.000 | \$0 |
| Minicam and VCR | 1.000 | \$0 |
| Record Player | 1.000 | \$0 |
| Tape Duplicator (reels to cassette) | 1.000 | \$0 |
| Radio Receiver/Cassette Recorder | 1.000 | \$0 |
| Vehicle | 1.000 | \$0 |
| Other | 1.000 | \$0 |

 Fill In Table To Provide Data Needed To Calculate Operational Costs

1. Fill in the Inflation Factor. (1.05 = 5% inflation/year)
 The Monthly Cost used in any year will be the 1986 monthly cost adjusted by the inflation rate.
2. Monthly Cost equals the monthly cost for each line item. Fill in this monthly cost at 1986 prices. (Note that you can redefine Monthly Cost as Unit Cost and Months Required as Units Required as long as their product equals cost per year.)
3. Fill in Months Required for each year.

| Operational Cost Data ***** | Inflation Factor | Monthly Cost As of 1936 |
|--------------------------------------|---------------------|----------------------------|
| Office | | |
| Rent | 1.000 | \$0 |
| Utilities | 1.000 | \$0 |
| Telephone | 1.000 | \$0 |
| Supplies | 1.000 | \$0 |
| Copy Machine Supplies | 1.000 | \$0 |
| Shipping & Postage | 1.000 | \$0 |
| Other | 1.000 | \$0 |
| Supplies For Lesson Preparation | | |
| Tapes | 1.000 | \$0 |
| Paper | 1.000 | \$0 |
| Art Supplies | 1.000 | \$0 |
| Other | 1.000 | \$0 |
| Field Trials | | |
| Teacher Training (per diem & travel) | 1.000 | \$0 |
| Materials & Supplies | 1.000 | \$0 |
| Other | 1.000 | \$0 |
| Maintenance | | |
| Vehicles | 1.000 | \$0 |
| Studio Equipment | 1.000 | \$0 |
| Office Equipment | 1.000 | \$0 |
| Other | 1.000 | \$0 |
| Vehicle Operation | 1.000 | \$0 |
| Other Travel | 1.000 | \$0 |
| Other | 1.000 | \$0 |

Results Results

Personnel Costs

Host Country Personnel

Coordinator
Instructional Designer/Researcher
Curriculum Assistant
Scriptwriter
Writer: Teachers' Guides
Lay-out Artist
Producer/Director
Actor
Studio Production Technician
Musician
Test Designer
Test Administrator/Data Analyst
Psychologist
Teacher Trainer
Computer Technician
Bilingual Secretary
Secretary
Accountant
Janitor
Driver
Other

Total, Host Country Personnel Cost

Technical Assistance

Project Management
Curriculum Design
Script Writing
Test Design & Analysis
Anthropological Studies
Other

Total, Technical Assistance Cost
Total, Personnel Cost

Furniture & Equipment Costs

Recording Studio
Build Studio
Studio Equipment
Other

Total, Recording Studio Cost

Furniture

Desks
Desk Chairs
Visitor Chairs
Conference Table & Chairs
Terminal Tables
File Cabinets
Storage Cabinets
Book Cases
Chalk Boards
Other

Total, Furniture Cost

Equipment

- Copying Machines
- Typewriters
- Computers
- Printers
- Calculators
- Telephones
- Artist's Equipment
- Lamps
- Air Conditioners
- Camera
- Slide Projector & Screen
- Minicam and VCR
- Record Player
- Tape Duplicator (reels to cassette)
- Radio Receivers/Cassette Recorders
- Vehicles
- Other

Total, Equipment Cost
Total, Furniture & Equipment

Operational Costs

- Office
 - Rent
 - Utilities
 - Telephone
 - Supplies
 - Copy Machine Supplies
 - Shipping & Postage
 - Other

Total, Office Cost

- Supplies For Lesson Preparation
 - Tapes
 - Paper
 - Art Supplies
 - Other

Total, Lesson Supply Cost

- Field Trials
 - Teacher Training (per diem & travel)
 - Materials & Supplies
 - Other

Total, Field Trial Cost

- Maintenance
 - Vehicles
 - Studio Equipment
 - Office Equipment
 - Other

Total, Maintenance Cost

- Vehicle Operation
- Other Travel
- Other

Total, Operational Cost

Totals by Year

Cumulative Total

```
*****
Summary of Yearly Costs
*****
Personnel Costs
  Host Country Personnel
  Technical Assistance
Furniture & Equipment Costs
Operational Costs

      Total Yearly Costs
*****
Summary of Cumulative Costs
*****
Personnel Costs
  Host Country Personnel
  Technical Assistance
Furniture & Equipment Costs
Operational Costs

      Total Cumulative Costs
```

```
*****
```

Gr1 Gr2 Gr3

**CALCULATION OF COSTS FOR NATIONWIDE USE OF
RADIO MATHEMATICS PROGRAM**
Prepared by Friend Dialogues, Inc.

A. Fill in this table about the school system:
=====

| | Grade 1 | Grade 2 | Grade 3 |
|--|----------|---------|---------|
| Number of students in each grade | 0 | 0 | 0 |
| Number of classes per grade: | | | |
| First session per day | 0 | 0 | 0 |
| Second session per day | 0 | 0 | 0 |
| Third session per day | 0 | 0 | 0 |
| ***RECALCULATE NOW*** to show | | | |
| "Total Classes Per Grade"-----> | <u>0</u> | 0 | 0 |
| and to show | | | |
| "Average Students Per Class"-----> | 0 | 0 | 0 |
| and to show | | | |
| "Transmissions Per Day Per Grade"---> | 0 | 0 | 0 |
| Number of teachers teaching each grade | 0 | 0 | 0 |
| Total number of teachers-----> | | | 0 |
| Percent teacher turnover per year-----> | | | 0 |
| Total number of schools-----> | | | 0 |
| Percent classes that have utility power-----> | | | 0 |
| | Grade 1 | Grade 2 | Grade 3 |
| Percent students providing their own supplies: | | | |
| Paper | 0 % | 0 % | 0 |
| Pencils | 0 % | 0 % | 0 |
| Percent students who have a desk | 0 % | 0 % | 0 |
| Percent students who have a ruler | 0 % | 0 % | 0 |

B. Course requirements (change if course is modified):
=====

| | Grade 1 | Grade 2 | Grade 3 |
|--|---------|---------|---------|
| Number of lessons per grade | 151 | 175 | 165 |
| Number of pages in teacher's guide | 164 | 189 | 120 |
| Number of worksheets per student | 100 | 0 | 0 |
| Number of sheets of paper per student | 15 | 50 | 50 |
| Number of rulers per student | 1 | 1 | 1 |
| Number of three color posters per class | 0 | 12 | 0 |
| Length of lesson in minutes-----> | | | 30 |
| Days of teacher training (new teachers only)-----> | | | 1 |

C. Assumptions about implementation (review and change where needed)
=====

| | Grade 1 | Grade 2 | Grade3 |
|--|---------|---------|--------|
| Number of pencils per student | 2 | 2 | 2 |
| Clipboards per student (if no desk) | 1 | 1 | 1 |
| Distribution of administrative cost by grade in percent | 40 % | 30 % | 30 |

RECALCULATE NOW if you changed grade 1 or 2 admin. percentages.

Number of administrative personnel:

| | |
|-----------------------------|-----|
| Project administrator-----> | 1.0 |
| Other professional-----> | 1.0 |
| Clerical-----> | 2.0 |

Total number of radios assumed in use-----> 0
 (This is equal to the maximum number of classes per grade during any one transmission per day. It assumes that the radios are shared with other grades and transmission times)

If you want to change the total number of radios in use
 enter new number here--> 0

RECALCULATE NOW to show "Total Radios In Use" -----> 0
 (This is the number of radios that will be used to calculate results in this worksheet)

Use of radios in addition to actual lesson time:

| | |
|---|---|
| Minutes that radio is "on" before lesson starts-----> | 5 |
| Extra use, hours battery operation per radio per year-----> | 0 |

Service life of radios in years-----> 6

Percent of radios that will require repair each year-----> 17

Average cost of radio repair per breakdown-----> \$12.50

Life of clipboard in years-----> 3

Life of teacher's guides in years-----> 5

Life of posters in years-----> 5

Percent of tapes that will have to be reduplicated each year--> 15

D. Answer these questions about local requirements & costs:

| Program revision | Grade 1 | Grade 2 | Grade 3 |
|--|---------|---------|---------|
| What is program life (before revision) in years? | 0 | 0 | 0 |
| What is cost for periodic revision of program plus producing & buying new materials? | \$0 | \$0 | \$0 |

| Lesson transmission | Grade 1 | Grade 2 | Grade 3 |
|---|---------|---------|---------|
| What is average cost for air conditioned storage for one transmitter set of lesson tapes? | \$0 | \$0 | \$0 |
| How many transmitters will be used?-----> | | | 0 |
| What is average cost to transmit a lesson?-----> | | | \$0.00 |
| What is cost to replace (duplicate) a lesson tape?-----> | | | \$0.00 |

Radio receivers, batteries & power

RECALCULATE NOW

| | |
|---|--------|
| What do radios cost in quantities of 0 ?-----> | \$0.00 |
| How much power does each radio use in watts?-----> | 0 |
| How many hours will radio play on one set of batteries?-----> | 0 |

RECALCULATE NOW

What is cost per set of batteries
in quantities of 0 ?-----> \$0.00

What is the cost of utility power per kilowatt hour?-----> \$0.0000

Administrative and training costs

What is yearly salary of project administrator?-----> \$0

What is yearly salary of project other professional?-----> \$0

What is project clerk's yearly salary?-----> \$0

What is yearly administrative travel cost?-----> \$0

What is yearly administrative overhead (office etc.)?-----> \$0

What is average daily rate of pay for new teachers?-----> \$0.00

What is travel/per diem cost per teacher for teacher training? \$0.00

Questions continued

=====

Printing

Grade 1 Grade 2 Grade 3

RECALCULATE NOW

What is the cost per 3 color poster? \$0.00 \$0.00 \$0.00
(bought in quantities of...) 0 0 0
(posters shared by different sessions in same classroom)

What is the cost per teacher's guide? \$0.00 \$0.00 \$0.00
(bought in quantities of...) 0 0 0
(spiral bound, number of pages...) 164 189 120

What is cost per printed worksheet? \$0.0000 \$0.0000 \$0.0000
(bought in quantities of...) 0 0 0

What is the cost per ruler to print
paper rulers in quantities of 0 ?-----> \$0.0000

Supplies

RECALCULATE NOW

What is the cost per sheet of quadruled
paper in quantities of 0 ?-----> \$0.0000

What is the cost per pencil of pencils
in quantities of 0 ?-----> \$0.0000

What is the cost per clipboard
in quantities of 0 ?-----> \$0.0000

Delivery of materials to schools

RECALCULATE NOW

What is yearly per school delivery cost for batteries
in average quantities of 0 sets?-----> \$0.00
(If true, assume batteries & supplies delivered in one trip)

Average yearly quantity of other supplies to be delivered per school:
Paper (worksheets, guides etc.) 0 reams.
Pencils 0 dozen.
Clipboards 0 each.

What is yearly per school delivery cost
for other supplies in the above quantities?-----> \$0.00

NOTE: Recalculate and then read results of cost analysis below.

| E. Results ===== | Grade 1 | Grade 2 | Grade 3 |
|--|---------|---------|---------|
| Annual total program costs ----- | | | |
| Worksheets | \$0 | \$0 | \$0 |
| Paper | \$0 | \$0 | \$0 |
| Pencils | \$0 | \$0 | \$0 |
| Clipboards (annualized) | \$0 | \$0 | \$0 |
| Rulers | \$0 | \$0 | \$0 |
| Teacher training | \$0 | \$0 | \$0 |
| Teacher's guides (annualized) | \$0 | \$0 | \$0 |
| Radio receivers (annualized and averaged over shared classes) | \$0 | \$0 | \$0 |
| Maintenance of radio (averaged over shared classes) | \$0 | \$0 | \$0 |
| Power, battery | \$0 | \$0 | \$0 |
| Power, utility | \$0 | \$0 | \$0 |
| Posters, three color (annualized) | \$0 | \$0 | \$0 |
| Radio transmission | \$0 | \$0 | \$0 |
| Duplication of worn tapes | \$0 | \$0 | \$0 |
| Air conditioned storage for tapes | \$0 | \$0 | \$0 |
| Administrative & clerical salaries | \$0 | \$0 | \$0 |
| Administrative overhead (office etc.) | \$0 | \$0 | \$0 |
| Administrative travel | \$0 | \$0 | \$0 |
| Delivery of batteries | \$0 | \$0 | \$0 |
| Delivery of other materials | \$0 | \$0 | \$0 |
| Program revision (annualized) | \$0 | \$0 | \$0 |
| | ----- | ----- | ----- |
| Total program cost per year (annualized). | \$0 | \$0 | \$0 |
| Annual per student program costs ----- | | | |
| Worksheets | \$0 | \$0 | \$0 |
| Paper | \$0 | \$0 | \$0 |
| Pencils | \$0 | \$0 | \$0 |
| Clipboards (annualized) | \$0 | \$0 | \$0 |
| Rulers | \$0 | \$0 | \$0 |
| Teacher training | \$0 | \$0 | \$0 |
| Teacher's guides (annualized) | \$0 | \$0 | \$0 |
| Radio receivers (annualized and averaged over shared classes) | \$0 | \$0 | \$0 |
| Maintenance of radio (averaged over shared classes) | \$0 | \$0 | \$0 |
| Power, battery | \$0 | \$0 | \$0 |
| Power, utility | \$0 | \$0 | \$0 |
| Posters, three color (annualized) | \$0 | \$0 | \$0 |
| Radio transmission | \$0 | \$0 | \$0 |
| Duplication of worn tapes | \$0 | \$0 | \$0 |
| Air conditioned storage for tapes | \$0 | \$0 | \$0 |
| Administrative & clerical salaries | \$0 | \$0 | \$0 |
| Administrative overhead (office etc.) | \$0 | \$0 | \$0 |
| Administrative travel | \$0 | \$0 | \$0 |
| Delivery of batteries | \$0 | \$0 | \$0 |
| Delivery of other materials | \$0 | \$0 | \$0 |
| Program revision (annualized) | \$0 | \$0 | \$0 |
| | ----- | ----- | ----- |
| Total per student cost per year (annualized) | \$0 | \$0 | \$0 |

G. A Plan for the Evaluation of Interactive Radio Instruction

APPENDIX G

A PLAN FOR THE EVALUATION OF INTERACTIVE RADIO INSTRUCTION

Goals of Evaluation - In addition to helping various countries implement interactive radio instruction, the Radio Learning project will also conduct evaluations to demonstrate the effectiveness of such instruction. What we propose is an "integrated" system of evaluation, in which similar evaluation tools and methods are used in all sites to ensure comparability of the results across national boundaries.

The two main goals of the evaluation are:

an investigation of learning gains, and
an analysis of the costs of producing these gains.

The impact of interactive radio instruction on the efficiency of the school systems will be investigated by conducting studies on:

determinants of failure and repetition, and
actual and potential effects of IRI on failure rates.

Besides these major efforts, the following studies will also be undertaken in some sites:

studies of teachers' attitudes,
observational studies in the classroom,
studies of changes in teachers' knowledge,
community follow-up studies of drop-outs,
evaluations of project management, and
country-specific evaluations.

An Integrated Evaluation System - In order to ensure comparability of results between sites, the evaluation will be planned and carried out from a central location. One evaluation expert will plan all studies and travel regularly to each site to oversee the collection of data. Tests will be "internationally standardized" so that they can be used in all countries; except for language differences, the tests used in each subject will be identical. Data will be analyzed at a central facility, using identical processes.

At each site, there will be a host country evaluator in charge of all ongoing data collection efforts. This person will be trained by the Radio Learning Project evaluator who will return at regular intervals to provide follow-up training and ensure that data collection procedures are being correctly followed and are on schedule.

Testing Learning Gains - Of primary importance in the evaluation will be the investigation of the learning gains produced by interactive radio instruction. These studies will be modeled after similar evaluations done in previous AID radio projects: the basic methodology will be a comparison between the test scores of students who take radio lessons with scores of students who have been given conventional instruction. Some of the past projects have conducted elaborate studies over a period of several years, and have used sophisticated statistical procedures for compensating for confounding variables. Since the basic questions about the effectiveness of interactive radio instruction have already been answered, we do not propose to duplicate these elaborate studies. What we

propose instead is a simpler process for the collection and analysis of test data, with no more than two testing endeavors in each site, one to test classes that are receiving conventional instruction and one to test classes that are taking radio lessons. Since several grades can be tested simultaneously, the total effort involved in collecting data will be less than in previous projects. To control confounding variables such as differences in incoming abilities between the control and experimental subjects, or differences in school facilities, we suggest using the same classrooms as both experimental and control. To do this, we would test in selected classrooms before radio instruction was available and then after, thus using each classroom as its own control. This obviates the need for pretesting to show comparability of control and experimental groups.

In countries that are using adaptations of already developed radio series, such as Radio Math, English as a Second Language, and Radio Reading, we propose using tests that have already been developed for the evaluations of these subjects, with suitable modifications to make them into internationally standardized tests. One reason for proposing the development of such an international test is to achieve comparability of evaluation results across countries. But another, perhaps more important, reason is to provide a tool that will help other countries to plan for the use of interactive radio. With tests that are free of national bias, and with data from a number of sites where radio instruction has already been implemented, we will have a means of accurately predicting for a new country the learning gains that could be expected in that country if interactive radio were to be implemented. This information, together with better cost estimates, would provide a sound basis for decisions about whether to implement interactive radio instruction.

Cost Studies - Besides student learning gains, which will be measured by paper-and-pencil tests, the costs of achieving such gains will be studied in detail. The Radio Learning Project will provide economic forecasting information for each site, using a standardized set of economic modeling programs. In addition to this effort, the Project will also carry out actual cost studies, providing standard forms for the ongoing collection of cost data, analyzing the results, and comparing actual incurred costs to previous projections.

Cost-Effectiveness Studies - To show cost-effectiveness of interactive radio instruction, it is not enough to show independently that the lessons are effective and that they have low cost. What needs to be shown is that the added value is worth the cost. Because of the incomparability of dollars and test scores, the argument must sometimes be fairly complex. The simplest case to prove is when a country is considering some alternative that would be more costly and less effective than IRI; one textbook per child plus extensive teacher training plus expensive supplementary classroom equipment would be an example of a case in which the relative cost-effectiveness of IRI would be easy to show. We are not often confronted with such simple cases however so other means of determining cost-effectiveness are also needed.

A second method of determining cost-effectiveness is to show that the cost of a gain of one "unit" of learning is less with interactive radio than with conventional instruction. The unit of learning would be defined as the amount children normally learn in one year (or in one-tenth of a year). To compare learning gains on this scale, the test would need to be scored in terms of "grade equivalents", which means that the tests would need to be normed for the school population at several points during the school year including the beginning and end of the year. This measure of cost-effectiveness has two advantages: it is sensitive to small but significant changes in learning outcomes and is relatively insensitive to local idiosyncracies in promotion decisions. This method,

however, may not produce a measure of actual cost savings that could accrue to the use of interactive radio.

A third method, which is less sensitive but a better measure of actual cost savings, is to show that the use of IRI improves the efficiency of the school system enough to offset the cost of implementing it. The aspect of school efficiency that we are especially concerned with is the repetition rate. We assume that most repetition is caused by failure (an assumption that should be verified), so the variable of interest is the failure rate. It has been suggested that if the quality of instruction is high enough, the failure rate should decrease, with a resulting saving in the total cost of the educational system. What needs to be shown is that the failure rate can indeed be decreased when IRI is instituted. To pursue this line of investigation, we would need accurate data on the variables that affect the failure rate, and the effects of IRI on these variables; see details in the following section. This method is suitable only for subjects that have a substantial impact on promotion decisions; that is, the subject must be one of the basic skills -- reading, writing, or arithmetic. Because of this and because this measure is less sensitive than the "grade equivalents" method, it may not be suitable for all subjects and for all sites.

Studies of Failure and Repetition Rates - To investigate how much the failure rate changes when IRI is used, we would conduct follow-up studies of children in both control and experimental groups. At the same time children are posttested, their teachers would be asked to identify the children who will not be passed to the next grade. At the beginning of the next year, we would go into the schools again to find out how many of the children failed are now repeating the grade, how many have enrolled in the next grade, and how many dropped out. This would provide us with evidence of the direct effect of IRI on repetition rates.

Although it is logical to assume that increasing the quality of instruction would decrease the failure rate, there is some evidence that quality of instruction is used only in a relative way in teachers' pass/fail decisions. Teachers may grade "on the curve", thereby effectively maintaining a quota system. When this is true, what happens is that increasing the children's skills simply leads to higher expectation on the part of the teacher, and no consequent reduction in the failure rate. This question needs to be investigated further.

If it is true that teachers' strategies for making pass/fail decisions use only relative achievement instead of absolute standards, we can analyze the data to determine how many of the children in the experimental class would have passed had teachers' standards remained constant. To do this, we need to determine the de facto standard used by teachers in the control classes, i.e. before the advent of IRI. The method proposed for doing this would involve setting a criterion level for the posttests by using a system of analysis that minimizes "errors" in pass/fail decisions, that is, we would set the level so as to best predict teacher-made decisions. The formula we develop for predicting teacher-made decisions (prior to IRI) could incorporate other factors known to be taken into account by teachers, for instance, age and attendance. The factors would be weighted by using a linear regression with teacher decisions as the independent variable.

Note that this method, which uses a subject-specific test, determines only whether a student passes a given subject, not whether he passes the grade. Thus, we need also to consider teachers' decisions on passing to the next grade. Some subjects, such as math and reading, undoubtedly contribute greatly to this decision, whereas others, such as science and social studies, contribute much less, if at all. As a result the analysis technique suggested here is applicable only to core subjects. For other subjects that are viewed as less important, this method of analysis would not be appropriate.

ADDITIONAL STUDIES

In selected sites, certain additional studies will be undertaken. The nature of the studies to be done will depend in part upon the radio series being used and in part upon the interests of the host country.

Attitude Studies - Since teachers are a potential barrier to the use of interactive radio instruction, it is of interest to investigate the attitudes of teachers with respect to this kind of innovation. Past studies have revealed that teachers' attitudes toward the usefulness and acceptability of radio instruction change with experience; initial skepticism changes to enthusiastic support. Without expending undue effort, it would be of interest to investigate this phenomenon more in other countries. For this purpose, we will develop a general aptitude questionnaire with subject-specific addenda.

Observational Studies in the Classroom - Although test data provide the most convincing evidence about learning gains, it is also important to provide "softer" data on children's reactions to the broadcast lessons. Such data can be best obtained by classroom observation since most of the children involved are too young to be good subjects for attitude questionnaires or interviews.

Classroom observations also provide data about certain process variables -- data that can be obtained in no other way. Of interest are such variables as the working condition (or existence) of the radio receiver, the diligence of the teacher in conducting required prebroadcast activities, and the availability of needed classroom supplies.

In past projects, classroom observation has been used regularly as a part of the formative evaluation process, but has not been reported systematically as part of the summative evaluation. What we propose is to institute a more formal system of observation as part of the summative evaluation endeavor. (In some sites regular observations for the purposes of formative evaluation might also be carried out, but these would be part of the development process and would be independent of the studies suggested here as part of the summative evaluation effort.) We would plan only one study per country, and would involve a team composed of MOE personnel working with the Radio Learning Project evaluator and the Project anthropologist. Although the cooperation of the host country development team would be needed (to help identify classrooms where radio instruction is used, perhaps to provide transportation, etc.), the development team would not be used as observers to collect data for these studies.

Studies of Changes in Teachers' Knowledge - In countries where it is acceptable to test teachers, we would mount a study of changes in the teachers' knowledge of both the subject matter and pedagogy. These tests would probably be administered at the same time we were testing the children. If feasible, we would combine the test with an attitude questionnaire.

Studies of Dropouts - It is not known how much of the high dropout rate in developing countries can be attributed to failure rate. It is reasonable to assume that children who fail a grade are less likely to return to school the following year, but this hypothesis needs to be tested. If a high percentage of dropouts are directly attributable to failure, this is another aspect of school inefficiency that IRI might alleviate. To conduct such studies, we would plan to send the Project Anthropologist into selected communities to question children, teachers, and parents about the reasons for dropping out. We would also attempt some statistical analysis using data already collected for other purposes.

Evaluations of Project Management - If desired, we could carry out evaluations of project management. Aspects that deserve special attention are the production schedule, the efficacy of formative evaluation, and the methods used in compiling cost data.

Audience Surveys - In some places, radio programs that have been designed for children in school have found a fairly wide out-of-school audience. If the local government is concerned with issues of adult literacy, it would be advisable to conduct simple surveys of the size of the listening audience with some follow up studies on the perceived effects of listening to the programs at home.

Other Country-Specific Evaluations - In some countries, there may be a demand for evaluation results of other kinds than those planned by the Radio Learning Project. One country may wish to investigate parents' attitudes. Another country may wish to use their own school leaving examinations to measure learning outcomes. The Radio Learning Project evaluator will work with the host country evaluator to plan and carry out such additional studies; if needed, the analysis of these additional data will be done at the central evaluation facility.

Friend Dialogues, Inc.

April, 1986

H. Members of the Advisory Board

APPENDIX H

MEMBERS OF THE ADVISORY BOARD

| | |
|--------------------|---|
| Juan J. Gutierrez | Interamerica Research Associates, Inc. |
| Alan F. Hershfield | International University Consortium for Telecommunications in Learning |
| Robert Hornick | Annenburg School of Communications |
| John Middleton | The World Bank |
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