TEACHING ENGLISH BY RADIO

Interactive Radio In Kenya

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Interactive Radio in Kenya

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Editors

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TEACHING ENGLISH BY RADIO: INTERACTIVE RADIO IN KENYA

TABLE OF CONTENTS

Figures vi
Foreword vii
Radio Language Arts Project Staff xi
Acknowledgments xiii

PART I: CONCEPTS AND OPERATION

1. The Context for Collaboration—*Maurice Imhoof, Mary Karue* 3
2. Developing and Managing the Instructional System—*Philip Christensen* 19
3. Instructional Principles and Methods—*Philip Christensen* 49
4. Adapting a Curriculum to Radio—*Philip Sedlak* 77
5. Formative Evaluation—*Greg Owino, Maurice Imhoof* 99
6. Writing Broadcast Scripts—*David Edgerton, Margaret Ojuando, Mary Karue* 115
7. Producing Radio Lessons—*Kurt Hein, Margaret Ojuando, Mary Karue* 149

PART II: RESEARCH AND EVALUATION

8. Research Design—*Maurice Imhoof, Greg Owino* 175
9. Test Development—*John Clark* 199
10. Summary of Results—*Rebecca Oxford* 215
11. Costs and Strategies for Dissemination—*Frances Kemmerer, Jamesine Friend* 229

PART III: SUMMARY

12. Summary—*Maurice Imhoof* 249

Afterword 257
Appendix 265
Radio Instruction Materials Available 319
Film/Video Available 321
Selected Project Documents 323
Index 325

FIGURES

Page

1. Project Phases 14
2. The RLAP Instructional System in Context 19
3. Annual Broadcast Schedule 22
4. Development Timetable 29
5. RLAP Professional Field Staff 34
6. The Production Process 38
7. Radio Language Arts Production Board 40
8. Production Checklist 44
9. Summary of RLAP Instructional Principles and Methods 50
10. Pattern of Pupil Responses in Lesson 102, Standard 2 61
11. Sample Organizational Frame 80
12. RLAP Year Two Script Format 122
13. RLAP Year Three Script Format 123
14. Summative Evaluation Design for One Classroom 182
15. Tests Used at Each Standard 199
16. Test Characteristics 214
17. Tests Given by Standard, Group, and Skill Areas 217
18. Did the RLAP Teach English More Effectively than Traditional Instruction Did? 217
19. Means, Standard Deviations, and Ranges for All Students 218
20. Means, Standard Deviations, and Ranges for Normal-Progression Students 219
21. Average Benefit, Expressed in Control-Group Standard Deviations, for Radio Students Compared With Control Students 222
22. Effect Sizes and Percentiles for Several Projects Involving Educational Innovation 225
23. Percentage Correct, for each Test, by Group and Standard 226
24. Number of Schools and Classrooms in Good and Poor Reception Areas 232
25. Resource Price List 236
26. Number of Classrooms Receiving Radio Language Arts Programs: Nine-Year Plan 237
27. Number of Classrooms Receiving Radio Language Arts Programs: Six-Year Plan 238
28. Resources Required for the Nine-Year Plan 239
29. Resources Required for the Six-Year Plan 240
30. Cost per Student per Year at Full Implemenation in Kenya (in U.S. $) 241
31. Cost per Student per Year of Implementation to Schools and Students in Good Reception Areas in Kenya (in U.S. $) 242

FOREWORD

This book is the record of an ambitious innovation. The goal of the Kenya Radio Language Arts Project was to show that serious improvement is possible in the teaching of a second language in primary schools. It was to do so through radio-delivered teaching, instead of through conventional classroom instruction.

At the outset, it seemed ludicrous to some to expect that radio teaching could play the central role in language teaching which requires guided practice in speaking and writing, as well as in comprehension. That the schools of Kenya draw students speaking more than 40 different native tongues increased the skepticism.

Why then did we in AID's Science and Technology Bureau believe enough in the activity to conceive it and then support it over a five-year period? We did so because we believe that, for most developing nations, classroom radio can offer the most practical way to rapidly improve primary school instruction. Radio is a remarkably inexpensive instructional delivery medium. That fact permits more resources to be directed toward the really important work of good instructional design. Our prior experience with the Radio Mathematics Project in Nicaragua had shown that the character of radio teaching could be dramatically improved—that, in fact, the medium could carry into a classroom some of the most instructionally sophisticated techniques yet developed to teach basic intellectual skills. Testing in the mathematics project had shown extraordinary gains in learning, gains that held true even in the poorest rural schools. Could this basic methodology, grounded in recent research on student learning, be adapted from mathematics to the very different domain of language? We believed that it could. The potential outcome warranted a major research and development investment to devise and test a system that, if successful, could serve as a prototype for other nations.

The results are now in. They show important gains in student achievement, and enthusiastic acceptance by both students and teachers. Costs are low and cost-effectiveness is high. The Kenya project provides another step in the revitalization of educational radio as a central tool of educational development.

We have labeled the methodology "interactive radio instruction" to convey the active, feedback-rich nature of learning with this

approach. The interactive radio approach has now shown major student gains in nations as diverse as Kenya, Nicaragua, and Thailand, and in subjects as different as language and mathematics. A "community school" model is also successfully in operation in the Dominican Republic, teaching students late in their work day with radio classes organized by community aides.

This powerful new instructional tool is becoming available at a time when the search for improvement in primary education is gaining increased attention. While developing nations have made enormous strides in increasing educational access, both quality and efficiency have suffered. Failure, repetition, and dropout rates are astonishingly high, and many children fail to move beyond the first two or three grades. The skills of those who do complete the entire primary cycle are often below desired norms. And with population growth continuing, the prospects for improvement using conventional educational means are grim—in fact, educational quality may well decline further.

The vigorous, systematic use of instructional radio now holds promise for breaking out of this cycle of decline. Interactive radio is not designed simply to do educational radio a little bit better, but to make possible a set of new educational strategies supporting teachers in the basic school subjects, as well as reaching out to areas where fully trained teachers are not available. The approach now seems ready for wider adoption.

Now that the research and development has been done (work in science education continues), adoption of these techniques represents one of the lowest-cost interventions available.

Adoption can involve varying levels of adaptation. Some nations will wish, initially at least, to use the actual radio tapes for the entire four- to five-year primary school curricula in English, mathematics, or Spanish language training (and later in science). These are available through AID. Others will want to revise the tapes, to put them into the local language and culture or to introduce local examples. For these nations, the scripts, supporting written materials, and the underlying instructional designs are available. Still others may wish to apply the instructional principles developed through these projects to create entirely new instructional series.

There may be great potential for expanded adult education through interactive radio instruction. In countries where these programs have been broadcast, thousands of adults have become regular listeners. If combined with newspaper supplements or distribution of associated written materials, a useful tool for adult literacy and numeracy might be at hand.

Interactive radio, we believe, now stands ready to serve as a powerful tool for educational development. Radio instruction can now be used with assurance to improve teaching quality, to increase educational access, and to introduce new subject matter. The incorporation of these approaches into the mainstream of education is the next step, and we look to readers of this volume as both partners and constructive critics in this effort.

Clifford H. Block
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The Agency for International Development, in its efforts to assist in education for the rural poor, has over the years provided long-term funding for interactive radio instruction. AID project managers, from the Office of Education, Bureau for Science and Technology, conceived of these interactive radio projects and maintained the continuity of activities from Radio Mathematics to Radio Language Arts, and beyond to Radio Assisted Community Basic Education and Radio Science. Their support for, and interest in, the projects has helped to ensure success. David M. Sprague, Director, Office of Education, and Patsy Layne drew on the experience of Radio Mathematics to direct the next interactive radio effort to language teaching. Strong technical support of the project continued with Donald Foster-Gross, Ray San Giovanni, and James Hoxeng. In addition, Clifford Block and Julianne Gilmore provided helpful guidance during the Radio Language Arts Project and in preparation of this book.

A number of consultants also helped us to shape ideas and taught us how to do things. Early in the project were those who put together the Radio Mathematics Project from which we learned so much: Barbara Searle, Jamesine Friend, and Klaus Galda. Later, more specialized help in curriculum design came from Duncan Catling, Donna Catling, and Ivan Propst. Grant Henning helped to prepare the first-year summative evaluation test. Frances Kemmerer, along with Jamesine Friend, prepared the cost study for the project. Through extensive visits and work sessions, Esta de Fossard showed us how radio scripts and production could be accomplished within the resources and timeline of the project without sacrificing quality.

The Center for Applied Linguistics, as subcontractor, provided assistance primarily in research design, data collection, test development, and summative evaluation. The Center also advised on English language teaching methodology and periodically reviewed lessons and tapes. G. Richard Tucker, Allene Grognet, and JoAnn Crandall were key contributors to research design, language teaching, and general oversight; Deborah Fallows and James Dias to the sociolinguistics survey; and John Clark, John Hermansen, and Rebecca Oxford to evaluation and data analysis. Robert Hornik, Annenberg School of Communication, University of Pennsylvania, assisted in refining research questions and analysis of the results.

In Kenya, invaluable assistance was provided by educators at the Ministry of Education, the Central Bureau of Statistics, and the Kenya Institute of Education. District Education Officers in the districts where we pilot-tested radio lessons facilitated our research activities, classroom observation, testing, and filming of project classrooms. They provided the support and continuity so important in a long-term research and development project.

At the Academy, William A. Smith kept us on target and provided creative technical and management counsel. Many others contributed almost daily support and skills that enhanced the project activities and products.

Special thanks are due Claudia Chesneau for assisting the project in countless ways and in typing the manuscript. Deborah Morris turned the multi-authored text into a coherent whole. Margaret A. Lynch created the index.

Major thanks go to the teachers in project schools, who, although skeptical in the beginning, always welcomed our presence, gave us their best efforts, and ended up our most enthusiastic supporters.

Kenyan children taught us the most about interactive radio instruction. Whatever our presumptions about children and about radio, the students either confirmed or corrected them, and always guided our activities. Their sincerity and enthusiasm challenged us to do a better job than we really knew how to do. They kept us going when the obstacles seemed too great. And they came through on their achievement tests to demonstrate that radio in collaboration with kids really works. Our debt to the children is a welcome one.

PART I
CONCEPTS AND OPERATION

Underlying concepts of the Radio Language Arts Project. What we learned about how to create and judge effective radio.

CHAPTER 1
THE CONTEXT FOR COLLABORATION

Maurice Imhoof and Mary Karue

Forty children look expectantly at the radio. They have just finished singing a lively "good morning" song with the radio. To these rural Kenyan third-graders, it is perfectly natural to sing along with the radio, speak to it, and follow the instructions of their friends on the radio.

"Good morning, children," says the radio voice. The children in the classroom respond enthusiastically and wait for the next cue from the radio. They are learning English by radio, and it is time for instruction to begin.

"I hear David and Anna are going to the coast," says Safiri, one of the radio characters.

"Yes, they're going to visit their grandparents," says Tina, another character.

"Children," Safiri asks, "why are David and Anna going to the coast?"

"To visit their grandparents," the students respond loudly, in English.

The children are animated and eager although they have walked a long way from isolated rural homes to reach their school. Their modest classroom has been built by the community and is typically a dirt-floored room lit only by sunlight through small windows or the open doorway. A few handmade posters and some drawings decorate the walls. Prominent on the teacher's desk is a radio. The children sit crowded together three or four to a bench at rough desks and listen for the next question.

Tina says, "One child, where are David and Anna going?"

At the signal of a bell on the radio, the classroom teacher points to one child who stands and answers, "To the coast."

Tina reinforces the correct answer, "To the coast."

For several minutes, the students continue listening and speaking in English with the radio characters whom they have learned to know during the three years of radio instruction. During the remainder of the 30-minute English lesson, the children also read silently and answer comprehension questions posed by the radio. They read aloud, with the radio speaking the same sentences to confirm correct pronunciation and intonation. Under the direction of the radio, they begin a writing exercise which they will finish with the classroom teacher's help after the broadcast.

"Teacher," directs Safiri on the radio, "point to sentence one on the blackboard." The classroom teacher points. "Children," Safiri continues, "read sentence one aloud."

"Although I was tired, I couldn't sleep," the children read as the teacher points to each word.

The teacher, untrained and of limited English-speaking ability, works with the radio instruction, encouraging and helping during the broadcast and in complementary lessons later on. The teacher is confident and comfortable with the activities suggested by the radio.

"Although I was tired, I couldn't sleep," repeats Safiri. "Good reading, children. Now let's look at Worksheet number ten."

The children work hard at their reading. They already know that English is very important to them, even in this remote school near the shore of Lake Victoria. In grade four, the children will study all of their school subjects in English, and their success in school will depend on their ability to read their textbooks written in English.

Just when the very young children might be getting restless, Safiri suggests a game, this time some physical exercise. "Bend to the right, bend to the left. Touch your toes, touch your nose."

During the 30-minute radio lesson, only English has been used by the radio characters and by the students. The children have responded to the radio more than a hundred times during the broadcast, and they are still eager and attentive as Safiri and Tina say goodbye.

On the basis of the production of three years of broadcasts and the evaluation of pupil achievement, the Radio Language Arts Project (RLAP) can now provide evidence that radio can be used in partnership with teachers to teach basic language skills. This project further confirms the experience of an earlier project in Nicaragua, the Radio Mathematics Project, that radio is a low-cost technology that can indeed improve the quality of instruction in primary schools (Friend, Searle, and Suppes 1980).

The U.S. Agency for International Development (AID), which funded these projects, recognizes that many rural children are not receiving quality education, sometimes because of poor instruction, but often because of poor distribution of material and human resources. In looking at alternate delivery systems, AID identified radio as a potentially powerful, cost-efficient medium for reaching isolated, disadvantaged populations. Of course, radio was not itself responsible for the success of the English lessons in Kenya. But it was a tool for good instructional delivery. AID's goal in supporting further research and development in instructional radio is to test the ability of radio to assist in providing greater access to education and higher quality in teaching basic skills.

This book describes our experience in Kenya in developing a radio-based instructional system for teaching English in grades one through three. Radio was the catalyst for all our activities which included:

- Adapting the Kenyan English curriculum for use in teaching by radio
- Designing an instructional system
- Writing and producing quality radio lessons
- Using feedback from classroom observations to improve upcoming lessons
- Measuring student achievement to judge project success.

Each of these activities, and each system that these activities produced, was the result of intense collaboration among Kenyan and American institutions and individuals. This book describes the development of each of these activities and the systems they led to, and summarizes the results of teaching English to Kenyan children by radio.

Our focus is on *processes*. During the planning and development phase of the project, we often felt like explorers in unmapped territory. Although we had solid previous experience in instructional radio to build on, we had to develop a number of unique systems to launch the project and to carry it through to its educational and research objectives. Naturally we faced a number of problems in doing so. We have documented here how we solved these problems and have described at length the processes developed to carry out the work of the project. We hope that other educators can benefit from our experience by neither duplicating ineffective approaches nor recreating those already developed. Our book outlines the route which the RLAP followed in creating a workable organization for the design, development, and testing of English as a second language (ESL) radio lessons in the Kenyan context. We do not intend to suggest that these processes and the systems they produced are the only ways of organizing work or that they are the best ways, but they do represent good operational decisions that worked for us.

The remainder of this chapter describes the contexts in which the project was developed and from which the processes emerged. The most important include:

- The particular kind of instructional radio used in the project—*interactive* radio instruction
- Previous AID-funded efforts to improve education in rural areas though the use of radio
- Kenyan educational institutions, particularly those involved in radio-assisted education.

INSTRUCTIONAL RADIO CONTEXT

The radio lessons developed for teaching English in Kenya are unlike those usually associated with educational radio. They are, however, very similar in educational methodology to the Radio Mathematics lessons developed in Nicaragua and subsequently adapted for use in Thailand and the Dominican Republic. We call this particular methodology *interactive radio instruction* (IRI). IRI is the kind of educational radio described in this book.

We are not suggesting that interactive radio is the only use of radio for instruction or that IRI is completely new. Educational radio of varying kinds has been a significant innovation throughout the world. Some developing countries have been broadcasting to schools for more than 25 years. Others, through distance teaching units, have taught adults a variety of skills and information, and continue to do so. Public and private radio has effectively educated whole populations on health, agricultural, community, and family issues. Participatory radio has been a feature of two-way radio instruction in Australia and Alaska. In most cases, however, we do not know how effective these radio applications have been, since many projects have not been carefully evaluated. There is some evidence, nevertheless, even if only anecdotal, that children and adults have gained from radio instruction in the past. IRI builds on these beginnings, and goes further.

We use the term interactive radio instruction to distinguish this kind of instruction from the more conventional Schools Broadcasts in Kenya that are usually supplementary and sometimes only incidental to classroom instruction. The IRI methodology is at the core of the RLAP's development process and is described in detail in subsequent chapters. Two characteristics will illustrate, at this point, how IRI is different from other educational radio.

First, the IRI methodoloy fosters *frequent interaction* between the radio characters and the children—once every few seconds in most lessons! One of the strengths of the Radio Mathematics project was its roots in previous work in mediated instruction and the interactive techniques of computer-assisted instruction. Overcoming some of the assumed limitations of radio, IRI has discovered new ways for getting pupils to participate in their lessons. The key word: interaction.

Second, interactive radio instruction is more *intensive*. IRI carries the major instructional burden, usually by means of daily radio lessons. Radio Language Arts lessons, for example, were 30 minutes every day. Conventional Schools Broadcasts are typically only 20 to 30 minutes a week for a subject, clearly meant to supplement

the curriculum, not to be the main carrier of the curriculum. Indeed, normal language classrooms are usually not very intensive either. Observations of conventional English lessons, without radio, showed that teachers spend very little time using, *or having their pupils use*, English. Lessons were often conducted in the native language, time was wasted on tasks that could not lead to language learning, and *children were seldom asked to speak the language*. The RLAP radio lessons, on the other hand, effectively structured the 30-minute daily lessons so that children were actually involved every minute.

We have found that interactive radio instruction works. Radio, long considered a constraint in teaching language because of its apparent one-way nature, challenged the project team to go beyond those appearances in order to teach the communicative, hence interactive, nature of language itself. Interactive radio instruction represents a breakthough in educational radio and has permitted the development of lessons for teaching all language skills, with reading and writing being the most challenging to teach by radio. The significance of the IRI methodology, in the Kenya project and beyond, is fully described in subsequent chapters—designing the instructional system, adapting the curriculum, writing and producing the lessons, evaluating the lessons, and, the heart of the matter, measuring pupil achievement.

AID CONTEXT

The Radio Language Arts Project is an integral part of a program within AID's Office of Education, Bureau for Science and Technology, to develop and validate models that provide innovative solutions to educational problems through the use of modern technology—in this case radio.

Since there are newer, more glamorous media for educational assistance, why was radio selected as a delivery system for innovation? These reasons are summarized by Block *et al.* (1984).

- Radio is widespread and democratic.
- Radio is still a novelty in many classrooms.
- Radio can entertain and teach at the same time.
- Radio can establish a uniform standard of excellence.
- Radio instruction can be based on the best of educational methods.
- Radio is cost-effective.
- Radio is a familiar technology.

Recognizing the widespread availability of radio and confident

that this simple and cost-efficient technology can be used to deliver better classroom instruction, AID has committed resources over a 15-year period to test radio's use in teaching basic skills. In addition to the Radio Mathematics and Radio Language Arts projects, AID has supported a radio project (RADECO) in the Dominican Republic to provide basic education for children who live in areas where there are no schools and a Radio Science project has been developed to teach primary school science.

These efforts are in response to critical educational problems in developing countries. More than 600 million adults remain functionally illiterate in the world today. Educational opportunity is unequally distributed between urban and rural, rich and poor, male and female. Student performance in developing countries, compared to that of similar age groups in developed countries, is often low. Educational infrastructure, schools, teacher training, materials, and administration are inadequate to meet present needs. Rapid population growth is outpacing hard-earned progress. Even though more children are being educated today, the actual number of unschooled individuals increases each year in many developing countries.

The RLAP synthesizes research in the field of language and reading instruction and the experiences of previous projects using radio for instruction. It is intended to provide a model that can be adapted and used in countries that have similar educational problems. Although the project was tested in Kenya, we believe that the systems developed for teaching English as a second language can be adapted in many countries where facility in English is critical to success in schools. The lessons learned in Kenya should make easier the modification of the model necessary for use in other countries.

KENYAN EDUCATION CONTEXT

In many ways, Kenya provided an ideal setting for educational innovation and collaboration. On the one hand, the rapidly expanding educational system faced, particularly in the rural areas, some of the problems of inequity and poor quality characteristic of other developing countries. On the other hand, Kenya had a highly developed educational infrastructure, including an experienced educational media unit within the Ministry of Education, Science and Technology, and a participatory system for developing and testing new curricula, textbooks, and radio lessons. Understanding some of the basic features of Kenyan education, and reviewing the recent history of educational development, will help in examining the project activities and in judging the results of the project.

Universal Free Primary Education

Restrictions on access to education for Africans was characteristic of colonial educational policy in Kenya. Consequently at Independence, there were serious shortages of indigenous high and middle level manpower. For these and other reasons, the post-Independence government gave high priority to the expansion of educational opportunities for Africans. The government pledged to provide universal free primary education and to train Kenyans to take over all posts held by noncitizens. One of the repercussions of this pledge was that primary enrollment started to rise by about 10 percent a year.

In light of some of these educational issues facing the country, the late President Jomo Kenyatta appointed the National Committee on Educational Objectives and Policies in 1976. In its report, the Committee noted that like any other developing country, Kenya continued to experience relative shortages of the resources required to meet all national development needs. The resources the country possessed therefore had to be used to maximum benefit. The Committee recommended two things: that an educational system be developed that provided universal free primary education and that raised the quality of primary education by providing trained teachers and suitable instructional materials. With regard to technical and physical facilities, the Committee pointed out the need for the production of educational materials that were culturally relevant, reasonably inexpensive, and expeditiously delivered to those who need them—for example, to Standard 1 classes where the teachers are generally not fully trained. In addition, these teachers faced the problems of poor buildings, few or no supplementary materials, few or no textbooks, and few desks and benches for the children.

Today in Kenya, 10 years later, nearly 20 percent of school-age children still find no places in Standard 1. Kenyan schools do not have adequate classrooms or teachers to handle the demand for learning among a rapidly increasing population.

Language Policy and Implementation

The policy debate most relevant in recent years to the RLAP has concerned language use in the Kenyan multilingual environment. Current policy states that in the lower primary grades (Standards 1 to 3) English is taught as a subject and appears alongside other subjects such as mathematics, while other curriculum content is conducted in a suitable language of instruction—that is, in the area's mother tongue, in Swahili, or in English in schools with

cosmopolitan recruitment. In the lower grades, English is taught as a subject for an average of five hours per week to prepare the children for the upper primary grades (Standards 4 to 8) where educational language policy requires that English be used as the medium of instruction. At this level all the books that are used are written in English.

Although administrative structures are in place to serve educational requirements, the need for school expansion strains both economic and human resources. The percentage of untrained teachers at the primary level remains high, in some regions well above the national 45 percent average. Kenya maintains a very enlightened policy of placing its experienced primary teachers at the lower grades, but for those teachers of limited training and experience, the teaching of English is difficult. Yet for the children, English is one of the most critical skills. Continuation in school absolutely depends on it.

Kenya Institute of Education

The Kenya Institute of Education is a curriculum development and research institute which develops educational materials for radio, television, and film. The Radio Language Arts Project was housed at the Institute (KIE) and functioned in a fashion similar to other administrative units within KIE. The Kenyan RLAP professionals were regular employees of KIE under the supervision of the project Field Coordinator who reported to the Director of KIE. Although the project enjoyed more autonomy than the regular units because of its project status, the RLAP fit within the organization of KIE, and carried out its research and development in cooperation with other KIE units and under the guidance of KIE leadership, including not only the Director but the advisory committees as well. Along with other methods of addressing the problems of teaching English being studied and tested by Kenyan educators, the RLAP was seen as an important test of applied radio technology by the Kenya Institute of Education.

The original impetus for formation of the Kenya Institute of Education was the need to improve the teaching of English, science, and mathematics, and to coordinate teacher education. This need was realized most strongly by teachers in the Nairobi area, where several specialized centers were established between 1957 and 1965. In 1966 these centers were merged to form the Curriculum Development and Research Center, which later joined with the Institute of Education to eventually become KIE. KIE is administered under the

Kenya Education Act of January 1968 and is subject to the provisions of this Act.

Committees overseeing the work of KIE include a wide representation from the education community, including members from the Association of College Principals, Kenya Heads of Secondary and Primary Schools Association, Kenya National Union of Teachers, voluntary agencies, church organizations, the University of Nairobi, and the Ministry of Education (MOE), as well as other co-opted persons. The KIE Board has an Executive Committee which implements its policy decisions, and a Professional Committee, which discusses and advises on matters pertaining directly or indirectly to the professional activities of the Institute, its member institutions, and its Subject Panels.

The Subject Panels are the largest and most active of the working committees. They were formed for each content area (math, science, English, etc.) and consist of subject teachers from several schools and teacher training colleges. Their responsibility is to write, field-test, and recommend materials for the schools. The regularly held panel meetings are chaired by the Ministry Inspector of the particular subject of that panel; the Secretary of the panel is the KIE member in charge of the subject. It is important to note that, through these panels, teachers are instrumental in making decisions pertaining to the curricula in the schools, as well as making these decisions work in the classroom.

Once materials are field-tested, and revised if necessary, they are turned over to the Ministry of Education for implementation at the national level. The exception to this procedure is the implementation of non-print media; KIE actually implements the radio materials through the Educational Media Services (EMS) and therefore controls the distribution process.

Educational Media Services

Education by radio is not a new activity in Kenya. In fact, the Schools Broadcasts Service was started just before Independence in 1963, although this service was at that time the Radio Section under the Ministry of Information and Broadcasting. In late 1965, the Schools Broadcast Service became the Schools Broadcasting Division of the MOE. In 1976, the name was changed to Educational Media Services and it became a division of the Kenya Institute of Education.

This administrative ambivalence regarding instructional radio is typical of many countries. In Africa, where broadcasting is usually

highly centralized, educational broadcasting may fall under a variety of ministerial units: broadcasting, information, communication, education, etc.

In its present situation at KIE, EMS is responsible for the development and evaluation of instructional media in close cooperation with the subject matter specialists and Subject, or Curriculum, Panels. Once the curricula and the media support system are approved, EMS is in charge of gaining air time from the Voice of Kenya, developing the Schools Broadcasts schedule, and liaison with the schools. It provides educational programming to schools for the entire school day, five days a week.

The RLAP fit in under the umbrella of this EMS division, and on many occasions we relied on its advise and contacts with the Voice of Kenya, where our lessons were produced until the last few months of the project. The air time provided by VOK for the project lessons was 30 minutes, from 9:30 to 10:00 a.m., Monday through Friday, for the whole school term.

The RLAP operated as an independent section of EMS, parallel to the Radio or Film sections, but of course in cooperation with the other sections when appropriate. Although the RLAP maintained separate project status, it was expected that project activities would be integrated into the Radio section once the project ended.

Getting Started in Kenya

On September 26, 1979, the Academy for Educational Development (AED) was contracted by the Agency for International Development to develop a radio-based instructional program for teaching English—to carry out the Radio Language Arts Project. The first activity was to assist AID in selecting an African site for the project.

Not all countries are appropriate for a radio research and development project. Although the potential to address severe educational problems and disparities is tempting in many different countries, the complexity of the development phase of a project requires a supportive policy and infrastructure. This does not mean everything has to be in place, but it does mean that personnel and facilities must be available at a level that does not put the project at risk of failure. Although personnel can be, as part of a project, trained in new skills, and facilities can be augmented, to meet research and development goals cost effectively, certain equipment, organization, and people must already be in place.

To assess a country's suitability, a site selection team used the following criteria in evaluating potential sites (Imhoof 1979):

- The stated intention of host country officials to incorporate into their educational system the innovations included in this project, if they proved successful.
- The willingness of the host country to enter into partnership in the planning and operation of the project.
- The commitment of the host country to cooperate by contributing personnel and materials to the project.
- The technical capabilities of host country personnel.
- The stated intention of the appropriate host country ministries to establish, implement, and see to completion the planned operations of the project.
- The stated intention of host country education administrators and teachers who would be connected with the project to cooperate in the stated purposes of the project.
- The stated intention of the host country Ministry of Education to ensure a male-female balance of students and staff insofar as practically possible.
- The existence of a host country language arts curriculum that permits the development of a primary language arts instructional program which uses children's first language during the beginning stages and includes the skills of speaking, listening, reading, and writing, and the cognitive objectives related to literature and the nature of language.

On the basis of site visits and discussions with host country educators and AID Mission officers, Kenya was chosen as the project site. The interest in the project shown by EMS at KIE, coupled with the production facilities then being built and the experienced personnel, easily convinced the site selection team that Kenya provided a good context for the project.

Time-Line

The contract between AID and AED governed project activities and schedule. One significant feature of the contract was the

spelling out of the collaborative nature of the project. (Grant Agreement 1980)

> The Contractor and host country project staff will cooperate in developing a detailed and specific implementation plan. . . . This design will be tailored closely to the specific operational location.

Although the Radio Mathematics Project had provided a model and generated expectations for the development and research components, we also expected that all efforts would be collaborative and that the project would serve the needs of *Kenyan* education.

The contract outlines the project according to five phases, roughly corresponding to the years of the project, as shown in Figure 1.

FIGURE 1
Project Phases

Phases	Activities
1	Select site. Field project team. Develop implementation plan. Develop and pre-test instructional radio format.
2	Operational Year One: Develop, broadcast, and evaluate first year radio lessons.
3	Operational Year Two: Second trial of Year One lessons; develop, broadcast, and evaluate second year radio lessons.
4	Operational Year Three: Implement Year One and Two lessons in the Kenyan classrooms; develop, broadcast, and evaluate Year Three lessons.
5	Implement lessons for all three Standards. Collect, analyze, and disseminate summative achievement data based on the cumulative results of three years of broadcasts.

For a number of reasons, revision of the activities and of the suggested time-line was necessary. (Although there was some time slippage, the chronology remained essentially the same.) Long delays in getting a signed Project Agreement resulted in a year's delay in fielding the American team, with resultant delays in Kenyan staffing and first-year study and preparation. In addition, because the Kenyan school year coincides with the calendar year, the project

team could not prepare itself for school broadcasts in the two and a half months lead time that they had available. This delayed broadcasts until the next school year of 1982.

Essentially, however, the delays resulted in a more practical implementation plan and the development of various evaluation instruments that we feel strengthened the project. They permitted a more careful analysis of tasks and strategies for completing these tasks, a more thorough understanding of the Kenyan curriculum and schools, and a more collaborative style of decision making. Much of the discussion in subsequent chapters describes the strategies and processes we developed during this planning and early implementation stage of the project.

Staffing

The formal Project Agreement between AID/Kenya and the Government of Kenya was signed on August 14, 1980. The agreement, based on the contract between AID and AED, identified the executing agencies for the project as AED and the Kenya Institute of Education, as authorized by the Ministry of Basic Education, now the Ministry of Education, Science and Technology.

It also specified the field staff in Kenya. The staffing of the project illustrated the range of experience necessary to carry out an educational experiment of this magnitude. A larger staff, with even more varied backgrounds, would have enabled the project to accomplish other research and development goals, but the staff described briefly below were able to carry out the day-to-day work in producing, broadcasting, and evaluating 585 30-minute lessons and accompanying teacher and pupil materials.

In accordance with the agreement, AED provided a field staff of four:

- A field coordinator, whose responsibility was to coordinate site activities, including supervision of the team and liaison with KIE. This position was held by Philip Christensen whose technical training and experience was in instructional systems design and evaluation.
- Two language arts specialists, whose major responsibilities were curriculum analysis and development and materials writing. One of these positions was held by Philip Sedlak whose training and experience included linguistics and teaching English as a second language. He had previously con-

ducted linguistic field work in the coastal areas of Kenya.

The second language arts position was held for two years by Morris Cutler, a public school teacher and administrator with previous overseas experience in language arts curriculum development. Later, Cutler was replaced by David Edgerton, an experienced ESL teacher and instructional materials writer.

- A broadcaster, whose major responsibilities were development of radio lesson design and production. The broadcaster position was held for 19 months by Pamela Brooke, a children's nonformal educator and an experienced radio writer-producer. Brooke was replaced by Kurt Hein, a seasoned educational radio writer-producer with previous overseas experience in radio and development and training in educational technology for development.

The Ministry, in collaboration with the project, provided through KIE:

- Two language arts specialists, whose major responsibilities were curriculum analysis and development and materials writing. The Kenyan language arts specialists were Mary Karue and John Muitungu. Both had many years of teaching and administrative experience in the schools.
- One broadcaster, whose major responsibilities were development of radio lessons and production. The broadcaster was Margaret Ojuando, a proven radio writer-producer already working at KIE in the Educational Media Services.
- One project feedback coordinator, working with the field coordinator, to be responsible for all feedback collection, analysis, and reporting activities. This position was held by Greg Owino, previously a specialist in the evaluation unit of KIE.
- Twenty part-time formative evaluators/observers to work on formative and summative evaluation. The observers were experienced primary school teachers assigned to the educational district resource centers, who in their regular duties provided assistance to less-experienced colleagues.

> The Ministry also provided, or caused to be provided, logistical and other support, and elicited the cooperation of educational personnel within the country as necessary for execution of the project.

The project office was built by KIE specifically for the project and rented by the project. KIE also helped to recruit support staff and provided some minimal office furnishings and equipment until project materials arrived from the U.S. or were purchased locally.

When the four American team members arrived in Kenya, the process of selecting the Kenyan professional staff members was underway. From the start, two team members were assigned from KIE staff, and subsequently, a language arts specialist with experience as both a teacher and headteacher was recruited. The fourth team member was not recruited until nearly one year later. As a result, it took longer than anticipated to establish the necessary team approach to the tasks to be performed.

KIE paid the salaries of the Kenyan professional staff as part of the project agreement, but the project provided an additional small housing allowance to help in part on the relocation necessary for staff members.

Salaries of the observers also were paid by the Ministry, but the project paid travel costs in connection with project activities both in the districts where observers visited radio lessons and for periodic meetings with the project staff in Nairobi.

SUMMARY

The Radio Language Arts Project successfully demonstrated that interactive radio instruction can be adapted to teach English as a foreign language by radio. Not surprisingly, this outcome parallels the results of the Radio Mathematics Project in teaching a critical school skill to primary school children.

Student achievement clearly shows that radio learners accomplish higher scores than learners in conventional classrooms. Perhaps more importantly, children in the radio classrooms are highly attentive and participate eagerly in the English lessons. Headmasters and independent Kenyan evaluators have commented on the English language fluency of the radio students, comparing them with fifth or sixth graders in their oral language skills.

The project won the enthusiastic support of teachers, too. Although skeptical in the beginning, most teachers came to enjoy teaching with the radio and welcomed the help broadcasts provided in teaching a difficult subject.

The RLAP intended to develop a radio-based model of broad adaptability for teaching English in other countries with similar educational patterns. Though the model which evolved over the three-year effort in Kenya had its origins in Radio Mathematics, a number of newer techniques developed over the course of the project which strengthened the interactive radio instruction methodology. On the one hand, we were able to increase the amount and frequency of class participation in the lessons. On the other hand, we were able to provide more individual pupil participation by addressing single children in the classroom and asking them to speak.

Though designed for wide applicability, the RLAP was clearly influenced by the context in which it was developed and tested. The strategies worked out in day-to-day collaboration were in response to local issues, situations, and resources, within the framework of sound educational principles and effective use of radio. The processes which finally resulted through the interplay of a theoretical implementation model and the reality of Kenyan education form the major discussion of the chapters which follow.

Part II describes the results of the entire project, based largely on student achievement. It discusses the research design and the evaluation process. It tries to answer the questions: how well did you do it, and how do you know that? *Part III* provides an overall summary of the project.

REFERENCES

Block, Clifford H., *et al.* 1984. "Radio in the Classroom: Ten Years of Proven Success." Washington, D.C.: Academy for Educational Development.

Friend, Jamesine, Barbara Searle, and Patrick Suppes (Eds). 1980. *Radio Mathematics in Nicaragua.* Stanford, California: The Institute for Mathematical Studies in the Social Sciences, Stanford University.

Imhoof, Maurice, with contributions by Patsy Layne and Pamela Brooke. 1979. "Site Selection Report: Radio Language Arts Project." Washington, D.C.: Academy for Educational Development.

Grant Project Agreement Between the United States of America, acting through the Agency for International Development (AID) and the Republic of Kenya. A.I.D. Project No. 931-1017. August 14, 1980.

CHAPTER 2
DEVELOPING AND MANAGING THE INSTRUCTIONAL SYSTEM

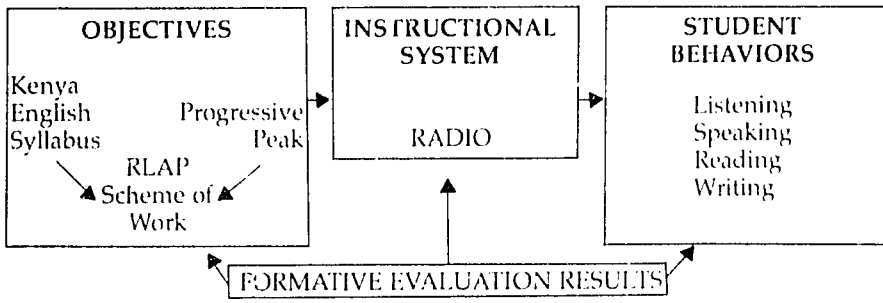
Philip R. Christensen

INTRODUCTION

Effective instructional radio requires the systematic application of an appropriate set of instructional principles to produce a workable methodology for teaching by radio. Although the RLAP's guiding principles had been tested previously their application in Kenya to language was new. AID wanted to learn whether the instructional model developed to teach mathematics in Latin America could be adapted successfully for teaching a new subject area, English, in a new region, Africa. The project, therefore, first looked at the content. It started with the Kenyan lower primary English curriculum, as specified in the syllabus (Ministry of Education 1978) and articulated in *The Progressive Peak* series of primers and teachers' books (Kenya Institute of Education 1975-77).

The figure below illustrates how the RLAP instructional system translates curricular objectives into student behavior. It also shows

FIGURE 2
The RLAP Instructional System In Context



the role of formative evaluation (explained in Chapter 5) in modifying objectives and teaching methodology on the basis of student performance. Most important, it demonstrates that the purpose of the RLAP was to implement Kenya's English curriculum, not to design it.

Starting from the Kenyan curriculum had significant implications for the instructional system. Our initial analysis of the syllabus suggested that it would be very difficult to cover all of its content in the three years available. Informal comments from some KIE professionals who had been involved in writing the syllabus indicated that they themselves were skeptical about teachers being able to reach all the objectives by Standard 3. These early impressions were later confirmed by the RLAP's own evaluation results, which showed relatively low scores on tests covering the entire syllabus in both radio and conventional classes.[1]

Had we developed a new English curriculum for Kenya, the instructional system would have attempted to achieve fewer objectives. This would have allowed more thorough instruction focused on the most important aspects of the English language, and might well have resulted in larger achievement gains but covering fewer linguistic items. Contractual and practical considerations dictated that we make every attempt to teach the entire syllabus, from Standards 1 to 3 using instructional radio.

To meet this goal, we had to design an appropriate instructional system that would take advantage of radio's educative power to translate the Kenyan English syllabus into reality. Our starting point was the Radio Mathematics model. It was not possible to copy this model exactly, however, because of several significant differences between the two subjects. Teaching English by radio requires new approaches to analyzing and organizing the curriculum, specifying objectives, tracking student progress, providing reinforcement, and agreeing on correct usage. Teaching children in a foreign language puts severe constraints on lessons that might not be felt when teaching another subject in the children's mother tongue.[2]

This chapter describes the resulting instructional system, as designed and implemented by the RLAP. Its first section summarizes the system and its components. The second section explains how the system was developed. The third section documents how the system was managed. Keeping in mind the reader interested in replicating this work elsewhere, this final section explains in some detail the required resources and the steps in the production process.

THE INSTRUCTIONAL SYSTEM: AN OVERVIEW

The RLAP instructional system is a radio-based system. It is often described as interactive instructional radio. The unique element of the approach pioneered in Nicaragua and Kenya is the fact that so *much* radio is used, enough to cover virtually the entire curriculum. The system is both intensive and interactive.

The instructional system depends on radio to carry the primary pedagogic burden. This does not mean, however, that radio is the sole delivery method. The teacher also plays an important role, and printed materials and classroom aids offer additional support. This section briefly describes each of these components that other chapters in this book treat in more detail.

Radio Lessons

The core of the RLAP instructional system is its radio lessons. Following a rigorous set of instructional principles and methods, these lessons are carefully designed to teach as much of the curriculum as possible. Each half-hour broadcast teaches all four language skill areas: listening, speaking, reading, and writing. The radio lessons are not supplementary; they are central. The design calls for the same teacher to teach first a control class and then, in the following year, an experimental (radio) class. The design also requires that students stay in either the radio group or the control group across all years of the project.

The Kenyan primary school year normally contains 40 weeks divided into three terms (usually 13, 14, and 13 weeks, respectively). Under the series title *English in Action*, the RLAP lessons were broadcast five days a week, every week of the school year except the first (when teachers and students were busy opening schools and schedules frequently were disrupted). Most radio lessons provided a combination of new and review material. Special review weeks were broadcast at the end of each term to help consolidate student achievement. Each review week was repeated once so that any lessons missed in the confusion of opening or closing a term could be heard again.

Figure 3 shows the annual broadcast schedule. Each year, 195 lessons were aired, for a total of 97.5 instructional hours at each grade level. Of these, 15 lessons were repetitions (7.5 hours) and the rest were unique (165 lessons with new material and 15 review lessons, totaling 90.0 hours). Broadcasts began in Standard 1 and continued through Standard 3. In other words, the RLAP had 585

radio lessons, or 292.5 hours, in which to teach the Kenyan English curriculum and give children enough competence in this foreign language to permit its exclusive use from Standard 4. Each week, an additional 50-90 minutes in the English schedule was used for post-broadcast activities. These are discussed below in relation to the teacher. The broadcast lessons were the only instruction over which we had absolute control, both in the design and delivery. It is a very limited amount of time for teaching the English language to young children.

FIGURE 3
Annual Broadcast Schedule

	CONTENT	NUMBER OF LESSONS	TIME
TERM 1			
Week 1	No broadcasts		
Weeks 2-12	New lessons	55	27.5 hrs
Week 13	Review 1st term	5	2.5
TERM 2			
Week 1	Review 1st term (repeated)	5	2.5
Weeks 2-13	New lessons	60	30.0
Week 14	Review 2nd term	5	2.5
TERM 3			
Week 1	Review 2nd term (repeated)	5	2.5
Weeks 2-11	New lessons	50	25.0
Week 12	Review 3rd term	5	.5
Week 13	Review 3rd term (repeated)	5	2.5
ANNUAL	New lessons	165	82.5
	Review lessons	15	7.5
	Repeated review lessons	15	7.5
	Total	195	97.5

During the project, *English in Action* lessons were aired as a part of the normal Schools Broadcasts schedule on the Voice of Kenya, except that they started earlier and ended later each term than other educational radio programs. The lessons opened the daily broadcasts to schools, from 9:30 to 10:00 a.m. Monday through Friday. Project schools adjusted their own timetables so that the participating Standard was assigned to English during the broadcast time.

English in Action is designed for broadcasting. The instructional system is radio based, not cassette based. Although cassette tapes were used during the project to provide lessons from earlier years to participating schools, this was done in response to requests from the headmasters and not as part of the research design. Poor radio reception can make broadcast lessons more difficult to understand than taped lessons, and tapes can be replayed when something is missed or not understood by the children. But cassettes are substantially more expensive than radio, with costs for the tapes themselves, their distribution, and increased battery usage all playing a part. Furthermore, several headmasters reported that teachers did not keep to the normal schedule when they had lessons on tape, thus negating the advantage offered by radio of forcing thorough curricular coverage. (See Oxford and Imhoof 1986 for results from the cassette experiment.)

The Teacher

Although radio lessons are the central component of the RLAP instructional system, the classroom teacher plays an essential role, too. She has three levels of responsibility. First, she manages the radio instruction, preparing materials and the classroom before the broadcast and making the transition to a new subject after it. Second, she serves as co-teacher with the radio, following its cues to give directions, explanations, and corrections to students during the broadcast. Third, she extends the radio lessons beyond the medium's limits, during the lesson with additional prompts and explanations to the children and, most important, after the lesson during special "complementary lessons" without the radio.

Such an instructional system must be designed to take into account widely differing skill levels among classroom teachers. On the one hand, a major rationale for using radio-based instruction is the high percentage of untrained and inexperienced teachers in countries whose schools are expanding as rapidly as Kenya's. Effective radio lessons must help children even where the teachers' assistance is limited. On the other hand, some teachers have good pedagogic skills. They can help children in areas where the radio's potential is limited (for example, in individualizing instruction). Effective radio lessons should take advantage of these strengths where they exist.

The approach we took was to design an instructional system that benefits from as much good pedagogy as a teacher is able to offer, but that can be successful even when the teacher's contribution is limited. The *English in Action* radio lessons lay a solid educational

foundation; the teacher builds on that foundation to the best of her abilities.

The primary vehicle for the teacher's extra contributions is the complementary lessons. In Standard 1, these are 10-minute follow-up lessons immediately after each daily broadcast. In Standards 2 and 3, they are two separate lessons, 30 to 45 minutes long, which are given each week.

Lesson plans for each complementary lesson follow the curriculum and take into account what material is covered in the week's 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. One example is practice in reading and writing. Another is individualized assistance for children who are moving slower or faster than the radio's pace.

The more effective the teacher is during these complementary lessons, the more the children can progress beyond the bounds of the radio lesson. The system is designed, however, so that even if complementary lessons are not offered at all (which may have been the case in one or two project schools), the radio lessons themselves will offer adequate basic instruction on every part of the syllabus.

In practice, virtually all the teachers in the project schools performed well as managers. They prepared the blackboard, distributed printed materials, turned on the radio, and so on. Most teachers also did well as co-teachers with the radio. The most common problem they had was not allowing the students to try to answer on their own. Many teachers almost always gave the class the right answer if the children hesitated. Poorer teachers occasionally would give wrong answers when trying to help, and this would overshadow the radio's correct model. Most teachers taught the complementary lessons. Some taught them very well, helping the class advance beyond what the radio lessons could offer. Overall, because of the special needs of teaching language, the teachers' role in the Radio Language Arts Project was greater than in Radio Mathematics (Christensen 1985).

For teachers to be able to play successfully their part in the instructional system, some in-service training is required particularly because the interactive radio model is so unlike conventional school broadcasts. But an important rationale for using instructional radio was to provide an alternative delivery method to teacher-centered approaches for situations where the required national level of teacher training was not feasible or was too costly. If the RLAP system had relied on expensive in-service training component, it would

have ignored this rationale and, most likely, begun to fail when external funds supporting the training ran out.

We felt strongly, therefore, that our instructional system had to be designed so that teachers could play their part with minimal special preparation. To meet this criterion, we designed a one-day, in-service program which could be carried out at the local level by field personnel (such as inspectors or area education officers) for national implementation. The seminar explained the technical details of using the radio (such as broadcast schedules, tuning, setting volume and tone controls), the rationale behind the radio lessons, and the expected role of the teacher. Teachers then listened to a sample lesson on cassette and again while volunteers from their midst practiced teaching with the radio. Using this strategy, all Standard 1 to 3 teachers in all seven provincial capitals could be trained to use *English in Action* for less than $5,000. This cost could be borne easily by the Ministry of Education's operating budget.

Many teachers indicated that they would have liked more training. Observers noticed a bit of uncertainty for the first two or three weeks each year on the part of some teachers new to the method. Their radio lessons did not run as smoothly as others and they were hesitant about the interactive radio method's viability. After three weeks, however, even these teachers were working without major problems and expressing confidence in the method. To a large extent, this is because the *English in Action* lessons themselves provide substantial cues and support to teachers, explicitly and implicitly. Even the minimum training that we were able to offer was enough to get teachers started. Once they began, they learned as they taught with the radio.

Of course there are other ways to provide in-service training besides face-to-face workshops. A radio-based instructional system obviously could take advantage of a radio-based, in-service approach—a logical enhancement for future replications of the model.

Printed Materials

The RLAP instructional system incorporates two types of printed materials: teacher's notes and student books. While these do not play the central role of the radio or the complementary role of the teacher, they do provide important support for the system as a whole.

Ideally, a radio-based instructional system would not depend on any printed materials being sent to schools. This would reduce costs to a minimum and insure that remote schools had equitable

access to educational services. In practice, this ideal is difficult to achieve. For one thing, teachers need some guidance about their responsibilities in each lesson. For another, students may need printed materials to support their learning.

RLAP teacher's notes include two different types of lesson plan, one for the broadcast lesssons and another for the complementary lessons. A full set of Standard 3 teacher's notes, for example, contains 180 broadcast lesson plans and 66 complementary lesson plans. (Broadcast lesson plans are not needed for the three repeated review weeks each year, and no complementary lessons are prepared for either the initial review weeks or their repetitions.)

One of the early decisions we faced was how much information to give to teachers. One possibility, to give them copies of each lesson's script, was rejected as being too expensive and counterproductive, since it likely would overwhelm teachers with too much information and divert their attention from helping to teach the class.

Instead, broadcast lesson plans were designed to accomplish two things. First, they give the teacher a general idea of what the radio lesson will cover (in the "Content," "New Words," and "Songs" sections). Second, they tell the teacher precisely how to prepare for and run the lesson (in the "You Will Need," "The Children Will Need," "Before the Broadcast," "On the Blackboard" and "During the Broadcast" sections). The complementary lesson plans have a similar format, with explanations of "Objectives," "Class Organization," "Materials Needed," "Preparation," "Introduction," and "Development."

Student books provide materials for the children to read. While the radio can handle oral English very well without relying on print at all, children cannot learn to read without reading something. Another early design decision was not to assume that classroom textbooks would always be available. While the Progressive Peak primers are useful, many Kenyan experts felt that there would be too many classrooms without adequate copies and some without any copies at all. This is a particular problem in the rural areas, precisely the locations the RLAP was designed to serve. So the *English in Action* lessons incorporated simple printed sheets with reading exercises and games. To reduce costs they used text and black-and-white line drawings, but no color or half-tone pictures. (See the Appendix at the end of this book.)

During the project these pages were called worksheets. They were designed and distributed a few at a time, to allow for forward revisions specified by the formative evaluation system. They were

reusable, however. Students did not write on them directly. Standard 1 used 19 pages. Standards 2 and 3, because of their increased emphasis on reading, used 48 pages each.

The Progressive Peak books represented a valuable resource for those schools with access to them and were not overlooked in our planning. Teachers were encouraged to use these books, and all other available materials, as much as possible. The complementary lessons, in fact, took advantage of regular English textbooks when they were available.

At the conclusion of the RLAP's developmental phase, the teacher's notes and student materials were revised and consolidated into books. Each Standard now has a teacher's book of all the lesson plans and a student book of all the worksheets. Because they are so simple and short, these books are relatively inexpensive to print and distribute. Estimated costs for the student books range from $.11 to $.21 each, and for the longer teacher's books, $.47 to $.80 each.

Classroom Aids

The final component of the RLAP instructional system is a variety of classroom aids. Like the printed materials, their general purpose is to support instruction that is delivered by the radio with the help of the teacher. More specifically, these aids are designed to compensate for radio's lack of a visual channel by providing visible cues to children to accompany the aural cues from the radio.

The most conventional aid, and perhaps the most useful, is the blackboard. We made maximum possible use of the blackboard for two reasons. First, anything that can be drawn or written by the teacher on the board does not have to be printed, thereby reducing costs and distribution problems. Second, by using a pointer and the board a teacher can focus the entire class' attention on some specific item or task much more easily than if each student is looking at a separate printed page.

Most *English in Action* lessons require the teacher to write a few words or simple sentences on the blackboard. Some also ask for simple diagrams or stick drawings. The only constraints on blackboard usage are the time required to prepare the board each day and the limited drawing abilities of some teachers. In other countries, the availability of blackboards would need to be assessed.

In addition to the blackboard, the radio lessons make liberal use of props that are likely to be found in classrooms or around rural schools: chairs, tables, books, chalk, pencils, grass, milk cartons,

etc. Not only can such realia be used to teach simple vocabulary directly (using grass to teach "grass"), it also can be used for introducing more sophisticated concepts (using grass and chalk with books and pencils to teach mass and count nouns).

Perhaps the most unusual classroom aid in the RLAP instructional system is the students themselves. Many radio lessons ask the teacher to select student participants ahead of time. These children are then assigned a standard name (Juma and Rosa, for example) and given a name tag showing it. During the broadcast, the radio asks them to say or do certain things ("Juma, walk around the table." "Rosa, ask Juma to give you his book."). This strategy is necessary to teach many things that require individuals, rather then the entire class, to act or to be addressed. This step toward individual participation is a standard element of daily instruction not found in the earlier mathematics project.

DEVELOPING THE INSTRUCTIONAL SYSTEM

The instructional system described above was developed during the field phase of the Radio Language Arts Project. From the time the RLAP Kenyan office opened in September 1980 until it closed in June 1985, three major activities were carried out: designing the instructional system, operating the system, and evaluating the system's effectiveness. Figure 4 shows the timing of these activities.

Design

Our initial challenge to design an instructional system for teaching English by radio in Kenya occupied the project team from the beginning of field work in September 1980 through the end of 1981. Individual Kenyan and American team members contributed distinct knowledge and skills that were blended into the system that evolved during this period.

First, we had to devise a basic strategy and a timeline for putting that strategy into effect. The key deadline was January 1982, when broadcasts to Standard 1 were to begin. Our starting point was to familiarize ourselves with the work done by Radio Mathematics in Nicaragua through the literature and with consultants. We had to become equally familiar with the situation in Kenya. At one level this involved review of the curriculum and its supporting materials. At another it required field work to observe conditions in rural primary classrooms and to assess children's abilities and problems. Standing with one foot in Central America and another in East Africa, we could begin to see possible approaches to accomplishing our task.

FIGURE 4
Development Timetable

	1980	1981			1982			1983			1984			1985		
	Sept.	Jan	Apr	July	Oct	Jan	Apr	July	Oct	Jan	Apr	July	Oct	Jan	Apr	June
Design																
Execution					Standard 1			Standard 2			Standard 3			Revisions		
Formative																
Evaluation																
Summative																

Next we began a more formal analysis of the Kenyan lower primary English curriculum in order to produce the instructional design document, called the Scheme of Work, which would guide the preparation of each lesson. This turned out to be one of the most difficult jobs of the design phase, requiring intense efforts by full-time staff and three consultants over several months before success finally was achieved.

In practice, it was quite difficult to articulate a language curriculum with the precision necessary for an effective, media-based instructional system. English cannot be organized into a neat hierarchy of categories appropriate to a subject such as mathematics. Also, the open-ended nature of language makes it difficult to specify instructional objectives for each linguistic behavior with the precision necessary for meaningful evaluation without producing an unmanageably long document. Consequently, we had to develop alternative approaches to preparing an instructional plan that was appropriate to our subject area.

Once the curriculum analysis was underway, we could begin designing the rest of the instructional system. We started by identifying possible changes to the Radio Mathematics model, such as an expanded role for the classroom teacher. We also began to focus more precisely on the radio lessons, developing hypotheses about what might work and what might not. These hypotheses were translated into prototype lesson segments, often just a few minutes long, that were tested in actual Standard 1 classrooms. As the results of those tests accumulated, we began to articulate a body of instructional design principles which, in conjunction with the Scheme of Work, would guide project writers. During 1981 our prototype lessons became longer and, in general, more successful.

By this point we had a clearer picture of each team member's responsibilities as well as of the instructional system itself. To test our ability to work together at the speed required in creating radio lessons and supporting materials that taught English, the final aspect of the design phase was a full-scale pilot test. We produced four weeks of instruction, including daily half-hour radio lessons, starting at the beginning of the Standard 1 curriculum. Since the actual school year was in its last term, we tested these lessons on cassette tape in nursery schools with students who soon would begin Standard 1 themselves. This provided one more chance to rectify any problems with our instructional and production systems. Then it was time to begin our work in earnest.

As regular lesson production began in October 1981, the major part of the design phase concluded. However, formal design activi-

ties were required again in 1982 and 1983 to produce the Schemes of Work for Standards 2 and 3. For each year, this involved a detailed analysis of the curriculum followed by a planning workshop attended by the project director, the entire field team, and consultants.

For the benefit of those undertaking similar ventures, it should be emphasized that the initial design phase in 1980 and 1981 was not as neat and linear in practice as it appears from this description. The steps listed here are clear enough in retrospect, but our view at the time was far murkier. Often we were uncertain precisely where we were going, let alone how to get there. Sometimes the lack of progress in one area hindered our work in another. For example, it was difficult to develop pilot lessons when the instructional design document was not yet available. Nevertheless, by trying to follow good instructional development principles, by combining common sense and creativity in applying those principles, and by persevering, we arrived at the end of 1981 with a system that could be tested in practice.

Operation

The primary project activity after October 1981 was the preparation of 585 radio lessons with accompanying teacher's notes and student materials. Each year 195 lessons were developed at a rate of five lessons for every school week, according to the schedule explained in "Managing the System," below. Standard 1 lessons were broadcast in 1982 beginning in January, the start of the school year; Standard 2 lessons began in 1983 and Standard 3 in 1984. Because of the lead time built into our production schedule, work on one year's lessons began in September of the previous year, as soon as the Scheme of Work was ready and the overall instructional strategies had been determined.

It is important to note that the operational phase also had design implications as a result of formative evaluations. Evaluation results continuously were being fed back to the lesson planners and scriptwriters, who accordingly modified their activities. Thus, the overall instructional system and its instructional design principles evolved in practice. Lesson 195 of Standard 3 and the process that produced it were substantially more sophisticated than Lesson 1 of Standard 1.

After the last lessons for Standard 3 were prepared in September 1984, our attention turned to revisions. Formative evaluation had identified changes that needed to be made to specific lessons before they were used again. Some of these were to correct outright mistakes. Others were to make substantial improvements in the meth-

odology. Because limited time and resources had prevented us from carrying out most of the revisions while we were developing the lessons themselves, the concluding months of our field work concentrated on making these changes retroactively in the scripts and tapes and in the associated printed materials. It should be emphasized that we did not substitute an untested methodology for a failed one. Rather, we replaced segments that failed with those that we knew worked from previous experience. By June 1985, the task had been completed. The entire instructional system had been developed, tested, revised, and accepted by the Government of Kenya.

Evaluation

The final component of our system development was evaluation. Its design and operation paralleled the design and operation of the instructional system itself. To simplify our presentation, the research and evaluation activities and results are discussed in Part II. It should be remembered, however, that the project development process included overlapping strands of design, operation, and evaluation. The activities of one strand always influenced the choices and decisions in another and sometimes suggested modifications in the entire instructional system. Formative evaluation in particular reshaped many of our original ideas and changed the way we worked. In brief, the following evaluation plan was carried out.

During 1980 and 1981 several steps were required in preparation for the project's operational phase. The schools to be included in the summative and formative evaluation samples were chosen. The summative and formative evaluation systems had to be designed. A sociolinguistic survey was carried out. A pretest to assess entry-level English language abilities was developed and administered. Results of pilot tests of sample lessons and materials were analyzed. At the end of 1981 the initial final summative evaluation test for Standard 1 was developed and administered.

From 1982 to 1984, as the radio lessons were written and broadcast, the formative evaluation system was in operation, providing details about successes and failures. This information, in turn, resulted in changes to the instructional system's shape and objectives. At the same time, final summative evaluation tests were developed by the Center for Applied Linguistics, AED's subcontractor on this project, and administered at the end of each year. The last test was given to the Standard 3 radio group in November 1984. Final analysis and reporting of the data was begun in 1985,

and extended beyond the field office's closing in June of that year. By the time the instructional system was ready for handing over to the Kenyan Ministry of Education, all of the information necessary to assess its effectiveness had been collected and the system's overall success demonstrated.

MANAGING THE INSTRUCTIONAL SYSTEM

Designing and operating the Radio Language Arts Project's instructional system was not only a pedagogic challenge, it was a management challenge. To develop and test three years of radio lessons and supporting materials required many resources, human and material, and a means of supervising their use. This section describes how we met the management challenge.

Human Resources

Including Kenyan professionals seconded by the Ministry of Education, American professionals from the Academy for Educational Development, and support staff hired by the project directly, 15 full-time and 25 part-time persons (the equivalent of 10 full-time staff) worked with the RLAP field office.

At the project's core were eight professional staff members: four Kenyans and four Americans. Unlike many foreign aid projects that deploy advisors to train unqualified local personnel, the RLAP assumed that each country would have significant contributions to make. It was clear from the start that every professional had valuable experience and skills, but that no professional had all of the answers. We began from the premise that none of us knew precisely how to teach English by radio in Kenya. Therefore, all of us had to work together to discover how to succeed and to find our individual roles in that success.

The result of this process was an eight-person team, in spirit as well as in name. The system we produced was neither Kenyan nor American; it went beyond the limits of either context, drawing from the strengths of each. This team building was one of the most important achievements of the Radio Language Arts Project.

The precise role assigned to each team member evolved as the instructional system evolved. Furthermore, for professional development reasons, many team members rotated among different positions during the course of the project. By Standard 3, a fairly consistent staffing pattern had developed. It is summarized in Figure 5.

FIGURE 5
RLAP Professional Field Staff

PROJECT AGREEMENT POSITION	JOB TITLE	MAJOR RESPONSIBILITIES
1) Field Coordinator	Field Coordinator	Field team management Instructional systems design
2) Language Arts Specialist	Linguist	Curriculum planning Lesson planning Scriptwriting Reviewing
3) Language Arts Specialist	Scriptwriter 1	Scriptwriting Lesson planning Reviewing
4) Language Arts Specialist	Scriptwriter 2	Scriptwriting Reviewing
5) Broadcaster	Scriptwriter 3	Scriptwriting Song writing
6) Language Arts Specialist	Materials Writer	Broadcast lesson plans Complementary lesson plans Reviewing In-service training
7) Broadcaster	Producer	Studio production Reviewing Revisions
8) Feedback Coordinator	Evaluator	Summative evaluation Formative evaluation

Of the eight professionals, six were involved full-time in lesson development: one linguist, three scriptwriters, one materials writer, and one producer. About half of the field coordinator's time was devoted to instructional systems design (although this percentage was much higher at the beginning of the operational phase and lower towards its end when production was smoother). More than half of the evaluator's time was devoted to formative evaluation, which is an integral part of the overall instructional system.

The professional team was assisted by a full-time support staff of seven people—a studio engineer, an executive secretary, three secretaries, a materials distribution supervisor, and a driver. Five part-time staff members worked in the studio—four actors and one musician. In the field, 20 education professionals, mostly heads of teacher resource centers, worked part-time as observers. These staff members were supported in part by the MOE and in part through project funds.

In addition to this core staff, of course, there were many other people whose association with the project was vital to its success. Chief among these were the headteachers and teachers at project schools, along with District Education Officers and their staffs.

Equally important was the staff of the Kenya Institute of Education and other agencies of the Government of Kenya.

Given our assumption that all personnel were basically competent, no external training was provided to any full-time staff member. On the other hand, all of us benefited through substantial on-the-job training from other team members as well as from consultants. The actors and musicians also received on-the-job training in instructional radio from the project's professional staff. Special training sessions were organized for the field observers as their specific tasks warranted.

The consensus at the beginning of the project was that our full-time professional staff was too small. Though colleagues at KIE did not expect us to be able to keep to our production schedule, or anything close to it, we did succeed. Every single lesson was produced in time for broadcast, and the only lesson not aired (although it was ready) was on the day of an attempted coup d'etat.

But it should not go without saying that the costs of this were high. As explained below, slippage added to the production schedule. The quality of our lessons and materials was sometimes less than we were capable of achieving because we did not have the time needed for improvement. Supplementary activities that would have been very useful to the project had to be left undone. Finally, our accomplishments required an extraordinary level of effort from the staff. One or two additional professionals could have made a noticeable difference in our work without leaving anyone too little to do.

Facilities

The RLAP was housed in a prefabricated block of offices at the Kenya Institute of Education, consisting of three small rooms for the field coordinator, the executive secretary, and the secretarial pool; a small duplicating room; and a large central room housing seven professional staff members. Later in the project, KIE assigned us an additional office, divided into three sections, that was used for tape copying and storage. Other facilities at KIE were available when needed for larger meetings and workshops.

Office equipment was also simple—furniture, five typewriters, a programmable calculator, and a photocopier. The most important item missing was a word processing system. When the RLAP was designed in the late 1970s, of course, no one would have considered such an esoteric option for a project in Africa. But today, sophisticated microcomputer-based systems are more common on the continent. Their power and flexibility would have been perfect for the

kind of writing and rewriting, carried out by several people, that we faced. Ancillary programs could have made jobs such as vocabulary record-keeping and proofreading much easier.

We had hoped that studios in the new EMS center at KIE would be available to the RLAP in time for Standard 1 production, but they were not ready until we had started work on Standard 3 two years later. For the first two years, therefore, we used one of the production studios of Voice of Kenya (VOK). They were basic, but adequate.

As with office equipment, the RLAP's studio equipment needs were fairly simple—at least three microphones, a simple mixing board, two or three tape recorders, and a turntable. All were available at VOK (thanks in part to supplementary equipment purchased by the project), and most of them worked most of the time. Nevertheless, maintenance was a problem, and working at a site a few kilometers from KIE posed communications difficulties. We were pleased, therefore, to move in 1984 to the newer, more sophisticated and more convenient EMS center at KIE to produce the remainder of our Standard 3 lessons. The most important piece of studio equipment that we lacked was a cartridge machine. It would have been very useful for frequently repeated themes, musical bridges, and sound effects.

Some additional equipment was purchased by the project to support its work outside of the offices and studios. Four vehicles were used mainly for materials distribution and evaluation. A tape-copying machine was needed to prepare cassette tapes of previous years' lessons to meet the fervent request from project schools that they be allowed to continue with the radio method. A broadcast-quality field tape recorder was supplemented by some inexpensive cassette recorders. Seventy radios were supplied to project schools and used for tasks such as summative evaluation testing.

Whereas the human resources fell short of our needs in reaching the full project potential, the facilities and equipment available were adequate, though limited. With the exception of a word processing system and a cartridge machine, few material resources could have been added to make the work go better or faster.

The Production Process

Anyone who has ever produced programs for broadcasting knows the extraordinary pressure imposed by the clock and the calendar. If a program is to be aired on January 10th, it must be aired that day. If it is to begin at 9:30, it must begin that minute. If it is to

last for 30 minutes, it must last that long. Failure means dead air, or a rerun, or scheduling problems for other broadcasts. The medium accepts no excuses, no matter how valid, and every failure is a public failure which can destroy an audience's trust.

Anyone who has ever developed instructional materials in a group knows a different set of pressures. How are the tasks to be divided among the various people? How can jobs be sequenced so that each person works at a steady, constant pace without having to pause because some necessary component has not been completed by a colleague? How can differences of style and approach be reconciled so that a group designing horses does not produce elephants instead?

Anyone who has faced these challenges simultaneously, who has worked in a group preparing broadcast materials, knows how difficult the task really is. For those RLAP team members who had not experienced such a situation before, it was a shock. To organize ourselves as an effective production group and to meet successfully a relentless series of deadlines was a major challenge that often threatened to exhaust our ideas, our energy, and our patience.

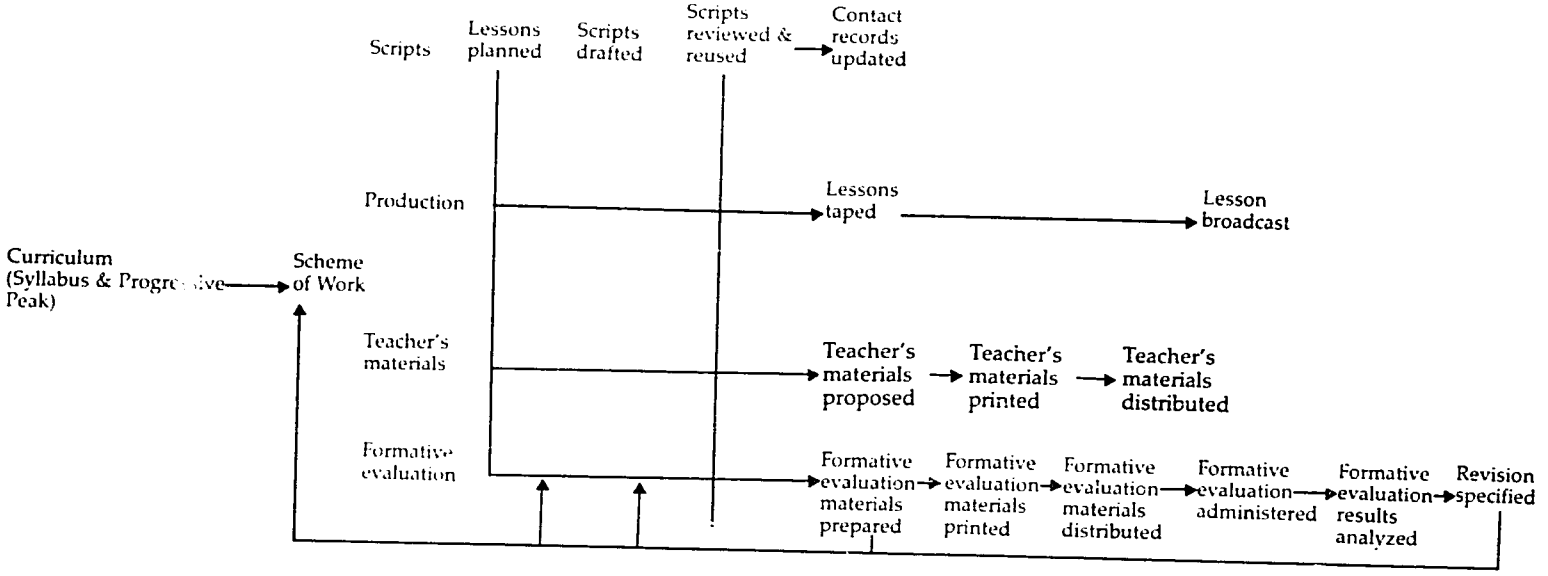
Figure 6 summarizes our production process. Starting from the Kenyan curriculum and the Scheme of Work derived from it, the process followed four main tracks: writing scripts, producing radio lessons, writing teachers' materials, and carrying out formative evaluation. These tracks culminated in the daily radio lessons. The formative evaluation results from each instructional week were used to modify the Scheme of Work, scripts in process, and teachers' materials.

To produce an instructional system with 585 radio lessons and accompanying printed materials, a tangible representation of the process was necessary. We achieved this with our production board, known to the team simply as "The Board." Hanging prominently at one end of the large staff room, it governed our lives for more than three years.

We did not bother with an expensive magnetic planning board. Our "Board" was a four-by-eight-foot sheet of varnished pressboard nailed lengthwise to the office wall. It was divided horizontally into 20 rows, each representing one major production task. Vertically it was marked off into 60 columns, in sets of five, each set of five columns represented a working week.

A cup hook was placed at the intersection of every row and column. Labels were written on paper price tags and hung from the appropriate hooks. The top row of tags showed calendar dates.

FIGURE 6
Radio Language Arts Production Process



The Production Process

Tags in the remaining rows showed what lessons and materials had to be completed by those dates. A simple code was used. Different colors were used for different standards. A Roman numeral indicated the term. This was followed by a stroke and an Arabic numeral showing the week of that term. Underneath were the lesson numbers. For example, a black III/13 meant Standard 2, Term 3, Week 13. Underneath that, a 190-195 meant lessons 190 to 195. Such a tag would mean that some task pertaining to these final five lessons in the second year had to be completed by the deadline shown at the top of that column

When a task was completed, we would turn over its tag so that it showed its blank white side. Known as "turning the tag," this simple step became the never-ending preoccupation of every team member. With this system, a quick glance at the production board clearly showed how much work had been completed (rows of blank tags), what tasks were outstanding (rows of tags with numbers on them), and what tasks were late (tags not yet turned under dates that had already passed).

Figure 7 shows a section of the actual production board—September 10 to 21, 1983. Looking at each row gives a step-by-step overview of the production process that we used. Key tasks on the critical path are indicated by capital letters.

Following Figure 7, each step, or activity, of the production process is described briefly.

FIGURE 7
Radio Language Arts Production Board

	Sept 10	11	12	13	14	Sept 17	18	19	20	21
1. Lesson plans prepared					III/13 190-195					I/1 1-5
2. Segments Written					III/12 186-190					III/13 191-195
3. Draft scripts reviewed				III/11 181-185					III/12 186-190	
4. Segments revised		III/10 176-180					III/11 181-185			
5. Content records updated					III/9 171-175					III/10 176-180
6. Teacher's materials written		III/8 166-170					III/9 171-175			
7. Teacher's materials reviewed and revised				III/8 166-170					III/9 171-175	
8. Formative evaluation materials written			III/8 166-170					III/9 171-175		
9. Formative evaluation materials reviewed					III/8 166-170					III/9 176-180
10. Scripts to actors	III/8 166-170					III/9 171-175				
11. Pre-production completed	III/8 166-170					III/9 171-175				
12. Production completed		III/8 166-167	III/8 168-169	III/8 170			III/9 171-172	III/9 173-174	III/9 175	
13. Production reviewed and post-production completed			III/8 166-167	III/8 168-169	III/8 170			III/9 171-172	III/9 173-174	III/9 175
14. Printing completed					III/7 161-165					III/8 166-170
15. Tapes and scripts copied and filed					III/7 161-165					III/8 166-170
16. Distribution completed			III/3-4 141-150 Central							III/5-6 151-160 West; Coast
17. Broadcast	136	III/2 137	138	139	140	III/3 141	142	143	144	145
18. Formative evaluation analysis completed						II/14-III/1 126-135				
19. Revisions completed to lessons broadcast					II/12-13 116-125					

1. Lesson plans prepared. The production process began with the preparation of a plan for each radio lesson. Following the guidelines in the Scheme of Work and working within the standard lesson format, one writer would specify what content should be taught in each lesson segment. The plan was posted in the office for all writers to follow.

2. SEGMENTS WRITTEN. The first key task in the process, this meant that all segments had been written for the series of five lessons in question, following the specifications in the lesson plans and the Scheme of Work, and that those segments had been assembled into a complete script with all necessary transitions. Accompanying student worksheets were prepared simultaneously. Turning this tag meant that five draft scripts were ready for review.

3. Draft scripts reviewed. Each script was reviewed by several people for congruence with the instructional objectives, adherence to our instructional design principles, appropriateness for the Kenyan cultural context, and production feasibility.

4. Segments revised. Once the original writer had agreed to any suggested changes (or, in the case of unresolved conflicts, once the writing group as a whole had reached a decision) the affected segments were revised. The final draft of the script was then approved by the chief reviewer.

5. Content records updated. Working from the final draft, the writers who had prepared the lesson plans recorded objectives taught in a working copy of the Scheme of Work, and listed vocabulary taught on special record sheets posted in the office.

6. Teacher's materials written. Teacher's notes were written for each lesson following approval of the final draft of its script. In Standard 1 these notes included guidelines for brief follow-up lessons. In Standards 2 and 3, two complementary lesson plans were prepared individually for each week, following the Scheme of Work objectives and taking into consideration what the radio lessons had covered.

7. Teacher's materials reviewed and revised. One writer reviewed the draft teacher's materials following the same criteria used for draft scripts. Any necessary changes were then made by the original writer.

8. Formative evaluation materials written. The evaluator prepared observation sheets for each lesson based on the final draft of its script. At the same time, the linguist developed a test to be administered at the end of the week, covering objectives taught that week and other material of interest to the team.

9. Formative evaluation materials reviewed. Observation sheets and the formative evaluation test for each week were reviewed by the instructional systems designer for accuracy in relation to the final scripts and the Scheme of Work objectives.

10. Script to actors. Scripts were distributed to actors and the musician by the day before production was to begin, to give them time to prepare their roles.

11. Pre-production. The producer and the studio engineer worked together to prepare sound effects and other needed materials prior to the recording session.

12. PRODUCTION COMPLETED. The second key task in this process was studio production. For three mornings each week scripts were recorded in sessions that combined rehearsals and final production.

13. Production reviewed and post-production completed. Any necessary editing to the recordings was carried out. One of the writers listened to each tape as a final review.

14. Printing completed. Teacher's notes, student worksheets, observation sheets, and formative evaluation tests were duplicated in sufficient quantities for project schools.

15. Tapes and scripts copied and filed. Duplicate copies of the entire instructional package (tapes and written materials) were made for storage.

16. DISTRIBUTION COMPLETED. This was the third key task in the process. Teacher's notes, complementary lesson plans, and student worksheets were distributed to project schools by our drivers once every other week. After the first year of broadcasts, cassette tapes of previous lessons also were distributed.

17. BROADCAST. The central element of the entire production system was the daily lesson broadcast. The scriptwriting, materials writing, and distribution components all prepared for this broadcast. All other deadlines were derived from this deadline.

18. Formative evaluation analysis completed. Project drivers brought back completed observation sheets and tests from their distribution trips. These were analyzed by the evaluator, two weeks at a time, for discussion by the entire team. Results of the formative evaluation review, in turn, affected the scriptwriting, materials writing, production, and revision components.

19. Revisions completed to lessons already broadcast. When possible, revisions to lessons already broadcast, required on the basis of formative evaluation results, were made in the two-week period prior to the next set of results becoming available. When this was not possible (as was generally the case), the revision work was deferred.

Every Monday morning the team met to review the production schedule. (Every other Monday these meetings also included a review of formative evaluation results.) Tasks were examined one at a time. Team members reported on their progress, and the appropriate tags were turned. Tasks that were falling significantly behind schedule were identified, the reasons for the delay discussed, and compensatory strategies developed to avoid other work being delayed too significantly. During the week, the production board served as a visible reminder of the work necessary to meet the deadlines.

As we became more and more comfortable with this production system, "The Board's" reminder was sufficient to keep the process moving fairly smoothly. Given our manpower situation we were often somewhat behind schedule, but we rarely fell so far behind the built-in time reserves that we risked missing a critical deadline.

In the project's early stages, however, team member's had less experience with the system. Consequently, they were less certain of the steps they had to take to meet the production board's deadlines. To supplement "The Board," therefore, we developed daily checklists ("ticking lists" in Kenyan English). Posted prominently in the office, this list showed each team member what had to be accomplished each day for specific lessons, and who stood next in the

process to receive the completed work. A large sign at the exit reminded staff members to "tick the ticking list" every day before leaving work. After months and months of living with this process these details became second nature and the checklists were dropped, but they provided an important self-training function until then.

Figure 8 replicates the June 1983 ticking list when work was being done for the latter part of Standard 2.

We used the three term breaks in each year's school calendar for catching up to schedule and for staff vacations. The routine production cycle operated only when school was in session and our lessons were being broadcast. This meant that for every week of school we had to produce a week of lessons, a rate of one lesson per day during regular production. Yet Figure 7 showed that the work on one week's lessons was spread over 15 weeks, not one week. Why was such a long timespan required?

The first part of the answer involves the fact that one cannot write, broadcast, and evaluate one lesson in one day. Some sequencing is mandatory. For the RLAP the minimum timespan would have been seven weeks (with a five-week lag in applying formative evaluation results), as follows:

Figure 8
PRODUCTION CHECKLIST

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Central, Coast distribution	Packing completed Lesson Plans proofed, corrected, and forwarded to print (by 12:00) Teacher's Notes reviewed and returned to Muitungu	Western distribution Lesson Plans reviewed and returned to Muitungu	Observation Sheets reviewed and returned to Greg	Weekly test reviewed and returned to Phil Teacher's Notes proofed, corrected, and forwarded to printing
Segments revised and forwarded to Kurt	Specifications for worksheets forwarded to Muitungu		Segments written (other than host)	Host segments written Draft script assembled and forwarded with worksheets to Muitungu
	Observation Sheets typed, proofed, corrected, and sent to printing	Observation Sheets written and forwarded to Chris	Observation Sheets received from Chris, revised and forwarded to typing	Observation Sheets printed and forwarded to George Formative evaluation analysis completed and distributed to team
Final script typed, assembled with cover sheets, proofed, corrected, and approved	Content records completed Copies of produced scripts filed Copies of ancillary materials filed Copied of produced scripts and ancillary materials to Imhoof, Thompson Master tapes and reel copies filed	Scripts revised and forwarded to typing Scripts copied and collated Taped lesson reviewed and approved (back 1 week)	Draft scripts and worksheet reviewed, revision specified for writers, worksheet forwarded to Muitungu Script copies forwarded to artists, Greg, Muitungu Taped lessons reviewed and approved	Segment ticking list posted Conflict chart posted Segments revised Taped lessons reviewed and approved Previously broadcast lessons revised as specified by formative evaluation decisions
	Cassette copies forwarded to Imhoof			
	Specifications for worksheets forwarded to Muitungu		Segments written and forwarded to Dave	Segments revised and forwarded to Kurt
Tapes copied Preproduction planning completed	Preproduction completed	Lessons produced Tapes edited	Lessons produced Tapes edited	Lessons produced Tapes edited
Draft scripts and worksheets reviewed and forwarded to Mary Worksheets revised and forwarded to typing Teacher's Notes (broadcast) written, forwarded to Phil Lesson Plans (nonbroadcast) typed, proofed, corrected and forwarded to Chris	Lesson Plans written and forwarded to Phil	Draft scripts and worksheets reviewed and forwarded to Phil (one at a time, as completed) Worksheets revised and forwarded to typing Teacher's Notes revised and forwarded to typing (by 12:00)	Lesson Plans revised and forwarded to typing	Worksheets drafted and forwarded to Dave (by 3:00) Worksheets typed, proofed, corrected, and forwarded to artists Worksheets completed by artist, checked, corrected, and forwarded to printing Teacher's Notes typed, proofed, corrected, and forwarded to Chris (by 12:00) Teacher's Notes, Lesson Plans, and worksheets printed and forwarded to George
Segments written and forwarded to Dave	Specifications for worksheets forwarded to Muitungu Segments revised and forwarded to Kurt Teacher's Notes reviewed and forwarded to Chris (by 12:00)	Draft scripts and worksheets reviewed and forwarded to Kurt Lesson Plans reviewed and forwarded to Chris (by 12:00)	Script Plans and methodology prepared Weekly test written and forwarded to Chris	Weekly Test revised and forwarded to printing Weekly test printed and forwarded to George

Writing scripts	Week 1	
Writing other materials	Week 2	
Studio production	Week 2	
Printing	Week 3	(5 weeks)
Distribution	Week 4	
Broadcasting	Week 5	
Formative evaluation	Week 6	
Revisions	Week 7	

Five radio lessons and their accompanying student worksheets had to be written in one week to keep up with the pace, and they were. Teacher's notes and complementary lesson plans, however, were written from those scripts. Since one lesson built upon another, changes to one script could mean changes to others in a given week. Work on teacher's materials, therefore, had to wait until the next week, when all five scripts had been approved. So did studio production and editing.

Written materials (teacher's notes, student worksheets, formative evaluation tests and observation sheets) could not be printed until after the tapes had been completed, since changes that affected the lesson plans and worksheets sometimes were made in the studio and the editing room. These materials could not be distributed until they had been printed, and the lessons could not be broadcast until schools had received the support materials. Formative evaluation results were not available until after the lessons had been used, and revisions could not be made until after the results were available. All of these factors combined to make the seven-week cycle the minimum that was realistically possible.

A production cycle of more than seven weeks was a result of too few resources. Project scheduling became complex when the same resources were needed for different, interrelated tasks. For example, transportation was a major expenditure in the project, one which went far over the budget. The cost of distributing materials to 31 schools in an area more than 600 miles wide was significant. To limit the number of vehicles needed, their operating costs, and the required staff, we decided to distribute on a biweekly schedule. This added a week each to the distribution, collection, and revision tasks, as follows:

Writing scripts	Week 1	
Writing other materials	Week 2	
Studio production	Week 2	
Printing	Week 3	(7 weeks)
Distribution	Weeks 4-5	
Broadcasting	Week 6	
Formative evaluation	Weeks 7-8	
Revisions	Weeks 9-10	

The other resource factor pertained only to the writers. In order to plan, write, review, revise, and review again five lessons in one week, there is absolutely no room for delay. A deadline missed by minutes means that someone else is held up in his or her work, and the effect cascades down the line. What happens when a certain lesson segment turns out to be particularly difficult to write, requiring more than the usual amount of discussion and revision? What happens when the Minister of Education visits and everyone must leave their normal duties to hear him? What about power outages or illnesses? A schedule with no room for unexpected delays is a schedule that cannot be kept in the real world.

To protect the production schedule's critical path, we added five additional weeks to the cycle. First, we inserted a week for planning. Next, we spread the scriptwriting task (including planning, writing, review, and revision) over three weeks, followed by another week as a "built-in hold." This helped us to cope with unexpected delays, to synchronize more easily the activities of different writers and to get an early start on other tasks involving the writers, such as preparing the teachers' notes, without jeopardizing studio production. Finally, we added another week's hold after printing and before distribution, so that any delays in preparing materials, revising them after production, or duplicating them would not delay distribution. The result was a 15-week schedule as follows:

Lesson planning	Week 1	
Writing scripts	Weeks 2-4	
HOLD	Week 5	
Writing other materials	Week 6	
Studio production	Week 6	(12 weeks)
Printing	Week 7	
HOLD	Week 8	
Distribution	Weeks 9-10	
Broadcasting	Week 11	
Formative evaluation	Weeks 12-13	
Revisions	Weeks 14-15	

The RLAP team in Kenya was barely large enough to keep up with the workload. If anything unexpected occurred, we fell behind. We always caught up during the three school term breaks each year, but most of the extra time built into the schedule almost invariably had been consumed by then. Had it not been for this extra time, we would have missed production, distribution, and broadcasting deadlines.

The major cost for this extra time was in lengthening the feedback loop. In the ideal seven-week cycle, by the time formative evaluation results from one week suggest script revisions, writers already are working on scripts five weeks later. In the 10-week cycle, the lag increases to seven weeks. For the 15-week cycle used by the RLAP, 12 weeks separated the evaluated scripts and the set then being planned by the writers.

Our experience suggests additional personnel would have resulted in greater efficiency, but it is not completely clear to what extent. In the beginning, a larger team might have been less efficient. When we were familiar with our jobs, we felt that with one or two additional staff members, we might have shortened the cycle by two or three weeks.

We could shorten the feedback loop when necessary, and we did. For example, if a particularly significant problem suddenly appeared in the formative evaluation results, we could intervene after the lesson planning phase. Scripts in the process of being written could be modified (reducing the loop to nine weeks), scripts in production could be altered (seven weeks), or, in real emergencies, scripts already produced could be corrected and the associated printed materials changed just before they were distributed (five weeks). This final option reduced the feedback loop to its ideal length, but at the cost of significant disruptions to the normal production schedule. In most cases, corrections to our methodology and attempts to reteach unmastered materials waited up to 12 weeks.

SUMMARY

The Radio Language Arts Project developed a four-part instructional system to teach English by radio in rural Kenyan primary schools. The system's core was 195 half-hour radio lessons each year. These radio lessons were complemented by the contributions of the classroom teacher, and by printed materials and classroom aids.

After spending more than a year designing this system, we began operation in 1982 with broadcasts to Standard 1. The operational phase concluded after broadcasts to Standard 3 in 1984. Formative and summative evaluation activities were carried out parallel to project broadcasting. A master production board was used to manage the activities of eight full-time professionals and a variety of support and part-time staff members as they worked through the production process.

NOTES

1 For example, in the test given at the end of Standard 3, control students (who were exposed to conventional English classes without the RLAP radio lessons) answered 38.2 percent of reading questions and 43.2 percent of listening questions correctly when questions were drawn from the entire syllabus.

2 For a more thorough discussion of the specific reasons for altering the Radio Mathematics model to make it more suitable for teaching English as a foreign language, see Philip R. Christensen, "The Radio Language Arts Project: Adapting the Radio Mathematics Model," *Development Communication Report* 49 (Spring 1985). Details of curriculum and instructional design considerations affecting the RLAP are treated in Chapters 3 and 4 of this book.

REFERENCES

Christensen, Philip R. 1985. "The Radio Language Arts Project: Adapting the Radio Mathematics Model." *Development Communication Report* 49.

Kenya Institute of Education. 1975-1977. *The Progressive Peak English Course.* Nairobi, Jomo Kenyatta Foundation and Oxford University Press. The Standard 1 primer is entitled *Hallo Children,* Standard 2 is *Read With Us* and Standard 3 is *New Friends.* The corresponding teacher's books are all entitled *Course Book for the Teacher.*

Ministry of Education. 1978. *Kenya Syllabus for Primary Schools: English.* Nairobi: Jomo Kenyatta Foundation.

Oxford, Rebecca L., and Maurice Imhoof. 1986. "Nairobi, Cassette, and Observation Students of the Kenyan Radio Language Arts Project: A Special Evaluation Report." Washington, D.C.: Academy for Educational Development.

CHAPTER 3
INSTRUCTIONAL PRINCIPLES AND METHODS

Philip R. Christensen

INTRODUCTION

Effective instructional radio methodology should be based on a close study of relevant research and experience. From the repertoire of the best available pedagogic principles can be drawn those which are suitable for the radio. An understanding of successful radio teaching techniques will show how these principles can be appropriately applied, and suggest additional educational approaches not usually found in classrooms.

One of the most important aims of the RLAF was to test further the interactive radio methodology successfully developed by Radio Mathematics, and to adapt it to the teaching of English in rural primary schools. The foundation for this work was laid during the year of research and development which preceded the start of full-scale production in October 1981. As taped lessons were tested in classrooms, our original hypotheses about effective radio teaching were modified and expanded.

When the first radio lessons were written for Standard 1 they were based on the instructional methodologies which had proven effective during our field tests. After that, we used the results of the formative evaluation process, described in Chapter 5, to refine the important principles for teaching by radio and our ability to apply those principles successfully. When pedagogic problems were noted we tried to determine whether they originated from a good principle improperly applied, or from a principle which was not valid in a particular context. When achievement problems were noted we tried to identify new methodologies which might be more effective in teaching certain content.

Once the curriculum had been articulated for teaching by radio, as explained in the previous chapter, the scriptwriters and reviewers worked towards its effective implementation in a given segment or lesson. They were guided by the instructional principles and methods that are summarized in Figure 9 and explained in the body of this chapter.

FIGURE 9
Summary of RLAP Instructional Principles and Methods

IMPLEMENTATION OF THE CURRICULUM

Systematic instructional design. A three-step process ensures that the entire curriculum is covered methodically while retaining the flexibility to respond to formative evaluation results as instructional materials are developed.

Distributed learning. Instruction in each competency is divided into many brief segments and spread over time to improve learning and retention.

Cyclical review. Initial instruction on each competency is followed a few weeks later by a review of that competency. Readiness and additional review cycles are added when necessary.

INTERACTIVE RADIO INSTRUCTION

Intensive radio. Daily radio lessons, one-half hour each, allow the medium to assume a primary instructional role.

The radio as a "door." Rather than having the radio imitate a classroom teacher, it is conceived as a door which permits interesting characters to enter the classroom and pupils to enjoy drama in other settings.

Frequent pupil response. Radio lessons call on pupils to respond in a variety of ways more than five times a minute. This high level of participation greatly enhances learning.

Model of good English. Each radio lesson exposes children to a model of proper Kenyan English which might otherwise be lacking for them.

Immediate reinforcement Every time children are asked to respond in English, they are immediately presented with a correct answer.

An engaging instructional pace. Each lesson varies the style and tempo of component segments to hold pupils' attention and enhance their learning. Over the year, lessons move through the curriculum as quickly as possible without risking leaving children behind.

Maximizing time-on-task. Radio lessons are conducted entirely in English to maximize children's exposure to the target language.

OTHER INSTRUCTIONAL MEDIA

The radio/teacher partnership. The radio provides a basic instructional foundation upon which teachers can build according to their skills.

Printed materials. Radio lessons use simple, reusable worksheets and teacher's notes which are cheaper to print then conventional textbooks.

Non-print materials. Using the blackboard and readily available materials reduces the radio lessons' dependence on printed materials as well as offering some pedagogic advantages.

Cost control. Costs for printed materials and teacher training are minimized.

IMPLEMENTATION OF THE CURRICULUM

The Radio Language Arts Project was not a curriculum development project. Instead, it sought to improve pupils' mastery of an established curriculum through the use of interactive radio instruction. This required that the existing curriculum be methodically implemented. The material specified by the syllabus had to be taught in such a way as to maximize the children's mastery and retention of the instructional objectives. The effectiveness of this teaching had to be monitored so that corrective action could be taken where necessary to ensure that the specified content had been learned as thoroughly as possible. Three pedagogic principles were designed to meet these requirements.

Systematic Instructional Design

One of the more difficult skills for classroom teachers to learn is how to pace effectively their coverage of a set curriculum. Even when the required content is clearly specified, there is a strong tendency to overteach those objectives which fall at the beginning of the year and, consequently, to shortchange those objectives scheduled towards the end of the year. Furthermore, some areas may be overlooked because the teacher feels weak in them and (often unconsciously) hurries past them or perhaps simply ignores them altogether.

For these two reasons, instructional system designers have always paid much attention to front-end planning. Content is clearly specified and scheduled before the lessons are recorded, in the same way that a film director may use a storyboard to plan a movie before shooting actually begins.

The RLAP's feedforward evaluation system, on the other hand, meant that the instructional package was developed continuously, responding to results from the use of previous materials with changes to future materials. A rigid lesson-by-lesson plan for a full year of radio lessons would not allow such ongoing development.

The RLAP used a three-step instructional design process to ensure that the entire curriculum was covered systematically while retaining the flexibility to respond to formative evaluation results. The first step was development of the Scheme of Work based on the existing syllabus. The Scheme of Work set a pace which covered the entire curriculum as thoroughly as possible. It established an appropriate instructional sequence in advance. Finally, it divided the content into units, or frames, each requiring approximately one week of instruction.

The second step was the preparation of a weekly script or lesson plan, which assigned the content required by one frame of the Scheme of Work to specific segments within specific lessons. Writers used the lesson plans to determine what their script segments must teach. This ensured methodical coverage of the curriculum as articulated in the Scheme.

Since the lesson planners were free to determine the exact amount of time (number of segments) allocated to each competency specified in the frame, the system also added the degree of flexibility necessary to make "in-flight" corrections according to formative evaluation results. When additional instruction on certain material was required, the lesson planner could insert it into a given week by reducing the time spent on the frame originally scheduled for that period.

The third step was the feedforward aspect of the formative evaluation process. The project's formative evaluation design is described in Chapter 5, and the way in which formative evaluation was integrated into the instructional design process is explained in Chapters 6 and 7. This system resulted in a regular flow of data on pupil achievement, which gave information about pedagogic effectiveness. This was used to modify future frames and lesson plans as well as to specify backwards revisions.

Distributed Learning

Psychologists demonstrated decades ago that skills which are practiced regularly are retained better, and that learning spread over time (distributed practice) is more effective than learning concentrated in only one period (mass practice) (Underwood 1961).

A more common mode of instructional organization, however, is the "topic"—one lesson devoted to one subject. In English language instruction the topic is usually a grammatical topic, such as "forming noun plurals" or "objective pronouns," or the like. Topical organization promotes mass learning, not distributed learning. It stems from and reinforces the traditional, teacher-centered view of instruction. Something has been taught when the teacher has covered it.

Unfortunately, many topics are taught but never learned. And even those which are learned today most probably will be forgotten tomorrow (or at least within a few weeks) if they are not properly maintained.

The way to judge the success of a teaching methodology is by pupil outcomes. Hence, we wanted children to be able to use Eng-

lish successfully in their classrooms. The substantial level of English language skill required by this goal and the relatively limited time available in which to achieve it meant that organization of instruction by topics had to be rejected as ineffective.

Distributed learning was a workable alternative. It could maximize initial learning and subsequent retention while minimizing the time required for adequate mastery of the objectives. One reason for adopting the RLAP's segmented script organization was to facilitate this instructional methodology. Rather than devoting one *English in Action* lesson to one grammatical structure, each lesson included instruction on several different competencies, from the four skill areas of listening, speaking, reading, and writing, and from different frames in the Scheme of Work. A given competency, on the other hand, was taught over several consecutive lessons. Then, as the next principle explains, after a few weeks it was maintained over several more lessons.

Besides facilitating efficient instruction, distributed learning enhanced the ability of the radio lessons to involve pupils. The relatively short attention span of lower primary children was much better served by a few minutes of concentration on one topic than by 15 or 30 minutes on the same topic. Children's interest could be maintained more effectively through the presentation of a variety of material and through the quicker pace such variety promotes.

Distributed learning can create a public relations problem, however. Topical organization is so common that most people expected to find it in our radio lessons, too. This meant that they might become concerned after hearing that one lesson devoted only a portion of the necessary time to mastering a certain objective, not realizing that the objective would be taught several times over several days. Although this point was stressed in the in-service teacher orientation, it was inevitably expressed as a concern by the same teachers over the first few weeks of radio lessons. Fortunately, the concern diminished and eventually disappeared as the teachers saw for themselves that their pupils were mastering more material more quickly than ever before.

Cyclical Review

Learning was not only spread over time, but previously taught material was also periodically reviewed, expanded, and integrated. In cycles of approximately four to six weeks after the conclusion of the initial teaching process, material from the same Scheme of Work frame was taught again.

Instruction was distributed over a period of about one week (i.e., the same amount at time devoted to initial instruction). For the second cycle, however, writers assumed that the children had retained some familiarity with the content, if not actual mastery. Maintenance segments, therefore, tended to be denser than initial teaching segments, covering more material in the same amount of time, but doing so in an integrated fashion by focusing on several frame components simultaneously rather than concentrating on just one or two at a time. As with the first cycle, we sought a minimum mastery level of approximately 70 percent as measured by weekly tests.

The cyclical review goes beyond review, or simply re-teaching the same content. Obviously, one intent is to jog the memory of the learner. Without the support of an English-speaking environment, the radio and classroom must provide regular practice and use of previously taught content.

In addition, teaching a competency again allows for expansion of the language useful in that competency. For example, an early competency was "talking about family members." Over the course of three years, the children periodically "talk about their families" but in each cycle they learn new vocabulary and structures in order to talk (or read and write) at a more sophisticated level.

At the same time the students are adding to their language, they are integrating it into what they already know. The cyclical review helps them do this by tying the new material to the old and practicing them together.

Formative evaluation results sometimes indicated an unacceptable level of achievement for a given frame component, requiring an additional instruction cycle. Whenever possible, this extra instruction was incorporated into initial teaching or maintenance segments already assigned to other frames. Since language uses many integrated skills simultaneously, this was often possible to accomplish without significantly reducing the amount of instruction originally planned. Alternatively, a second maintenance cycle could be scheduled for remedial purposes.

Lesson 102 from the middle of Standard 2 illustrates the complementary principles of distributed learning and cyclical instruction.[1] Its first four instructional segments maintain competencies[2] from Frame 13 which were originally introduced six weeks previously in Lessons 71 to 75:

A. Listening 1. Understand descriptive words related to morning and getting up.
2. Begin to hear the difference between verb forms (e.g., "She *looks* in the room." "I *look* in the room.").
B. Speaking 1. Talk about getting up and describe the situation.
C. Reading 1. Comprehend narration of a series of events based on habitual order.

Within these competencies, six words from the list of 15 vocabulary items specified in Frame 13 are maintained: dark, down, light/lit, night, put (on), wake/woke (up). Several other words from the syllabus which related to the segment stories are also reviewed (for example, "somebody" and "nobody"). The instructional strategies include simple didactic segments, oral and written stories with related comprehension questions, a drill contrasting "light" and "lit," and a song, as well as one segment which provides a change of pace through brief physical activity (a clapping song). Thirty-eight percent of Lesson 102 is devoted to maintenance segments.

Initial teaching segments, taking up 48 percent of the lesson, are spent on four initial teaching segments. In Lesson 102, Frame 19 included the following competencies:

A. Listening 1. Understand comparison of size and shape.
B. Speaking 1. Compare familiar objects and people by size and shape.
C. Reading 1. Comprehend comparisons.
D. Writing 1. Write the names of five animals found on the *shamba* (small farm).
2. Write from dictation, "This *tree* is bigger than that one.

Nine words from the specified vocabulary were included in the five segments devoted to Frame 19: bucket, dry, grass, shorter, taller, than, thicker, thin, and thinner. These are supplemented with other comparatives from the Standard 2 syllabus, such as young/younger and old/older. Instructional methods again include didactic segments, a story, a drill, and a song. A sixth segment, for change of pace and entertainment, also contributes to this instruction since it is a song built around the structure "It's too heavy."

In this manner, Lesson 102 mixes introductory and review work from frames separated by five weeks. The same lesson demonstrates how the Radio Language Arts Project distributes learning over several days. This particular program is planned for a Tuesday, the second lesson in the week. Each segment is one of a series of five teaching a specific competency that week. Generally, one segment of the series is used each day, so the instruction for that competency stretches from Monday through Friday. In the case of maintenance listening competencies, however, two of the five segments are used together, so that the review will be finished earlier

in the week and the children will be able to move on to other material.

Thus, the RLAP distributed instruction in two complementary ways: in cycles separated by several weeks, and within each cycle over several days. The effect was to increase learning and retention, and to make easier the process of systematic curricular implementation modified by feedforward formative evaluation results.

INTERACTIVE RADIO INSTRUCTION

Radio offers several advantages to those seeking cost-effective educational strategies. Instructional radio has been used for teaching languages in many countries over many years. Yet its potential as a tool for formal classroom instruction is still questioned by experts, and there is little systematic proof of its effectiveness for language instruction (Imhoof 1981).

One reason for the lack of clear evidence in support of formal instructional radio's value is the way in which the medium is generally employed for broadcasts to schools. By far the most common approach is to use short radio programs to supplement regular classroom instruction. Prior to the Radio Language Arts Project there were no descriptions in the literature of radio language instruction in which the broadcasts were designed to serve as the prime means of instruction. Even within the context of supplementary radio lessons the pedagogy tends to mimic conventional classroom instruction or textbooks rather than capitalizing on the medium's unique characteristics.

From its outset, therefore, the task of the RLAP was to make the best use of instructional radio's strengths while minimizing its weaknesses as much as possible. The instructional principles considered here are intended to realize the full potential of radio for language teaching. They are, therefore, among the most important aspects of the Radio Language Arts Project's pedagogy.

Intensive Use of Radio

The difference between the RLAP's intensive use of radio and more conventional, supplementary radio lessons is the difference between a teacher and a wall chart. The wall chart can assist a good teacher in some aspects of his or her work, but it cannot accomplish very much by itself. Without the wall chart, a good teacher can still succeed. Without the teacher, the wall chart is worthless. Even with the teacher's cooperation, the wall chart only helps with a small part of the total instructional job.

Supplementary radio lessons are very much like aural wall charts. They can be of significant help to teachers in the limited curricular areas on which they focus. But for most of the time, for most instructional objectives, the teacher must stand alone. Intensive radio lessons such as *English in Action*, on the other hand, are designed to carry a major portion of the instructional burden. They cover as much of the curriculum as possible, without leaving the teacher alone. In fact, the radio itself becomes a teacher.

This is not to say that radio becomes the only teacher. *English in Action* lessons did not replace the classroom teacher. In fact, they rely on the teacher's cooperation during the broadcast, and they are planned in recognition of the fact that some aspects of English are more efficiently practiced without any radio assistance at all. For those parts of the curriculum where radio can help teach more effectively, however, it is used to the greatest possible extent. It is a foundation, not an addition.

What is the greatest possible extent? In Kenya, radio has been used for many years to supplement classroom English instruction. There, lessons are approximately 15 minutes long. They are broadcast for eight weeks in each of the three school terms, for a total of 24 weeks, beginning in Standard 2. One new lesson is broadcast each week, although it is generally repeated at least once.

In comparison with this norm, the 30-minute[3] *English in Action* lessons are longer. They are much more frequent, since a new lesson is broadcast every day, not every week. They begin earlier, at the start of Standard 1, and cover 39 weeks of the 40-week school year. The result is that, over the first three years of primary school, RLAP children will listen to 292.5 hours of radio English lessons, compared to the 12 hours of radio which children in conventional classrooms would receive in the same period.

In other words, RLAP children are exposed to 25 times more instruction by radio than children in conventional classrooms that use radio as a supplement. It is this level of intensity that permits radio to assume a major pedagogic role. In such a situation it is no longer merely an occasional aid for the teacher. It becomes a strong partner.

The Radio as a "Door"

Conventional instructional radio tends to mimic a teacher as well as a teacher's methods. The Radio Language Arts Project adopted a different concept of the radio's role to avoid slavishly imitating a classroom teacher's methodology. We see the radio not as a substitute for the classroom teacher, but as a door into another world.

This world is inhabited by characters who become well known to the children—Juma, Rosa, Safiri, Tina, etc. They are friendly adults and children who often walk through the radio door to visit the classroom.

While in the classroom the radio characters can, in fact, act as teachers. In formal didactic segments they explain things, model correct patterns, and drill the children. During other segments they lead the children in songs, games, and physical activities.

A door is a two-way passage, however. As the radio characters can walk through the radio door into the classroom, so can the children use the same door to leave their school. If they cannot physically do so, they can at least peek through the door and see what is on the other side. Many segments, therefore, are not set in the classroom, but in the rural village where the characters live and work. These parts of the lesson provide dramatic interludes which not only capitalize on the medium's ability to engage the children's interest, but also extend or reinforce instruction.

Lesson 102, for example, begins (as do all lessons) with Tina and Safiri coming into the classroom to sing the Good Morning Song with the children and quickly introduce the next section of the lesson. The following lines are spoken under the drama theme, a musical cue to the children that they will soon be looking through the door themselves:

Safiri: Children, today I'm going to tell you a story about Sara and Rono.
Tina: But first let's practice the words "somebody" and "nobody."

Now Rono and Sara come into the classroom to lead several exercises about "somebody" and "nobody," using children in the classroom as well as words which the teacher has written on the blackboard. Safiri and Tina then lead the children in a song using some of the vocabulary items being taught, after which Rono and Sara take the children through a drill.

After the drill the drama theme reappears, and Safiri says to the children that he is going to tell them a story. While Safiri continues to talk from the classroom, the children peer through the radio door into Sara and Rono's home, to which the two characters have returned:

Safiri: Last night Sara and Rono were asleep. It was dark. Sara woke up. She said. . . .
Sara: Rono! Wake up!! There's somebody in thy room!
Safiri: Rono woke up. He lit the lamp.
(Sound of match striking.)

Rono: No, Sara. There's nobody in the room.
Sara: Then what *is* it?
(Sound of cat meowing.)
Rono: It's a cat!
Tina: Now, children . . . let's talk about the story.

By using the radio as a door and the actors as characters who can walk through it at will, we gain access to the full potential of instructional radio and escape the danger of merely imitating the methods of a classroom teacher. Not only does this concept allow dramatic and entertaining alternatives, it simultaneously frees writers from related assumptions, such as automatically sequencing lessons according to the textbook with no regard for the medium's special advantages.

Frequent Pupil Response

Children learn better when they are actively involved in the learning process physically, intellectually, and emotionally. This is a major challenge in conventional classrooms, where pupils often sit listening to their teacher talk for extended periods of time.

The problem is even more severe for radio. Any one-way broadcast medium tends to encourage passivity among listeners. An exclusively aural medium also risks losing the attention of its audience because the absence of visual messages allows easy distraction by extraneous stimuli. Any adult who has ever tried to listen to a cassette tape of a professional lecture will testify to this fact. It is a still greater concern for children, with their shorter attention spans. Unless careful steps are taken to promote active responses from young learners, the effectiveness of radio lessons will be significantly reduced. This is a central instructional design principle of the Radio Language Arts Project.

The first key to success in this area has just been described: getting children to accept the radio as a door into another world, whose characters can communicate with the pupils in the classroom. The primary objectives of the first Standard 1 lessons centered on this task. Children learned to respond directly to commands and questions from the radio characters during carefully timed pauses in the broadcasts.

Because those characters, in turn, seemed to reply to the children, a sense of two-way communication was created. By Standard 2 this interaction became a strong foundation for the instructional message. With no hint of self-consciousness, pupils learned to ask and answer questions of the radio characters, sing songs with them, play games with them, and travel with them in the realm of imagi-

nation to a variety of locales where functional English can be acquired and practiced.

Once this two-way relationship was established, it was possible for the radio to stimulate pupil participation. RLAP writers tried not to let more than 10 to 20 seconds lapse without requiring some sort of response from the children. The exact type of response depended on the instructional objectives being treated. For example, pupils could be asked to answer a question, ask a question, repeat a pattern, work through a transformation drill, read a sentence, find a word, write a phrase from dictation, or copy a sentence from the blackboard.

To hold the pupils' attention effectively, the lessons had to be interesting as well as participatory. Besides asking questions or posing problems, the radio characters might ask the children to perform a song or chant. They might have the class play a short game requiring physical activity. They could ask a riddle, or have the children act out a story. Often these activities are linked in some way to the formal curriculum, but they can be employed for their own sake, too.

Figure 10 shows the pattern of responses for Lesson 102, Standard 2.

During Lesson 102 every pupil in the class is required to respond to the radio in some way 155 times. (Some individual pupils also are asked to do other things, but these activities are not included in Figure 10.) Since the lesson lasts 28:30 minutes, pupils respond more than five times per minute on the average. This is roughly one response every 11 seconds. The longest time between pupil responses in this lesson is 1:11 minutes, when Safiri is telling a story to the children in segment C2-3. During the drills, on the other hand, sometimes less than a second elapses between responses. In all, 39 percent of the lesson (11:12 minutes) is used for pupil participation of some type.

Besides demonstrating the high frequency of pupil responses in the *English in Action* broadcasts, Lesson 102 shows the wide variety of such interactions. By far the most common is repeating a reinforcement given by the radio (for the reasons explained below). Forty-one of the 155 responses (26%) are of this type. Repeating something modeled orally (15 responses), reading aloud (15), and writing from a model (2) represent another 21 percent of the total number of responses. There are 26 responses (17%) as part of two oral drills, and 15 responses (10%) requiring oral or reading comprehension.

FIGURE 10
Pattern of Pupil Responses in Lesson 102, Standard 2

Segment	Response Type	Number	Length
A1—Standard opening	sing	1	:20
(1:09)	conversation	1	:03
	subtotals: A1	2	:23
C1—Continuity	none		
(:25)			
C2-3—Oral Maintenance	drill	14	:52
(8:13)	repeat model	8	:31
	repeat reinforcement	8	:22
	oral comprehension	1	:04
	sing	3	:51
	look	3	:06
	subtotals: C2-3	37	2:46
D1- Continuity	none		
(:12)			
D2—Enhancement	physical activity	10	:25
(1:02)	conversation	1	:03
	subtotals: D2	11	:28
E1—Continuity	none		
(:13)			
E2-3—Reading Maintenance	read aloud	9	1:04
(4:29)	repeat reinforcement	11	1:05
	repeat poem w/actions	2	:24
	look	2	:04
	subtotals: E2-3	24	2:37
E4—Reading, initial	read aloud	6	:40
(3:33)	repeat reinforcement	12	:34
	reading comprehension	6	:14
	look	1	:02
	manipulate materials	4	:09
	subtotals: E4	29	1:39
F1—Continuity	none		
(:17)			
F2—Enhancement	sing	3	:30
(:58)	subtotals: F2	3	:30
G1—Continuity	none		
(:16)			
G2—Oral, initial	drill	12	:36
(4:46)	repeat model	7	:28
	repeat reinforcement	10	:24
	oral comprehension	8	:15
	sing	2	:18
	look	2	:04
	subtotals: G2	40	2:05
H1—Continuity	none		
(:16)			
H2—Writing	write	2	:22
(1:46)	look	4	:08
	manipulate materials	1	:33
	subtotals: H2	7	:33
J1—Standard close	singing	1	:09
(:51)	conversation	1	:02
	subtotals: J1	2	:11
Totals For Lesson 102		155	11:12

Pupils are called upon to sing or chant (11 times) and engage in some physical activity (10 times) for 14 percent of the lesson. They are asked to look at something 12 times, manipulate objects such as pencils and worksheets 5 times, and answer conversational questions (for example, "Ready?") 3 times.

All of these techniques, and many others, involve pupils actively in each radio lesson. In this manner, the children's attention is held firmly, they are better able to acquire new skills, and they are more likely to retain those skills. One result is that teachers and headmasters frequently comment on how much the children enjoy and are interested in the *English in Action* lessons.

Modeling Good English

The extraordinary challenges Kenya faces in teaching English to every primary school child have already been noted. In particular, there is an increasing number of teachers who lack the skills necessary to model and teach English effectively. Yet rural children probably need better instruction than those in the city. The linguistic environment in rural areas is very different from urban centers such as Nairobi. Children in urban schools hear English regularly outside of their classes; rural children rarely encounter the language except in an academic context.

One of the particular advantages of radio in teaching foreign languages is that it can provide a good oral model for learners, an important aspect of the Radio Language Arts Project instructional methodology.

The standard model of English provided by the *English in Action* lessons is very important. The goal is not only correct English, but English which is natural and useful within the Kenyan academic and social contexts. The four regular actors for the series included two professional announcers from the Voice of Kenya, a well-educated housewife who is now working full time with Schools Broadcasts, and a college student. They worked closely with the writers to harmonize each lesson's pronunciation and intonation with standard Kenyan English, as defined by British usage in grammar and vocabulary and educated Kenyan usage in vocabulary and intonation. Lessons were designed to compensate for some types of broadcast problems by stressing clarity in the actors' speech without sacrificing naturalness.

The result of these combined strategies is one of the important instructional design principles used by the RLAP. Stated simply, the radio lessons sought to expose children to English of much

better quality than they would otherwise hear. Without the radio, many teachers would have difficulty providing consistently high standards of grammar, vocabulary, pronunciation, and intonation. Without the radio, rural children have little exposure to good English beyond what their teachers can offer. With the radio, however, all lower primary children can hear the same high quality model of the target language. Whether they are in an English-rich urban environment or an English-poor rural environment, the *English in Action* series ensures that they are exposed to the linguistic model which they need to learn well.

When this principle is combined with the complementary strategy of maximizing time-on-task, the radio can provide increased quantity as well as increased quality of English. Together, these two factors undoubtably account for much of the achievement gain in children exposed to daily radio English lessons.

Immediate Reinforcement

Another important lesson for education is that learning is enhanced by immediate feedback to the learner. This is also an area where the one-way nature of broadcast media can cause problems unless appropriate care is taken.

The Radio Language Arts Project lessons are designed to serve teachers who may be weak in English, as well as those with good English skills. Therefore, each segment must be planned so that the pupils will benefit from everything that the classroom teacher can contribute, but will not suffer if this contribution is limited.

For this reason, the radio gives pupils correct answers to problems as often as possible without assuming that the teacher will participate. If the pupils have already responded correctly, the radio's answer reinforces their success. If they have responded incorrectly, or have not responded at all, the radio's answer shows them a proper response. Almost every time the radio provides this kind of reinforcement with new material, the children are asked to repeat it with the cue, "Again."

There are, of course, reinforcement strategies other than repeating the correct answer. The other logical possibility for radio broadcasts is generalized approval (for example, "good" or "well done"). These are used sparingly in *English in Action* lessons, however, because it is impossible for the writers to know for certain whether the children's response will in fact be good. Giving one right answer, on the other hand, automatically provides positive reinforcement or corrective feedback as appropriate.

As noted above, 26 percent of the pupil responses called for in Lesson 102 were repetitions of a radio-supplied reinforcement, a total of 41 repetitions in all. Comparing this to the number of responses requiring children to repeat an oral model (15), read aloud (15), and answer oral or reading comprehension questions (15), one sees that pupils heard academic reinforcement 45 times during the lesson and repeated more than 90 percent of these reinforcements.

The following excerpt from an oral maintenance segment illustrates the simple technique involved.

Sara:	Look, Rono, I can touch the top shelf!
Rono:	You're tall, Sara!
Safiri:	Children, is Sara tall?
	(Pause 3 seconds for pupil resonse.)
Rono:	"Yes, she is." Again.
	(Pause 2 seconds for pupil response.)
Sara:	Rono, try to touch the top shelf. (teasing)
Rono:	I can't, Sara. I'm too short.
Safiri:	Children, is Rono short or tall?
	(Pause 3 seconds for pupil response)
Sara:	"He's short." Again.
	(Pause 2 seconds for pupil response.)

The open-ended nature of language makes such reinforcement difficult to implement for English. In the case of reading exercises, the problems are minimal. If the child has been asked to read something, the radio can repeat it correctly. If a comprehension question has been asked, the radio can model an appropriate answer.

In the case of writing, on the other hand, it is very difficult for the radio to provide effective reinforcement. The pupil's attention can be drawn to a model of the correct response, but his or her actual written work can neither be judged nor corrected by the radio. This remains the teacher's responsibility.

Oral language falls between these two poles. In the first year of broadcasts it was fairly simple to anticipate the correct response to a question, since the pupil's English was relatively limited. As the children's language ability increased, however, so did the difficulty of reinforcing correct responses. In the above example, there can be several good answers to the question, "Is Rono short or tall?" Appropriate responses include: "He is short," "He's short," "Short," "I think he's short," "Short, of course," etc.

Fortunately, classroom observations suggest that the pupils are not confused by hearing the radio offer one correct answer after they have given a different one. Sometimes they will change their

next answer to follow the radio model, and sometimes they will continue with their own chosen pattern.

The important thing seems to be to demonstrate the correct concept in one of the appropriate linguistic contexts. Most children can then compare their answers to the one modeled and verify or correct it as necessary. If they are certain that their response was linguistically correct they will continue to use that pattern. Otherwise, they will switch to the one modeled by the radio. This allows the continued use of the important instructional technique of immediate reinforcement during the broadcast.

An Engaging Instructional Pace

One of the earliest challenges faced by the RLAP team was to establish an effective instructional pace. How long should each lesson last? What should be its tempo and timing? How should different types of programming be selected and mixed? How quickly should the curriculum be covered?

Probably the most significant decision in this area was to divide each lesson into discrete segments, or pieces. It was based on two major considerations. First, the curriculum itself breaks neatly into three separate areas: listening and speaking, reading, and writing. Second, the attention span of a child of six or seven years who is just entering Standard 1 is closer to three minutes than to 30 minutes. Even Standard 3 children are limited in their ability to focus on an academic task for any extended time.

The segmented lesson format was chosen, therefore, as a way to accommodate distributed learning by allowing each broadcast to address all skill areas in both initial teaching and maintenance modes, and as a method of holding pupils' attention for a relatively long time. The Radio Mathematics experience showed us that 30-minute lessons were possible. Even so, there was considerable skepticism among our colleagues at the Kenya Institute of Education that Standard 1 children could endure a 30-minute broadcast. The regular Schools Broadcasts from the Educational Media Services do not begin until Standard 2, and then they are only 15 minutes long. Even the Standard 3 broadcasts last for 20 minutes at most.

Some of our earliest field tests, therefore, investigated the possibility of a 30-minute segmented lesson. We were pleased to discover that there was no problem in holding children's attention, even at the late nursery school level, as long as the segments were short and varied enough and the learners were actively involved.

Striking a balance among different types of segments was a somewhat more difficult job. The need to establish an effective and varied pace is limited by the sheer bulk of the curriculum. The entire curriculum, including all of the major structures of the English language and 2800 vocabulary items, is allotted 256 hours of new radio instruction. The Scheme of Work and the lesson plans distribute this content. It takes the creative ingenuity of the writers to make the lessons engaging. Chapter 6 discusses the ways in which language teaching methodology was coupled with various radio techniques to develop lively lessons.

One of the disadvantages of the radio medium, however, is the fact that it must set one pace for all children. It is not able to individualize instruction, as can a competent classroom teacher, because writers cannot assess the needs and performance of particular children in particular schools as *English in Action* is being broadcast. The clear danger is that the pace set in an effort to meet the demands of the syllabus will be too fast for some children.

Pace was a constant concern of project staff from the beginning of our work. Early in our planning we made a basic decision. Insuring that the children learn what we present is more important than thoroughly covering every single item in the syllabus. The prioritized sequencing of the Scheme of Work is designed so that, if the tempo must be slowed, the least important material will be omitted. Within this context the lesson planners attempted to set a pace that would allow slow and average children to keep up without boring the faster children.

One of the most important tasks of the formative evaluation system was to indicate how well this objective was being met. When problems arose, appropriate steps were taken to correct the situation. For example, in the middle of Standard 2, test results and observation reports indicated that a group of children at many schools was falling behind the class leaders in reading skills. On the basis of supplementary investigations by project staff, it was decided to review certain reading skills, such as word attack, even if this meant slowing down the introduction of new material from the Scheme of Work.

In brief, the principle of appropriate instructional pace is applied in two ways for the Radio Language Arts Project. First, each lesson is designed to teach effectively as much material as possible by varying the style and tempo of the component segments. Second, the lessons for each year are planned to cover as much of the curriculum as possible without risking leaving a large group of children hopelessly behind.

Maximizing Time-on-Task

One of the most powerful predictors of student achievement is time-on-task (Strother 1984). The more time children spend studying something, the more they are likely to learn.

The consistent application of such obvious principles in practice, however, can be elusive. In the case of time-on-task, the concerns of most teachers and curriculum developers center on the total amount of time allocated to a given subject in one year. Less frequently examined are the amount of time actually spent teaching that subject within the allocated time, and the amount of active learning taking place in response to that teaching. Simple arithmetic shows that if only half of each class period is used for learning activities related to the target instructional objectives, pupils will learn only half as much as they might have learned.

This is certainly a concern for foreign language instruction. A surprising amount of the average EFL class is conducted in some language other than English. The situtation worsens when teachers are not comfortable in English, for they are then even more likely to retreat to discussions *about* English conducted in a vernacular language. One way to improve learning by pupils in rural schools with less qualified teachers, therefore, is to ensure that the lessons are conducted in good English to the greatest extent possible.

The centralized control offered by instructional radio offers an obvious solution. For the two and one-half hours each week that Radio Language Arts Project pupils listen to *English in Action*, we can make certain that they hear as much English as possible.

During the early stages of the Standard 1 broadcast, teachers were asked when necessary to speak to the children in mother tongue, serving as intermediaries between the pupils, who had virtually no English at that point, and the lessons, which were conducted in English only. Once pupils gained some initial language skills, however, this type of mother tongue intervention was substantially reduced. Teachers were asked to explain something in mother tongue only when required to ensure mastery of some lexical item difficult to teach successfully. Most lessons called for no use of the vernacular at all.

Given the restricted amount of time available for English lessons during the first three years of school in Kenya, maximizing the actual time-on-task within each lesson is even more important. It is the only way to permit effective teaching of all of the critical components of the curriculum. The principle also has two secondary benefits.

First, the decision to conduct radio classes exclusively in English solved another problem facing the project team. In a country with more than 40 languages, how can broadcasters communicate effectively with children? Since it is not practical to produce multiple versions of each lesson without astronomically increasing the costs involved, the use of only English in the broadcasts was an important alternative.

Second, the intensive use of English in the RLAP lessons served as a useful model for teachers and pupils. In the complementary, teacher-led lessons that augment the radio lessons, teachers were encouraged to use more English and less vernacular, further increasing the time on task. Team members noted that project teachers tended to use English immediately after the broadcasts for transitions to the next class. Headmasters have reported that RLAP pupils use English outside of their English classes (for example, on the playground) far more frequently than children from conventional classrooms. This multiplier effect enhances the results of maximizing the amount of English used in each broadcast.

EFFECTIVE USE OF OTHER INSTRUCTIONAL MODES

There is no such thing as the perfect teaching technology. No one should argue that radio is a panacea for the many challenges facing an educational system like Kenya's. The purpose of the Radio Language Arts Project was to explore its potential for cost-effective instruction by capitalizing on its strengths and compensating for its weaknesses.

The 10 principles already described primarily address the question of capitalizing on radio's strengths. The next three principles, on the other hand, focus on compensating for its weaknesses by supplementing the broadcast lessons with help from the teacher, printed materials, and non-print materials.

It should be noted, however, that these compensatory strategies introduce problems of their own. The extent to which an instructional radio system relies on supplementary modes to enhance its effectiveness limits, in turn, some of the major advantages offered by the radio medium itself. In particular, relying on teachers too heavily can reduce the ability of radio to offer an alternative to weak instructors. Relying too heavily on printed materials and other props can increase the cost of radio-based instruction and reintroduce distribution problems.

Generally, the Radio Language Arts Project has sought a moderate approach, compromising between an exclusive use of unsupplemented radio and a heavy reliance on alternative instructional

modes. The goal has been to ameliorate some of radio's problems without introducing major new disadvantages.

The Radio/Teacher Partnership

The basic goal of the *English in Action* radio lessons is to enhance the classroom teacher's effectiveness. This is accomplished by bringing into rural classrooms instructional techniques that might not otherwise be available: systematic coverage of the curriculum, a strong model of correct English, sophisticated pedagogy, maximum exposure to the target language, and lessons that can capture children's attention and motivate them.

As the pupils' English improves, it becomes neither realistic nor efficient to expect the radio to be able to teach everything. It can carry a major instructional burden, but the greater the teacher's contribution, the more the children will benefit. On the other hand, if the radio's potential to compensate for specific weaknesses in specific teachers is to be realized, the programs cannot depend too heavily on the teacher's contribution lest children in classrooms with teachers of limited English ability and/or language teaching skills suffer.

Some things are virtually impossible to teach without the help of a human being in the classroom. The radio alone is inadequate to these tasks. Other important components, such as reinforcing feedback to pupils, can be made far more effective with the teacher's competent help. The radio can tell children what *one* good answer to a question is. Only someone in the classroom can tell the children whether *their* answers were good.[4] Finally, the all important challenge of individualization requires a teacher. The radio can deliver effective instruction to most pupils, but it cannot respond to the particular needs of individual children.

The RLAP team developed three principles on which to base the relationship of the teacher to the radio in the *English in Action* series:

1. The radio lessons should offer some benefit to children who have no help at all from a teacher in their classroom. This means that some parts of each lesson must teach without relying on printed materials, blackboard work, or teacher intervention. The regular inquiries from schools which indicate that they are using English in Action without benefit of teacher's notes or worksheets, and reports of adults such as taxi drivers and housemaids listening to the lessons each morning, suggest that there is some value to the RLAP broadcasts by themselves.
2. Minimally adequate learning in each of the four skill areas

(listening, speaking, reading, writing) must take place with limited intervention by the teacher. If he or she only prepares the blackboard, distributes the worksheets, and selects children required to assist in the lesson, pupils must be able to master the major foundational objectives of the curriculum.

3. To the extent that the teacher can go beyond these minimum requirements, his or her pupils must benefit. The lessons must augment the teacher's abilities, and take advantage of whatever contributions he or she can make to the educational process.

In other words, the radio is a foundation, not an equalizer. Its purpose is to ensure some minimal level of learning on the part of every participating pupil. Those children lucky enough to be in classrooms with strong teachers, however, will learn more than those with weak teachers.

The most effective use of the *English in Action* lessons, therefore, requires cooperation between the teacher and the radio. This partnership is implemented in two ways. First, in the process of preparing the Scheme of Work for each year, a careful analysis is made of every objective to determine the most efficient way to teach it. Some objectives are assigned primarily to the teacher's area of responsibility, with the radio offering support. Lesson plans are prepared by RLAP staff for such areas, so that these competencies can be covered systematically, too.

These teacher-led lessons are called "complementary lessons" to emphasize the fact that they are intended to augment the radio lessons. They are scheduled in the time available for English beyond the two and one-half hours devoted to broadcasts. In Standard 2, for example, the current national timetable calls for four hours of English each week. Five 30-minute *English in Action* broadcasts leave one and one-half hours for additional instruction. The project's teacher training specialist, therefore, prepared detailed lesson plans for two complementary lessons per week in Standard 2. Each of these lessons is designed to last between 30 and 45 minutes.[5]

A good example of this teacher/radio partnership is written work. Only two minutes out of 30 in each Standard 2 *English in Action* lesson are devoted to writing. This time is used to introduce the children to new skills (such as writing from dictation). Practicing these skills, on the other hand, is left to non-radio class periods under the guidance of the teacher. Devoting half of the radio lesson to writing practice, however, with dead air in the background while

children execute tasks for which the radio can give little useful feedback, would be inefficient and ineffective.

Second, teacher's notes are prepared for every radio lesson to provide teachers with a clear picture of what will be covered and how they can work effectively with the radio. These notes summarize the content of the lesson, outline the preparation required, and give specific suggestions about what the teacher should do during the broadcast. The broadcasts themselves contain guidance for the teacher whenever necessary, to supplement the most important points in the teacher's notes. The in-service training workshop held at the beginning of each year emphasized how teachers could help make the broadcasts more effective as well as how the radio could enhance the teachers' effectiveness.

Printed Materials

One of radio's strongest advantages when compared to the more conventional technology of textbooks is that it can avoid the costs of printing and distribution. Kenya, for example, benefits from the good primary English textbook series, *The Progressive Peak*. Even in the small sample of 31 Radio Language Arts Project schools, however, few had enough copies of these books for every lower primary pupil, and some had almost no copies at all.

Part of the problem is supply. Books are not always available from the publisher when needed, and they represent a major expense. Even more significant is the distribution problem. Many project schools had funds available to purchase the Progressive Peak books they need. The books can be obtained in Nairobi, but they are absent from the district school equipment supply centers which serve rural areas.

Completely avoiding the need for printed materials to supplement *English in Action* would solve this problem. Unfortunately, this was not practical. Language teaching benefits strongly from visual perception. Printed materials play an important role in any EFL program, particularly for reading. One cannot learn to read without having something to read.

Rather than trying to eliminate all printed materials completely, then, the RLAP sought to reduce the amount of series-specific material to a minimum while allowing schools to take advantage of whatever textbooks they might have. This parallels the philosophy that lessons do not require, but can benefit from, strong teachers.

To achieve this goal, the radio broadcasts themselves make no mention of *The Progressive Peak* textbooks. A school without a single

English book would still be able to use the *English in Action* series fully. Instead, guidelines are provided for using the Peak books, if they are available, during the complementary teacher-led lessons. If these textbooks are not available, the teacher can substitute other books or, if necessary, rely solely on the materials used during the radio lessons.

The minimal print material supplied by the project was the pupil worksheets. RLAP worksheets used typewritten text and simple, black-and-white line drawings, primarily to support reading work. When oral segments required such worksheets, writers used or modified the ones already designed for the reading segments rather than developing new ones.

The number of these worksheets was held to an absolute minimum. Nevertheless, this figure tended to increase as the pupils moved to higher grades and the reading component assumed greater importance.[6] Nineteen worksheets were developed for Standard 1, 48 each for Standards 2 and 3. Their simple design made them relatively inexpensive to prepare and print. Simple offset printing or even mimeographing is adequate.

During the project's pilot phase these worksheets were continuously developed in conjunction with the lesson scripts, and distributed (with the teachers' notes) to project schools every other week. This was required by the feedforward formative evaluation system, which assessed the entire instructional package, including printed materials. For national implementation, however, the worksheets could be compiled as small booklets, which would be cheaper to print than textbooks ($.11 to $.21 per booklet, depending on the number of pages and the quantity ordered) (Kemmerer and Friend 1985).

Non-print Materials

The strategy for reducing printed materials to an absolute minimum relies in part on substitutes which can be provided by the teacher. Two major alternatives were used: the blackboard and simple props.

Every set of teacher's notes had a section entitled "On the Blackboard," and most lessons called for at least some use to be made of this most basic of all educational technologies. The obvious advantage of the blackboard for the project was that it could replace some printed material. Whatever the teacher could draw or write on the board did not have to be distributed in a book.

A second advantage was pedagogic. One difficulty of radio instruction is providing cues to direct the pupils' attention. A teacher helping the class to read a short paragraph can easily get the children to look at a specific word by holding up a copy of the book and pointing to the proper place. The radio, on the other hand, must guide the children through a complicated series of steps. For example, "Find the third line. (Pause) Touch the third line. (Pause) Now find the fifth word. (Pause) Touch the fifth word. (Pause) Read the fifth word. (Pause)" This can be shortened somewhat by using numbers or other symbols to cue the children, but only at the expense of creating a somewhat artificial format for written English. Even the most sophisticated approaches to the radio's guiding the children through such tasks have proven to be time-consuming and difficult for pupils to follow.

Using the blackboard is an excellent alternative. Once the teacher has written a few words or sentences there, he or she can focus the children's attention as necessary simply by pointing with a stick. The same pointer can help younger children master skills like reading from left to right, or moving from the end of one line of text to the beginning of another. It can help pace older children as they move through the body of a paragraph. This proved to be a powerful instructional technique in *English in Action*.

There are, of course, constraints on this method, namely blackboard space and teacher time. RLAP blackboard work sometimes had to coexist with material from other subjects which was complicated enough to be saved from day to day. Even when *English in Action* had sole claim on the blackboard, too many drawings or too much text could exceed the available space. The teacher had a limited amount of time to write large amounts of text on the board. Some teachers lack the skills to do anything more than the simplest of drawings.

For these reasons, scriptwriters had to pay careful attention lest the demands of several segments written by several people completely overload the blackboard and the teacher. A special planning chart was used for this purpose. As segments were developed, the writer made a note on it every time board work was required. Each writer checked this chart before adding anything to the blackboard in a given lesson, to ensure that no unreasonable demands were made.

The other way of reducing printed materials is by using simple, easily available props. There is no need to show children a picture of a pencil when the real thing will teach the vocabulary word "pencil" more effectively.

The teacher's notes list those props that had to be acquired ahead of time. Great care was taken not to request things that are too expensive or too difficult to find. This was another aspect of the radio methodology which was carefully monitored by formative evaluation, so that corrections could be made when unobtainable props are requested.[7] Even given this limit, however, the use of props has become an important component of *English in Action*.

Cost Control

As with any educational technology, instructional radio involves expenses against which its achievements must be measured. Start-up costs can be high, particularly for a new series such as *English in Action*. Operating costs are a significant factor, particularly for the air time required by the broadcasts.

Because of the inherent expenses of developing and broadcasting radio lessons, it is important to ensure that no additional costs are unnecessarily associated with the methodology if the total package is to remain economical. Furthermore, pilot projects such as the RLAP too often depend on resources (human and temporal, as well as material) which cannot be supported by normal operating budgets. In such cases, of course, no matter how impressive the results, the new methodologies can never be properly implemented.

The goal of the Radio Language Arts Project was to develop an effective radio-based instructional package which could be used nationally with minimum additional expense. The basis of this package was three years of radio English lessons which are "on the shelf," ready for use with no additional investment other than the broadcast time itself. Two additional components, however, required further expenditures: printed materials and teacher training. A primary objective of the RLAP, therefore, was to hold down these two costs. Since this had pedagogic implications, cost control became an instructional design principle in its own right. Cost guided our decisions about pupil worksheets and in designing teacher's notes. Major cost issues are discussed at length in Chapter 11.

CONCLUSION

None of the instructional methods described in this chapter are particularly revolutionary. Most are based on principles which have been recommended in the literature for some time. Their potential for establishing an effective, innovative approach to teaching English by radio rests on two facts.

First, the RLAP integrated these methods into an instructional package. For example, the active participation of the children was enhanced by the engaging pace of the instruction, while the proper pace was maintained in part by the pupils' participation. The systematic instructional design process facilitated the distribution of learning in cycles of days and weeks, while these same cycles provided a natural structure within which to design the series of lessons systematically.

Second, the RLAP applied these principles *in practice*. We worked hard to identify, validate, and *use*, on a daily basis, an instructional methodology based on the principles elucidated in this chapter, principles which often required us to change our previous ideas about designing mediated learning packages.

This is not to suggest that the pedagogy described here was either perfectly conceived or perfectly executed. The formative evaluation results consistently identified areas where new principles had to be developed or old principles applied more consistently. *English in Action* evolved as the project team gained more experience and knowledge. The important point, however, is that this evolution was guided as much as possible by the powerful instructional principles explained above.

NOTES

1 This chapter draws on Lesson 102, Standard 2, for several specific examples of the application of the instructional principles being discussed. Lesson 102 was produced at the Voice of Kenya studios on May 18, 1983 for broadcast on June 28, 1983, halfway through Standard 2.

2 Competencies from three skill areas, listening, speaking, and writing, are generally maintained in each lesson. The fourth skill area, writing, involves primarily psychomotor skills which can be practiced in concert with a wide variety of speaking/listening and reading objectives. For this reason, the specific writing competency from a given frame usually is not assigned special maintenance segments.

3 The actual running time of these Schools Broadcasts is always somewhat shorter than what is shown on the timetable to allow for continuity announcements between programs. Each *English in Action* lesson, for instance, runs approximately 28:30 minutes. These global calculations, however, are based on the full 15- and 30-minute periods, respectively.

4 On the other hand, problems arise when the radio and the teacher give conflicting feedback. Every time we have observed this situation, the pupils have followed the teacher's lead. For obvious reasons, he or she is a far more important classroom influence than the radio. The consistent use of one correct answer to reinforce every pupil response assumes additional importance in this context. It helps to guide some teachers as well as their pupils.

5 Most teachers take a few minutes each day to prepare for the radio lesson. In order that *English in Action* not interfere with other subjects on the timetable,

headmasters are instructed to reduce the complementary lesson periods to compensate for this time. Furthermore, during the project's pilot phase it is important that the time spent teaching English with the radio methodology not exceed the time spent at each school the previous year teaching English without the radio. Project schools are told, therefore, to reduce the time alloted to complementary lessons as necessary to keep the total English class time constant in schools which deviate from the official timetable.

6 The Radio Mathematics Project in Nicaragua was able to reverse this trend. No individual pupil worksheets at all were distributed after the last third of the first grade course. They were replaced by a set of 14 posters for each classroom in the second year, and pasteboard rulers and inexpensive copies of arithmetic tables in the third and fourth years. This is one area where mathematics instruction is better able to take advantage of radio's potential than language instruction. See Jamesine Friend, "Shaping the Radio Mathematices Curriculum," in *Radio Mathematics in Nicaragua*, eds. Jamesine Friend, Barbara Searle, and Patrick Suppes. Stanford, California: Institute for Mathematical Studies in the Social Sciences, Stanford University, 1980, p. 50.

7 Formative evaluation results in this area occasionally surprise the team. For instance, a series of Standard 1 lessons used books to teach colors. Teachers were asked to obtain books with different colored covers for use during the broadcasts. These props were very effective, except that many teachers could not obtain a book with a black cover. By chance, none of the textbooks normally available in a typical Standard 1 classroom met this criterion.

REFERENCES

Imhoof, Maurice. 1981. "Reading by Radio: A Position Paper on the Use of Radio in Teaching Reading Skills for Educational Development." Washington, D.C.: Academy for Educational Development.

Kemmerer, Frances, and Jamesine Friend. 1985. "Strategies for and Costs of Disseminating the Radio Language Arts Project throughout Kenya." Washington D.C.: Academy for Educational Development.

Strother, Deborah Barnett. 1984. "Another Look at Time-on-Task." *Phi Delta Kappan*, June 1984: 714-717.

Underwood, B. J. 1961. "Ten Years of Massed Practice on Distributed Practice." *Psychological Review* 86: 229-247.

CHAPTER 4
ADAPTING A CURRICULUM TO RADIO

Philip Sedlak

The principal objective of the Radio Language Arts Project, to improve the quality of basic English instruction offered to children in the first three years of the Kenyan primary school system, also stipulated:

- The primary medium of instruction for the three-year instructional package was to be radio.
- This radio-based package was to be delivered at minimal cost.
- The radio language arts curriculum was to be the same curriculum taught in the schools of Kenya. These constraints then affected the way the curriculum was implemented; that is, the way it was put into the hands of the teachers and students.

This chapter describes the process of adapting the curriculum to interactive radio instruction. The first section discusses the work of translating the Kenyan text-based curriculum into a radio-based curriculum and interpreting it for the scriptwriters.

ADAPTING THE KENYA CURRICULUM

Specification of curriculum content followed three developmental stages. First, the Kenya English syllabus was analyzed. This content was reorganizd as the yearly Scheme of Work, and on the basis of the Scheme of Work, daily lesson plans were developed.

The Kenya English Syllabus

The Ministry of Education booklet, *Kenya Syllabus for Primary Schools: English*, specifies the curriculum content of the *English in Action* radio lessons, as it does for all English classes in Kenyan public schools. For Standards 1-7, the syllabus summarizes the objectives as follows:

> All children should acquire a sufficient command of English in spoken and written form, to enable them to communicate freely, follow subject courses and textbooks, and read for pleasure in the language (Ministry of Education, 1978:1).

It further states that students who complete Standard 7 should have:

> (a) a pronunciation of international intelligibility, (b) a good ear for language, (c) a working command in the necessary skills of words and phrases (including idioms) of general serviceability, and (d) working command in the necessary skills of grammatical items (often referred to as "Sentence Patterns") of general serviceability . . . (1-2).

On the basis of the generalized objectives cited above and the specific content to be taught listed as "words" and "sentence patterns" in the Kenya syllabus, the RLAP team, in consultation with a curriculum development specialist, developed a series of behavioral objectives for the skill areas of listening, speaking, reading, and writing. A typical behavioral speaking objective might be stated, for example, "to talk about getting up in the morning and describe the situation." Program developers used this series of behavioral objectives as guidelines for the design of our Scheme of Work and the daily lessons.

The syllabus lists two sets of vocabulary items, one for listening and speaking, and another for reading for each of the seven years of primary English. It specifies a total of 1600 oral (listening and speaking) and 1200 reading vocabulary items, and a subset of the oral items, for the first three years of English instruction. It also lists 45 "sentence patterns" for the first year, 45 for the second, and 30 for the third. The syllabus does not state, beyond the content of the brief quotation above, what level of mastery is expected of the vocabulary or structures.

The syllabus is essentially a set of lists for each Standard: a list of listening and speaking vocabulary, a list of reading vocabulary, and a list of sentence patterns. This linguistic content is realized in *The Progressive Peak English Course*, the textbook series which sequences the language, gives guidance to the teacher on methodology, and provides the exercises, stories, and examples that are intended to bring the language to life.

One suspects that the syllabus—at least the vocabulary lists—was written *after* the texts and simply listed everything in the books. The vocabulary seems rather arbitrary and frequently irrelevant, particularly to Kenyan rural children.

Sentence patterns, on the other hand, are very much like those covered in other beginning-level texts. Given the density of the sentence patterns, however, it is unlikely that very many pupils even approach mastery of the more complex structures. For example, the pattern suggested for the Standard 2 level: Sentences

with anything, something, nothing, anybody, somebody, nobody; e.g., Is there anything in the bag? There's something/nothing in the bag. Is there anybody at the door? There's somebody/nobody at the door. This pattern—really a set of structures—is especially complicated, and when it is combined with negation becomes even more so. Since we were responsible for teaching the structures specified in the syllabus, we introduced them in our instructional program with modest expectations as to the level of mastery.

Although the syllabus for Standard 3 level consists of only 30 additional structures, they include those which would comprise a complete syntactic inventory of the English language, if the implications of each of the suggested structures is taken into account. Again, these structures can only be introduced, but with only 256 hours of radio instruction to cover all the complex structures, such as relative clauses, as well as simpler ones, mastery is unlikely. The content of Standard 3 appears to increase in complexity compared with that of Standards 1 and 2. The aim seems to be to cover all the major structures of English before the children enter Standard 4, the year during which English replaces mother tongue as the medium of instruction.

The Scheme of Work

To develop a curriculum guide for each Standard, we looked at both the Kenya syllabus and the set of overarching language-behavioral objectives. We developed these objectives and checked them against the objectives of the *Peak Course* although these books do not state objectives for each lesson in behavioral terms. From the language content of the syllabus and the rather universal objectives, we devised a systematic series of curriculum units—the Scheme of Work. The Scheme of Work, developed through the collective labor of various team members and consultants for each of the three years of primary instruction, formed the basis for lesson planning, radio methodology, and script development, and was the standard reference point from which formative evaluation test items were derived. It was, in effect, a restated version of the Kenyan English curriculum.

The Scheme of Work is divided into a number of "frames." The number of frames per year corresponds roughly to the number of weeks in a year. Most frames require one week for initial teaching; more complex ones require more time, less complex ones less time. Each frame has a unity through the relationship between vocabulary, sentence patterns, and the topic or situation suggested for using the language. The sample frame below shows how each frame is organized.

STANDARD 2

FIGURE 11
Sample Frame
Scheme of Work

FRAME 13

Version A 10/1/82
Begin Term II

Topic	Skills	Competencies	Structures	Vocabulary	Additional Notes
Getting up	A. Listening	1. Understand descriptive words related to morning and getting up. 2. Begin to hear difference between verb forms, e.g., She looks in the room. I look in the room.	1. It's dark at night. 2. It's raining. 3. Is there somebody in the room? Yes, there is. No, there isn't. 4. There's somebody in the room. 5. There's nobody in the room.	1. light (n) 2. turn on 3. turn off 4. call 5. leg 6. shoe 7. put away 8. down 9. neck 10. night 11. asleep 12. safe 13. woke up 14. dark 15. light	
	B. Speaking	1. Talk about getting up and describe the situation.			Use first-person narrative-like work sheet to show verbs.
	C. Reading	1. Comprehend narration of series of events based on habitual order.			Follow up: RWU, 1-17
	D. Writing	1. Write answer to question: Is there something in _____ 's room? 2. Write from dictation: She wakes up. I wake up.			Worksheet 1 2-3 family members getting up mother, daughter

Topics. The topic is a suggested setting for the dramatic action of the script. It is a situation or activity requiring communication around which vocabulary and sentence structures can be used in a realistic manner. The topics provided the context for introducing new language, but when topics were repeated they enabled the writers to integrate and expand the language at a more sophisticated level. Topics were those familiar to children; many are also found in the *Peak* materials.

Skills. It is an advantage to scriptwriters to be aware that certain objectives, or competencies, can best be achieved through the practice of one skill rather than another although they frequently overlap in real life. Listening and speaking are usually paired in practice, but we expect learners to be able to understand much more than they are able to speak. For purposes of instruction, each skill can be isolated and emphasized.

Competencies. One way of stating objectives in language teaching is to stress the linguistic items, particularly the forms of those items. Exercises point out and practice the formal differences. For example:

> She looks in the room everyday.
> She looked in the room yesterday.

Consistent with current language teaching trends, however, we took a different approach. Basically, we stated the objectives for a frame as somewhat general competencies, indicating what we expected students to be able to do with the language. The relationship between sentences used in an exercise is based more on meaning, therefore, than on formal differences. The student might be expected to speak three sentences like the following:

> I get up at 7 o'clock. I wash my hands and face.
> My mother makes my breakfast.

Naturally we want students to know the correct forms, the difference, for example, between "I wash/She washes." The focus here is on communication, however, not on grammar for its own sake. The design of the RLAP curriculum was eclectic, sometimes focusing on particular grammatical structures and sometimes focusing on functional-notional categories. In terms of language teaching, "competency" therefore referred to the knowledge of a rule or set of rules of grammar or to the knowledge of a rule or set of rules of communication.[1]

Structures. The essential structures specified by the syllabus had to be covered. They were grouped, as much as possible, into clusters that related to the topics and provided the basic grammar necessary to achieve the competencies identified for the week.

Vocabulary. The vocabulary also was grouped to relate to the topic. The scriptwriters tried to use the vocabulary listed in the required syllabus. They had the freedom to delay teaching those words that were not appropriate, however, and to introduce words from later frames if they were more useful. They also used previously learned words, as discussed in the previous chapter.

Additional Notes. The additional notes, for the production team, referred to miscellany related to the frame. As in the sample frame, the notes often indicated follow-up activities (here a reading selection in *Read With Us*, pp. 28-29 "Emma, Jim, and the Goat,") and suggested topics for worksheets devoted to a given frame to accompany the radio scripts written during the week. Notes also indicated integrative activities, messages for the teacher's notes, etc.

Sample Frame 13 is representative of the type used in Standard 2. Standard 3's emphasis had two notable differences. First, the Standard 3 Scheme of Work focused more on "notional" and "topical" categories[2] and less on specific language structures. Second, each frame contained a number of suggested settings, structures, and vocabulary items which were not all covered within one frame. Settings, structures, and vocabulary could appear in more than one frame. Although the focus was on notional and topical categories, throughout the course of the year all of the vocabulary and structures specified by the Kenya syllabus for Standard 3 were used. The reason for suggesting rather than requiring vocabulary and structures was to give the writers greater flexibility in designing broadcast segments and to achieve more natural language.

The earlier Radio Mathematics Project used a "strands structure" form of curriculum organization (Searle, *et al.*, 1976:70-71). Six basic strands were defined:

- Basic concepts
- Numeration
- Addition
- Subtraction
- Applications
- Measurement

The RLAP curriculum has some parallels. The *basic concepts* in a language curriculum are the sentence patterns and vocabulary. Some traditional language programs stop instruction here, and test achievement by knowledge of the grammar and words mastered.

Normally, however, learners are expected to *do* something with the language, to communicate with others or to read works in the language. Since a language curriculum is only a sampling of the language appropriate to the learners' stage of development and to the learners' use of the language, another strand is *context for use*.

These were the "topics" of the RLAP frames. This is what the students do with the language.

The specific receptive skills of listening and reading and the productive skills of speaking and writing are similar to the math strands of *addition* and *subtraction*.

In practice, the Scheme of Work worked quite well for managing the teaching of generalized pupil competencies and specific grammatical structures. It was more difficult to apply this approach to managing the teaching of specific vocabulary, primarily because of the large number of words that the syllabus required be mastered in three years.

The problem was essentially one of recordkeeping. It was a fairly simple matter to assign those words required by the syllabus in a given year across the frames of that year's Scheme of Work. The writers made every effort to provide adequate initial instruction for a given frame's specified vocabulary. Keeping track of the actual use of every target word in every lesson of every week, however, exceeded the limits of available resources. Systematic review of the vocabulary taught in previous frames was difficult to achieve, depending on the accuracy of the writers' memories and their ability to incorporate items from one frame into the instructional setting of another. It was easy, for example, to introduce the word "bus" in a series of lessons written about a journey, but quite difficult to review the same word in a series set on someone's *shamba*, or small farm. The same problem made it far more difficult to test any more than a small sample of specified vocabulary for formative evaluation purposes.

To improve this situation, the vocabulary for Standard 3 was prioritized according to the importance of each word in relation to what is required of pupils in Standard 4. High priority words, those that occur frequently in normal academic contexts, were not given much attention within the vocabulary tracking system since they would probably occur naturally throughout a year's lessons. Low priority words, those listed in the syllabus but not commonly used in academic settings, were covered in at least one series of segments, but not tracked, on the assumption that they are not as important to master.

Middle priority words were given the most attention in the vocabulary records. These words were important enough that they had to be learned and retained, but without special attention they might not have been used by writers frequently enough to accomplish this. By focusing resources on tracking and testing these middle priority words, and assuming that the high priority words

would automatically receive adequate instructional time, the project team was able to cover the vocabulary specified in the curriculum more systematically.

Development of Daily Lessons

Our essential aim in the curriculum design was to preserve the linguistic content of the Kenya syllabus, to sequence individual items differently to take advantage of the radio medium, and to specify measurable objectives in order to evaluate the success of the teaching. The next step then was to convert the curriculum into daily lesson or script plans, including suggested teaching methods, to make it more usable for the scriptwriters.

A few general language teaching principles guided the development of the daily lessons. It might be more accurate to say that these principles emerged gradually during our early experimentation, but they became important considerations in the development of the lesson plans. (Beyond these principles, many other factors affected lessons. They are discussed later in this chapter.)

First, throughout the three years of the project, the pedagogical focus was on syntax (the grammar system), rather than phonology (the sound system) or morphology (the word-form system). From time to time, exercises, games, and drills were devised which emphasized phonological or morphological contrasts—tense and lax vowels, voiced and voiceless consonants, verb tense forms—but we found it necessary to develop contrastive exercises to stress sound contrasts which are perfectly clear in live speech, but which do not come across very well in areas of poor radio reception. During the first year, for example, children had a great deal of trouble producing the initial sounds in the minimally paired pronouns "he" and "she." We suspected that what was happening was that the children in poor reception areas were hearing a generalized white noise burst for both sounds. The children's belief that they were hearing the same sound for both pronouns was no doubt corroborated by the lack of gender contrast in third person singular pronouns in many Kenyan languages, like Swahili, which has a third person singular pronoun *yeye*, meaning "he" *or* "she." Exercises to contrast these sounds were developed as well as others which contrasted initial and final voiceless stops [p], [t], and [k], another series of sounds whose contrasts were difficult to hear in poorer reception areas. Occasionally, exercises were developed which pointed up morphological contrasts such as singular/plural noun forms (boy/boys; book/books; box/boxes); third person singular/non-third per-

son singular verb forms (she sings/you sing), present/past tense verb forms (I walk/I walked).

The second principle was to proceed from the simple to the complex. There is not complete agreement among curriculum designers and textbook writers about linguistic complexity. In general, complexity is a combination of intuitively judged syntactic complexity and sentence length. In practice, we asked children to repeat or produce three, four, or five-word sentences. These sentences became syntactically more complex and increased in length as time went on. However, when children encountered unfamiliar material which they were required to repeat, they were not capable of more than 10 to 15 words. Maximum sentence length for repetition was constrained by a number of factors: memory span, familiarity with the structures used in the sentence, familiarity with the vocabulary items, number of structures in the sentence. Formative evaluation of early lessons showed us where we were too complex.[3] For example, when children were required to produce a new word in a familiar syntactic context, they might have faltered at the point where the new word was encountered and failed to produce the remainder of the sentence. Novel syntactic structures could produce a similar effect.

Later in the first year and from the beginning of the second year, we followed the principle of using global sentence-marking elements; these, in the words of Rivers (1971:131), allow the learner to:

> . . . recognize rapidly sentence shape by identification of clues to question form, negation, coordination, subordination. He must recognize clues which indicate condition, purpose, temporal relationships.

Cates and Swaffar (1979:11) state that:

> Syntactic functions . . . which determine meaning at the level of the sentence or text—in other words, those that have global relevance—are much more important for comprehension than functions like noun and verb morphology, which have only local relevance.

To put it another way, the global elements are basic to communication, the local elements are niceties. At a relatively early stage, children were introduced to the various question forms of the English language together with appropriate answer forms so that they would quickly internalize the contrast between WH- and Yes-No questions, for example, and to recognize the appropriateness of using "because" in response to "why" questions. We were able quickly to develop the interactive nature of the lessons through question and answer dialogues between the radio characters.

In addition to these broad language teaching principles, the daily lesson plans were guided by the instructional principles in the previous chapter.

The following section describes some other issues we faced. We tried to develop appropriate responses to these issues within the limitations of the project. This discussion, centering as it does on language learning factors, will be of interest to English teaching specialists primarily.

FACTORS INFLUENCING CURRICULUM DESIGN

The "limitations" which we originally sketched out in the design phase of the project often turned out to be assets as much as liabilities. For example, the use of radio as a medium of instruction was seen to be a distinct disadvantage, lacking as it does a visual component. But as time progressed, we began to realize that the very lack of a visual component allowed the play of the pupils' imaginative powers, giving them the opportunity to concentrate more on the linguistic signal, which is unaccompanied by a potentially ambiguating and distracting visual component. A second advantage of the radio medium was that it allowed us to control the amount of language exposure, and through the pacing, to give us the opportunity to offer the children a much greater volume of English-language input than in non-radio language classes.

A second area where we originally perceived limitations was that of the teacher. Initially, the development of "teacher-proof" lessons was considered. As the project developed on site, however, we began to perceive distinct advantages to integrating the teacher as fully as possible into the programs. We saw that teacher participation enhanced the radio "presence" and, not insignificantly, contributed to the teachers' self-esteem and enthusiasm to assist.

Although radio is central to the project, it was the *controlling* medium of instruction, not the *sole* medium. Classroom props, teacher activities, pupil classroom modeling, classroom materials, and blackboard usage radiate from radio-focused lessons. Supplementary materials and activities were planned to cost as little as possible and were used when project staff could not effectively teach a skill solely by radio.

The Radio Medium

There are numerous examples of radio used as a foreign language instructional medium. The vast majority of these cases are those in which language instruction commences at an intermediate or ad-

vanced level. Although Kenya has been a pioneer in the use of radio for instructional purposes, it has used radio for English instruction only in a supplementary fashion and only commencing in Standard 2. Before the RLAP began producing lessons, there was considerable doubt at the Kenya Institute of Education about whether radio could serve as the major instructional medium. Many RLAP consultants also believed that visual contact would be necessary in the early stages even though language operates primarily through an aural-oral channel. They also felt that when reading and writing were taught later, the visual component would be even more essential. As will be seen in the subsequent discussion, the nature of radio often proved to be an advantage, not a liability.

Friend (1980:53) cites some characteristics of radio which would affect curriculum design. Radio, she states:

- is a unidirectional medium of oral communication;
- lacks a visual component; and,
- is a mass medium.[4]

Unidirectional Oral Communication and Lack of Visual Component. Language has been defined as a "systematic means of communicating ideas or feelings by the use of conventional signs, sounds, gestures, or marks having understood meanings" (*Webster's New Collegiate Dictionary*). Such a system is central to cultural transmission and the sharing of knowledge. Although there are still many cultures in the world which communicate through spoken language alone and have no written form of the language, there are no cultures in the world which have a written language but no spoken language. This confirms the primacy of the oral nature of language. In many societies, where literacy is not yet commonplace, spoken language is even more essential. In the initial stages of language learning, if the language student is destined eventually to master all four language skills, it is generally accepted that some proficiency in speaking and listening should be developed prior to the teaching of reading and writing. This was especially true in our case where the language learners were simultaneously achieving literacy not only in English but also in their own vernacular languages and in the major *lingua franca* and national language of the country, Swahili.

During the first year of the project, when the children's proficiency in English was near zero, one of the major problems was how to transmit sound-meaning correspondences to the children successfully. Because of the oral nature of the radio channel, it was decided that at the very beginning of the broadcast period in Standard 1 the attention of the children would be focused on nouns and verbs

which could easily be illustrated by sound effects on the radio. Concrete rather than abstract nouns and verbs were chosen. Thus, the sentence "That's a bird" would be juxtaposed with the sound effect of a bird, "That's a bell" with the sound effect of a bell, "Juma is clapping" with the sound of clapping in the background, "Rosa is stamping her feet" with the sound of feet stamping. Verbs included "singing," "clapping," "laughing," etc.

One benefit of the oral nature of radio, is that the pace of the programs is much faster than that of traditional classes and the amount of time on a task is greater. A cursory observation of several traditional English classes revealed more interruptions for questions, requests, etc., which were often responded to in mother tongue as well as mother tongue explanations of language structures. This unsuspected difference resulted in radio classes having 200-300 percent more exposure to English, even if such a crude measure as number of English words per half-hour is applied.

First-year results reflect the oral emphasis. In the summative evaluation test, listening scores for the radio group were 50 percent higher than those for the non-radio group; mean reading scores were 25 percent higher than those of non-radio classes.

From many of the insights we gained from the Radio Mathematics Project, we knew from the beginning that we should do whatever possible to allow the children time to participate in the program actively rather than demand that they merely sit and listen. As veteran teachers as well as learners of foreign languages, most of us were aware that active participation in language learning is even more essential than in other subject areas. We believed that the more radio-pupil interchanges simulated real-life language behavior, the more likely it was that our instructional package would be effective. From the outset, radio characters talked to the children and only infrequently to one another. We tried to develop radio characters and a radio style which was authoritative but not threatening. The radio engaged the children by giving instructions, having the children ask and answer questions, and having them participate in songs, drills, poems, games, and other activities. Lesson 102 from Standard 2, a typical script, had the children making a verbal or physical response about once every 11 seconds, for a total of approximately 155 responses in the 28-and-a-half minute program.

We tried to avoid pauses that were either too long or too short. Pause length was continuously assessed by both project observers and team members themselves. This was an ongoing activity, because not only were new types of activities introduced, but children also become quicker in their response times to familiar material. If

pauses were too short, children were not only unable to say what was required in the time allotted, but they were also unable to hear what followed. If pauses were too long, the children sensed that the program was losing its liveliness and became bored and nonparticipatory.

Children's attention was engaged item by item. The teacher was encouraged to assist the children in making a response. We also explained to teachers that radio characters first model new items and then the children respond. A difficult problem here was in training the teachers to encourage the children's participation but not to do too much. When the teachers "led" the responses too much, the level of children's responses dropped off, and most likely, so did their learning. It is clear that they saw the teacher doing their work for them.

Radio does not easily allow the possibility of different responses on the part of the user. This is especially troublesome with the teaching of language. There is no way in which the radio can carry on a realistic conversation with all of the audience or even a single member of it. Other than for highly ritualized greetings, one cannot predict what one's interlocutor is going to *say*. As a one-way channel of communication, therefore, the radio is limited to, let us say, asking a question, for which the answer has already been modeled or for which there is only one answer. A brief illustration from a lesson should suffice to make the point.

Safiri: What's that on the table, Tina?
Tina: It's a book. Children, what's that on the table?
[Pause for Pupil Response.]
Tina: It's a book. Again.
[Pause for Pupil Response.]

Note that even here, "It's a book" may not be the only appropriate response. "A book" would also be correct in this situation.

Although free conversation is ruled out by the one-way aspect of the radio, at the Standard 2 level, multiple responses were encouraged, particularly from individual pupils. Prior to each lesson, individual pupils were selected by the classroom teacher to act out or model language competencies during the broadcast. Each was given a name tag with the name that the radio used to call on the pupil. In the following example, the pupil is Rosa.

Safiri: Rosa, where are the eggs?
[Pause for Pupil Response.]
Tina: Yes . . . in Rono's shop . . . on the top shelf . . . in the middle.

Prior to this segment, the children (including Rosa, the pupil volunteer) had responded, "in Rono's shop," "on the top shelf," "in the

middle," to various questions which had each of these responses modeled *separately*. The child, Rosa, therefore, had a fairly good idea that any one of these responses might be considered a correct one. Also, the teacher, in the teacher's notes, is encouraged to assist Rosa in the classroom.

To allow for free conversation and more natural language use, teachers are given guidelines in the teacher's notes as to how free conversation can be organized in the complementary lessons.

Radio as a Mass Medium. As a mass medium, radio is capable of carefully controlling both the rate and the amount of exposure to new language material. Although no systematic attempt was made to measure the amount of English to which typical radio and non-radio classes were exposed, observational and anecdotal evidence suggests that the radio classes heard at least twice the amount (and probably more) of spoken English (as measured by the number of words) in a half-hour period as the non-radio classes. The radio classes also heard English exclusively during the half-hour period, while many (but not all) of the non-radio classes heard a great deal of mother tongue. (One reason why radio classes heard more English is that the pacing of the radio instruction did not permit interruptions.)[5]

A common criticism of radio as a mass medium is that superior schools will be treated the same as inferior ones, stronger students the same as weaker ones. And it is those groups on the periphery of average performance which require special attention. To compensate for the lack of individualization, we attempted to provide additional activities for fast children and compensatory activities for slow ones in the complementary lessons. In spite of our misgivings about aiming the level of instruction at the average student, achievement test results indicated that children in schools in each of the three Certificate of Primary Education (CPE) performance categories did better than their counterparts in non-radio classes.[6]

Another advantage of radio as a mass medium is its central control over the content and the teaching methodology. This allows for more consistency than would be possible with each teacher making decisions individually over what and how to teach. This proved to be an advantage primarily with weak teachers.

In summary, we perceived only two characteristics of radio as disadvantageous: that it is a mass medium and that it offers only one-way communication. These represented major challenges to the scriptwriters and the rest of the production team, but as a result, the scripts were probably livelier and more effective. The availabil-

ity of an oral channel, and by implication, the lack of a visual one, proved to be advantageous.

Language-related Factors

Individual language repertoires and societal multilingualism in Kenya have played important roles in decisions about curriculum content and design. Language skill of children entering primary school was a factor in shaping the content of the curriculum at its initial stages. Throughout the course of the project it was important to decide when language used on the radio should be completely comprehensible to the children and when it need not be.

Sociolinguistic Constraints on the Curriculum. Features of both individual and societal multilingualism figured in the overall research design phase of the project and influenced curriculum design strategies. In the selection of three project schools in each of the seven districts, we attempted to maximize the linguistic diversity of the sample while at the same time selecting languages with the largest number of speakers. The principal languages of the schools in these districts are: Swahili (Kilifi District), Kamba (Machakos District), Maasai (Kajiado District), Kikuyu (Kiambu District), Kalenjin (Kericho District), Luo (Kisumu District), and Luhya (Kakamega District). Speakers of these languages represent over 70 percent of the Kenyan population.

Classroom language profiles varied from school to school but schools could be divided into three categories:

- The vast majority of the children were speakers of one mother tongue—16 schools fell into this category.
- A majority of the children were speakers of one mother tongue, but there were significant minorities of other mother tongue speakers—four schools fell into this category.
- There was a mixture of mother tongue speakers, with no dominant group—only one school fell into this category.

The official Kenyan national language policy has children learning in their mother tongues for the first three years of primary school while they study English as a subject. From Standard 4 they learn in English while studying Swahili as a subject. In practice however, the medium of instruction in Standards 1-3 differs from

school to school as well, although each school can be placed into one of the following major categories:

- One mother tongue[7] served as medium of instruction
- Swahili was used as medium of instruction
- English was the sole medium of instruction
- Swahili and English were the media of instruction
- Mother tongue, Swahili, and English were combined as media of instruction.

Although there is a great deal of linguistic adaptation to local conditions, project schools reveal much conformity to the official language policy. As radio does not allow individualization of language teaching at the school level, we designed our programs to fit the official policy.

English listening and speaking skills were emphasized during the early stages (Standard 1) of the project and the skills of reading and writing were introduced somewhat later, beginning in the latter part of Standard 1 with more and more emphasis in Standards 2 and 3, so that by Standard 3 new structures, notions, and vocabulary were also introduced in the reading segments of our programs, rather than exclusively in listening and speaking segments. One of the reasons why the introduction of reading was delayed was the hypothesis that early introduction might have created interference problems because of competing sound-letter correspondences between mother tongue and English. An additional complication was, in those schools without a common mother tongue, Swahili, a second language to the children, is treated as if it were a mother tongue and appropriate literacy materials are introduced in it.

There is a supposition among teachers of second languages that there is a synergistic effect across the four skills among older, *literate* language learners. It is possible that this synergistic effect does not hold among young language learners, since they are not yet literate in any language. We felt that the curriculum could be more effectively taught if children were allowed to acquire at least the foundations of literacy in their mother tongues before learning to read in English.

Richard Tucker (personal communication) summarized the evidence from a bilingual experiment in Montreal:

> What we found . . . was that anglophone children who did not have prior knowledge of French were able if relatively rapidly to acquire a sufficient oral base so that reading instruction could begin immediately in French rather than in English, their mother tongue. We found, furthermore, that by the end of grade 2

> (during which time English language arts instruction was introduced) children were reading at or above grade level in both French and in English. Apparently there was a very effective transfer from French reading skills to English reading skills—that is to a language in which they already had a solid oral base.

The similarities between our experience and the Montreal experience are that in both cases, reading was *not* introduced simultaneously in both languages (the introduction of reading in one language preceded that in the other) and that reading was introduced in both languages after the children had acquired a sufficient oral base. The major difference was that the anglophone children were involved in an immersion program in French which consisted of the full school day in that language and that our children are receiving only two and one-half hours of instruction a week by radio and one hour and a half through complementary lessons.

Robson (1981) examined a related but slightly different problem. She looked at the development of various areas of English language proficiency among a group of preliterate Hmong refugees who were marginally educated or without any education whatsoever. In her study, one group received a treatment in which all of the time was spent in intensive English training with no attention to language skills in the group's mother tongue, Hmong, while another group spent part of its time developing literacy skills in Hmong and then using additional time later to learn English language skills. Robson discovered that the second group, which received literacy training in the mother tongue first, showed evidence of higher levels of English proficiency than the group which had received their literacy training only in English.

These studies merely suggest that the sequencing approach we took to English language skill introduction was probably appropriate, although, had sufficient resources been available, it would have been interesting to examine alternative approaches to skill sequencing in the Kenyan multilingual context with experimental rigor.

English in Kenya. Sociolinguistic factors go beyond individual project schools. For example, there is the challenge posed by the linguistic environment around rural schools in general. In Kenyan cities such as Nairobi, English can be taught as a second language. Children hear it regularly outside of their English classes, both in the general community and possibly in school itself. In rural communities, on the other hand, pupils are unlikely to be exposed to any English at all outside of their classes.

Another challenge is the difficulty in agreeing on what standard Kenyan English really is. The traveler in Africa is struck by the

linguistic differences between former French and English colonies. There is less variation across varieties of African French than across varieties of African English because the French required schools to use French exclusively while the British, as one of the consequences of indirect rule, encouraged the use of a variety of mother tongues and *lingua francas* at various levels of the educational system. Not only are there audible differences between the English spoken in Kenya and, for example, Nigeria, but there are equally significant differences between the English in different parts of Kenya spoken by people of varying linguistic backgrounds. Two Kenyans might use perfectly acceptable grammar but noticeably different pronunciation and vocabulary.

It is easier to define what correct Kenyan English is not. Specifically, it is not American English. Beyond that point, however, Kenyan experts disagree in how closely their English should follow the British model. For the purposes of the RLAP, we agreed in practice to use the British model for grammar and vocabulary. *The Concise Oxford Dictionary* and *A Grammar of Contemporary English* (Quirk *et al.*) generally were used as our arbiters. On the other hand, we accepted more variation in pronunciation and intonation, as long as the results were intelligible and did not violate the basic syntactic rules of English.

This resulted in a model of spoken English within the *English in Action* broadcasts that was a distinct improvement on what the average pupil in the average rural classroom would otherwise be likely to experience. Still, there is disagreement over whether the radio model should be closer to British English. In the absence of any consensus among Kenyan professionals, the project team attempted to take a moderate position—good Kenyan English, but not necessarily English as spoken in Britain.

Incoming Language Skills. In a test administered to a sample of pre-school age children from various language backgrounds in rural areas of Kenya, we confirmed an early hypothesis that we could not rely on any degree of English language proficiency which could be used as a starting point. A small number of children were able to produce a greeting in English ("Good Morning") and a few knew some of the numbers from one to ten. A small number was also able to recognize some Kenyan English when it was used within a context of samples of Kenyan languages other than their own. This limited proficiency is likely to have come about through hearing the language from parents, school-age siblings, or the radio. These children, on the average, could name two of 10 commonly used Kenyan household products when they saw photocopies of that

part of the label giving the product's name, but this figure dropped to approximately one out of 10 when they saw the names typed on a sheet of paper. This showed that the children had a limited degree of print awareness and some incipient reading skills. We felt, however, that neither the English proficiency results nor the reading results justified starting at any level other than zero-proficiency in any skill area.

Critical and Noncritical Language. The Radio Mathematics Project also had to heed self-imposed guidelines regarding syntactic and lexical complexity, even though it was not a language teaching project. Friend (1980:72) states that on that project a distinction was drawn between *critical* and *non-critical* uses of language:

> Any question that we expected the children to answer or any instruction that we expected them to follow was what we call a critical use of language.

Non-critical language generally occurred in "asides made by the radio personalities or in the entertainment sections," although non-critical language also could occur within instructional segments of the program. The example which Friend gives is a reference to the Spanish word for "giraffe," which the children did not know. The instruction given to the children is:

> Look at your worksheet. See all the giraffes drawn on the worksheet. There are five giraffes altogether. Take your pencil and circle three of the giraffes.

On the worksheet there appears only one kind of animal, the giraffe, and therefore it is unneccesary that the children comprehend exactly what kind of animal a giraffe is since it is the only one illustrated. Vocabulary is thus taught through verbal and pictorial contextualization.

In designing RLAP scripts for broadcast, a similar technique was employed. For example, the word "sentence" was taught in this way. "Sentence" was never explained by paraphrase nor translated into mother tongue to enable the children to acquire its meaning. Instead, the children were given worksheets with a number of reading examples, such as:

> (3) The first boy is taller than the second boy.
> (4) The second boy is shorter than the first boy.

An illustration accompanied the written text, with a tall boy labeled "1" and a short boy labeled "2." While looking at the worksheet, the children were instructed via the radio: "Read sentence 3 aloud." It was therefore not necessary for the children to understand the meaning of the word "sentence" since we knew that they understood "read," "3," and "aloud," and therefore had enough infor-

mation at their disposal to follow the instruction correctly. At the same time the children were developing a semantic representation of the word "sentence."

Just as "sentence" began to acquire the semantic representation "set of words following a number bounded by a punctuation mark," the term "word" acquired the meaning of "set of letters bounded on either end by a space." As Friend notes, the word "giraffe" was not used in a critical way since the only animals on the worksheet were giraffes; the distinction would become critical if more than one kind of animal were shown. Analogously, the children did not have to know "sentence" unless it were contrasted with another term like "word."

In Radio Mathematics, the mother tongue of the children was the same as the medium of instruction, Spanish. Adjustments in degree of lexical and syntactic complexity were made to conform to the level of language acquired by the average child at a given grade level. In Kenya, the mother tongue of the children is *not* that of the medium of instruction. Much more of the language used in RLAP broadcasts, therefore, must be considered critical rather than non-critical, with the exception of instructions directed at the teacher. Songs and games, in addition to their secondary function as entertainment, had a primary function of enhancing other material, and therefore also contained critical language.

CONCLUSION

In preparing the radio curriculum, there were two major issues: the weight of the Kenya curriculum and the complexity of the factors influencing curriculum decisions. We already have given attention to the first issue, but we should emphasize that the heavily loaded curriculum is probably more of a disadvantage to rural children than to urban students. With little environmental support in the use of English in rural areas, children must rely on instruction and practice in school as the means of maintaining their English. Urban children have that environmental support and can perhaps see the relevance of English to a greater extent.

The complexity of the factors influencing decisions has obvious implications for any instructional radio intervention where materials are being designed from the ground up. It is difficult for even a large team to bring all the skills necessary to efficient decision making. We all learned on the job, and the later instructional materials are probably better than the beginning materials, although the achievement results do not always indicate this. Certainly, the efficiency with which we worked was easier as many of the difficult

decisions we had to make concerning the students, teachers, medium, supplementary materials, production, and the language itself had to be made in the first few months of the project. The decisions we had to make were at times so complex that we were temporarily immobilized. The luxury of lingering over a lesson until it was just right was denied us by the production schedule we had to meet. We learned to live with approximations and to use the next lessons as challenges to improve.

NOTES

1 The word "competency" here is used to refer to a skill or set of skills related to either *linguistic* competence or *communicative* competence. For further discussion of grammar vs. communication in syllabus design, cf. Wilkins 1976.

2 "Notional" is used here in the sense of Wilkins, 1976. A series of notions which project staff thought important for the Standard 3 curriculum was adapted and integrated into the Scheme of Work for that year. "Topical" frames focus on the situation, i.e., the physical settings in which events enacted in the broadcasts occur. Typical of many second language texts, these have titles like "On the Shamba," "Going to the Coast," etc.

3 For a discussion of the formative evaluation procedure, the reader should consult Chapter 5.

4 In Friend's schema, four characteristics are listed. She breaks down the first into "oral communication" and "one-way communication." In discussing radio's effect on language teaching, it is more convenient to discuss its oral nature *together* with the characteristic of one-way communication.

5 Occasionally, words difficult to contextualize or model through radio were translated into mother tongue as were instructions too complex to relay directly to the children in English. Standard 1 lessons used this technique most often; Standard 3 rarely.

6 In each of the seven project districts, three schools were selected, one a high performer on the CPE examination, one at the middle level, and one at the low performance level. The CPE scores were the best available indicators of overall school quality.

7 For ease of classification, although Swahili certainly is a "mother tongue," it has been excluded as such from the categories of school language policy.

REFERENCES

Cates, G. Truett, and Janet K. Swaffar. 1979. *Reading a Second Language. Language in Education: Theory and Practice* No. 20. Washington, D.C.: Center for Applied Linguistics, ERIC Clearinghouse on Languages and Linguistics.

Christensen, Philip R., and Ephantus Mugiri. 1983. "The Intensive Use of Radio for Teaching English in Kenyan Rural Primary Schools: Exploring a Cost-Effective Application of Educational Technology." Paper presented to the UNESCO/BREDA International Seminar on the Use of Appropriate Technologies in Education, Nairobi, Kenya, 21-26 March, 1983.

Friend, Jamesine. 1980. Shaping the Radio Mathematics Curriculum. In *Radio Mathematics in Nicaragua*, Jamesine Friend, Barbara Searle, and Patrick Suppes, (Eds.), xxii, 254,49-81. Stanford: Institute for Mathematical Studies in the Social Sciences, Stanford University.

Kenya Institute of Education. 1975-77. *The Progressive Peak English Course*. Nairobi: Jomo Kenyatta Foundation and Oxford University Press.

Ministry of Education. 1978. *Kenya Syllabus for Primary Schools: English*. xi, 60. Nairobi: Jomo Kenyatta Foundation.

Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech, and Jan Svartvik. 1972. *A Grammar of Contemporary English*. London: Longman Group.

Rivers, Wilga. 1971. "Linguistic and Psychological Factors in Speech Perception and Their Implications for Teaching Materials." In *The Psychology of Second Language Learning: Papers from the Second International Congress of Applied Linguistics*. P. Pimsleur and T. Quinn, (Eds.), 123-124. Cambridge: Cambridge University Press.

Robson, Barbara. 1981. *Alternatives in ESL and Literacy: Ban Vinai*. Final Report to the Asia Foundation on Grant SF-110-SF-0039.

Searle, Barbara, Jamesine Friend, and Patrick Suppes. 1976. *The Radio Mathematics Project, Nicaragua 1974-1975*. Stanford: Institute for Mathematical Studies in the Social Sciences, Stanford University.

Wilkins, D.A. 1976. *Notional Syllabuses*. Oxford: Oxford University Press.

Chapter 5
FORMATIVE EVALUATION

Greg Owino and Maurice Imhoof

OVERVIEW

The RLAP applied a technique developed by the Radio Mathematics Project that made formative evaluation an integral part of the instructional development process.

Radio Mathematics had developed a formative evaluation model based on the feedback system used in industry to control continuous process. Industrial application of this approach involves continuous monitoring of output, with any deviation from desired outcomes causing an automatic adjustment of the input. Its educational application calls for the ongoing assessment of lesson effectiveness, with corrections being made (e.g., material being retaught, usually in a revised form) in future lessons as necessary.

As applied in the RLAP, this system is labeled the *feedforward* revision system to underscore its emphasis on improving instruction through changes to future lessons. Formative evaluation data were compiled, analyzed, and summarized by the RLAP evaluation specialist, who then presented the results to the entire production team. Problems were identified and decisions made about correcting them.

The feedback system developed by the RLAP consists of these steps:

- Closely monitoring outcomes
- Analyzing formative evaluation data
- Revising upcoming lesson content and instructional techniques.

Monitoring Outcomes

The primary concern of the RLAP team was student outcomes:

- How well pupils followed the daily 30-minute broadcasts.
- Pupils' retention of concepts and skills, their levels of interest.
- Student participation.
- The quality of radio reception as it affects the pupils' learning process.

Equally important was the teacher's role during the broadcasts:

- How well the teacher was prepared for the lesson.
- Her performance in guiding the children throughout the broadcast.

The two main techniques used in monitoring these outcomes were classroom observation and weekly achievement tests.

Direct classroom observation was carried out in the 10 observation schools. Twenty educators from the regional teacher resource centers assigned to the project on a part-time basis were the project observers. They were trained in observation techniques by the team for 10 days before the broadcasts began in November 1981.

A team of two observers was assigned to each of the 10 observation schools. Their duties included both formative and summative roles such as:

- Observing classrooms using observation sheets, rating scales, and detailed anecdotal notes of actual events as they occurred in the classroom during radio lessons. A sample observation sheet is shown in the Appendix at the end of this chapter.
- Administering the formative tests under the supervision of the project's feedback coordinator.
- Conducting interviews with teachers and children using both structured and unstructured interview techniques.
- Ensuring that teachers turned on the radios regularly between 9:30 and 10:00 a.m. every day.
- Ensuring that all feedback data and evaluation materials were sent back to the project office in time for analyses.
- Administering the summative evaluation tests at the end of every year. Summative evaluation is discussed in Chapters 8, 9, and 10.

In January 1982 when the broadcasts started, observers observed three lessons each week, completing the observation forms which focused their attention on such student outcomes as:

- How well students followed the broadcast, their levels of interest and participation.
- Students' retention of concepts and skills.
- Common mistakes.
- Teacher preparation and performance.
- Quality of radio reception.

Observers also talked to teachers, eliciting their comments and suggestions about the content of the lessons and the instructional techniques.

To these reports were added observations by the RLAP professional staff members, each of whom observed a lesson a week in the observation schools near the project site. The project staff treated classroom observation as occasions for gathering "live" data, and on their return to the project office discussed with the rest of the team what they observed. This gave the scriptwriters and the producers an idea of how well or poorly their products were working in the classroom.

The field observers as well as the RLAP professional staff submitted the completed observation forms to the feedback coordinator who then summarized the data from the forms. A summary report of observations was compiled. A problem was reported to the team if it was raised by about one-quarter of the observers of a particular lesson. This was arrived at by tallying under each block and segment of the lesson the number of problems raised by each observer. A summary report is illustrated in the Appendix.

Every effort was made to ensure that the observers reported exactly what they observed in the classroom. To help achieve this we attempted to make the purpose of the observation clear and specific. During the training sessions, stress was placed on ways to articulate what was observed, separating facts from impressions and interpretations. This did not always occur, however. On several occasions observers reported their opinions or interpretations, the reports were vague or too general, or significant events were recorded incompletely. This made the task of summarizing difficult, and the problem was compounded by the fact that some of the field observers could not express themselves well in English.

Despite these problems, classroom observations provided useful data and determined how instructional techniques and the content of the broadcasts could be improved. Observational instruments yielded both qualitative and quantitative data. It was from the observations that we learned:

- How long instructional segments should be.
- What kinds of instructions were ambiguous.
- How fast the pace should be.
- What kinds of entertainment students preferred.
- How long we should pause for children to complete different tasks, such as writing words or sentences, writing from dictation, or reading a sentence or a passage.

Analysis of Student Worksheets and Exercise Books

Although classroom observations are extremely valuable, some information could not be gathered by this technique. For such additional information, we turned to the children's exercise books and worksheets. At the end of every term (every three months), completed worksheets were collected and returned to the project office for the feedback coordinator to study and report on to the professional staff. Although the worksheets were not subjected to rigorous statistical analysis, we could obtain information on each exercise, giving the team a reasonably good idea of how well the children were learning the various concepts covered in the broadcasts. The exercise books were examined by the observers at the schools, particularly to assess the writing abilities of children in Standard 2. The feedback was then given to the team in weekly meetings and a course of action was taken to modify instruction.

Weekly Classroom Tests

The RLAP formative testing goal was to measure how well the children as a group were following the instruction. We wanted to measure learning for a large number of curriculum objectives, and for each objective we needed to test the children as frequently as possible to be able to measure gains. To accomplish this we designed weekly tests to evaluate pupils' skills in the areas of listening and speaking, reading, and writing. Since we wanted to measure *group* gains, not individual gains, it was not necessary to test the same children every week or to give the entire class any one test.

In each of the 10 observation schools, five children were selected at random each Friday to participate in a weekly achievement test. An average of 50 children, therefore, were tested in the 10 observation schools each week. Different children were tested each week, rotating the testing within a fixed group of classrooms so that the same children were tested again after about eight weeks. A sample test is shown in the Appendix.

Each test had an average of 10 test items drawn from the specific language items and the stated objectives in the Scheme of Work. The weekly tests were administered by the field observers. Most of the tests were individually administered largely to facilitate the testing of speaking which does not lend itself easily to group testing. In general, if at least 70 percent of the pupils sampled performed successfully on a given item, no remedial instructional materials were introduced into the subsequent programs. If, however, an item did not reach the 70 percent criterion level, the item was analyzed and team members discussed how to modify the method-

ology and decided whether or not to introduce supplementary teaching material.

Whenever a serious problem was identified either during observation or testing and the team was not satisfied with the item testing that particular objective, a sharply focused supplementary test was quickly developed. This test was then administered to the children the following week to pinpoint the problems. Such instances were very few.

On some occasions, group tests were developed and given to the entire group of classrooms in the observation schools. Such tests were designed to measure specific skills, such as writing proficiency. Again, these were very few indeed.

Analysis of Test Data

The faster information from observers was fed into the production cycle, the better the curriculum materials were. The gross analysis of test results was compiled quickly because it was easy to quantify and analyze them. There were no complex statistical analyses and the style of reporting was informal since the audience for the analyses of the formative data was within the project. The reporting of the results was therefore made as fast as possible in a language that was easily comprehended by curriculum designers, scriptwriters, artists, writers of teacher's notes, and the rest of the staff members.

Results from classroom observations were more difficult to summarize because observation sheets had to be closely studied, analyzed, compiled, and summarized.

Test results were reported in a form that shows the test item number and the results. The results form shows performance by item from each observation school. For each item, the number of pupils who attempted the item and got the item correct, got it wrong, or gave no response is clearly indicated (C-correct response, W-wrong response, and NR-no response). At the top of the form the Scheme of Work code for each objective tested is indicated so that when revisions were to be made as recommended by the team, the production staff knew exactly what content and/or instructional objective to revise, record, or delete. Also indicated on the analysis sheet is the number of pupils who took the test in the observation schools and whose returns were received, the percentage of pupils who took the test, and the number of correct, wrong, or no responses. The last horizontal column shows the percentage correct from total responses. A sample evaluation report is shown in the Appendix.

Weaknesses in the Testing Strategy

Sometimes the results of a detailed analysis of the test data showed that the student performance difficulty was not with the instructional techniques or the lesson content but with the test items themselves. Ideally, we should have tested all of our weekly tests as rigorously as we did our lessons. To develop a good test is in itself a time-consumming exercise that requires much field testing, analysis of data, revision, and perhaps retrials which we did not have time for. Thus, we adopted a procedure, also followed by the Radio Mathematics staff in Nicaragua, in which we "tested the tests as we tested the children." If the item turned out to be of questionable validity, we simply ignored the results. At other times, however, we devised another set of items to test the same objective.

On some occasions the items were too difficult and the children tested in a particular week did not reach our acceptable criterion of achievement of 70 percent. Such instances frustrated the team because the results always appeared far below expectations. In such cases the team analyzed the items in detail in the weekly meetings and decided whether or not the problems were worth further consideration in terms of devising a better test.

Other problems stemmed from the subjectivity of field observers in recording the children's responses. Sometimes our observers gave subjective, opinionated judgments of students' performance. In some cases, they were stricter or more lenient as they proceeded through the test. The integrative nature of language (that is, the same linguistic item is used in a variety of contexts over and over) and the fact that tests were given each week, tended to counterbalance any questionable test items If we asked a stupid or misleading question one week, we usually balanced the data the next week with a better question.

Using Feedback Data

Formative evaluation data were presented to the team in weekly staff meetings. Problems were identified and decisions made about feedforward revisions. In some cases a specific problem was solved by writing a limited number of segments to correct it. For example, a segment might be taught again using a different instructional methodology. In other cases, a general problem resulted in a new instructional design principle which was then applied throughout future lessons; for example, a new worksheet format, or more time and help given in the radio lesson to aid children in finding the proper place on their worksheets.

When serious problems arose, of course, decisions were sometimes made to change lessons which had already been recorded. A segment which was observed to fail completely, leaving pupils confused and not participating, resulted in such a decision. But the emphasis of the feedforward formative evaluation process was on revisions to scripts not yet recorded. This required that the instructional design principles on which the materials were based be carefully validated to ensure that problems were the exception rather than the rule.

Changes Resulting from Feedback

There are an unbelieveable number of ways in which a radio lesson can go wrong. Each is a separate discussion, but the following list gives examples of areas in which formative evaluation had influence on lessons.

- Length of radio programs
- Methodology of instructional segments
- Clarity of initial teaching segments
- Length of instructional segments
- Amount of instruction on different topics
- Mix of instructional and entertainment segments
- Style of transitions between segments
- Complexity of directions to pupils or teachers
- Length of directions
- Vocabulary complexity and appropriateness
- Frequency and duration of dialogues between radio personalities
- Frequency of students' responses
- Kinds of responses
- Time allowed for different kinds of responses
- Kinds of background sounds used during pauses
- Speed of speech
- Signals used to indicate the ends of pauses
- Mix of different kinds of voices
- Mix of adult and juvenile voices
- Cultural appropriateness of content
- Actor's pronunciation, inflection, delivery, etc.
- Appropriate, comprehensible sound effects
- Congruence with specified content
- Technical problems with tape
- Cueing students' responses
- Way of teaching lyrics of songs
- Spacing of review exercises
- Rate for phasing out supportive instructional messages
- Format of the worksheets
- Selection of other supplementary manipulable materials
- Frequency and style of use of the classroom and chalkboard
- Layout of the teacher's guide
- Number of activities in the postbroadcast period
- Style of instructions written in the guides

Some of the problems are minor. The purpose of formative evaluation is to improve instruction, not to make pretty radio programs. Although some of the changes appear to be only cosmetic, they influence the total instructional effect. Several small problems soon add up to confused presentations and disinterested students and teachers.

The above—and other—changes resulted from the feedback process, from data collected from observation and testing. But as pointed out, we remained flexible and receptive to any valid feedback from other sources as well. These changes entered into the production process at different points. Some required revisions to lessons already taped for broadcast. Some required changes to lessons already broadcast; these were made at the end of the pilot phase of the project. Most of the revisions were incorporated into scripts being written or under review and production. The kind of changes to be made were carefully documented in the summary sheet from observation sheets, and the professional team member responsible to effect the changes was also clearly specified on the same sheet.

ISSUES

Since the project design required a widely dispersed sample of linguistically diverse schools, the formative evaluation process was also complex and cumbersome in terms of logistics and implementation. Schools were located in widely separated districts—one on the coast of the Indian Ocean and another on the shores of Lake Victoria as extremes. This had enormous cost implications. This ambitious scheme seemed necessary in the beginning, however, to insure that the lessons were effective with the widest variety of learners. The information collected probably had decreasing value to the production team over the life of the project. We soon learned that there was not much difference in the response to lessons by children at either end of the country. The production team also got better and better at writing and producing lessons that were effective on first trial so that information gathered by the observers was of less and less use to the writers; it merely confirmed what they already knew.

An alternative would have been to decrease the amount of observation and thereby the involvement of the observers. This would have had important cost considerations since transportation costs for the observers, provided by the project, was one of the largest single budget items over the life of the project. There were perhaps more important, not easily measured, considerations. For example, the continued involvement of the observers kept their level of commitment high. They remained strong advocates of the radio methodology. They understood the project aims and methodology. As a result, they developed into highly professional test-item writers and administered all of the summative evaluation tests for the project. Without their continued involvement, many of these procedures would have been additionally complicated.

CONCLUSION

Formative evaluation was critical to the successful development of the lessons. The process that emerged included:

- Development of effective instruments for testing and observing children.
- Accurate testing of children.
- Careful documentation of classroom observations.
- Relevant feedback of evaluation results to the writing and production team.
- Revisions of upcoming lessons.

The project team is strongly convinced that the two major development processes that contributed to the success of the project are the instructional system and the formative evaluation. Each process contributed to the other. Although Standard 3 lessons were a bigger challenge, they were written more efficiently, the instruction was more effective, and they were better radio.

At the beginning of the project, direct observation and testing identified segments of the lessons that succeeded or failed. Observation helped to refine techniques for student participation and teacher involvement.

Later on, feedback from radio classrooms provided a safety net, often confirming an effective technique. But even in Standard 3, between one and two unsuccessful attempts a week were modified in some way based on the formative evaluation.

The following chapters on scriptwriting and studio production illustrate, among other things, how the formative evaluation data influenced and modified lesson segments.

APPENDIX
RADIO LANGUAGE ARTS PROJECT SUMMARY FROM OBSERVATION SHEETS

Side 1 The report highlights some of the major concerns raised by observers. It was compiled after examining each observation sheet noting important problems raised by each observer. An issue is viewed as a general problem if raised repeatedly by about one-quarter of the total observers for that lesson.

LESSON	N	BLOCK	Segment	SOW CODE	No. raising problem	No. of schools raising problem	Problem and recommendation/resolution comments	Action Taken
106	6				NIL	NIL	NIL	
107	4	—	—	—	1	1	Extremely poor reception at Lusui (Kakamega)	Check regularly
108	4	—	—	—	2	1	Poor reception at Sotik (Kericho)	Check regularly
108	4	G	4	—	2	1 (Including Dave reporting from listening at the RLAP office)	Pattern: Drill—sleep, sleepier Problem: The stress was wrong. "He's hungrier than she *is*." Should have been: "He's hungrier than *she* is." "He's lazier than *she* is." Rec: Team to discuss Team Resolution: To be re-recorded.	Change stress and re-record

APPENDIX

FORMATIVE EVALUATION RESULTS FOR LESSONS 111-115 DATE: 4-08-83
PERFORMANCE BY ITEM FOR OBSERVATION SCHOOL

SOW CODE	A/12/c/1				→									A/21/c/1,3			A/21/A/1,2 A/21/B/1			"rear"			A/21/b/1		
ITEM			1			2			3			4			5			6			7			8	
SCHOOL	N	C	W	NR	C	W	NR	C	W	NR	C	W	NR	C	W	NR	C	W	NR	C	W	NR	C	W	NR
GICOCO																									
METUMA	5	5	–	–	2	2	1	4	1	–	5	–	–	–	4	1	5	–	–	–	2	3	5	–	–
ISENYA	4	2	1	1	–	2	2	3	–	1	3	–	1	1	2	1	3	–	1	1	3	–	3	1	–
KIBIKO	5	4	1	–	–	3	2	2	2	1	3	2	–	–	3	2	5	–	–	–	4	1	3	2	–
LUSUI																									
SOTIK	5	4	–	1	2	2	1	4	–	1	4	–	1	–	1	4	3	1	1	1	1	3	2	2	1
SIANDA	5	5	–	–	–	4	1	1	3	1	4	1	–	–	1	4	1	3	1	–	1	4	1	4	–
GITHAITI	5	5	–	–	1	4	–	5	–	–	1	4	–	3	2	–	5	–	–	–	–	5	5	–	–
TANGU	5	4	–	1	1	4	–	4	1	–	5	–	–	1	3	1	5	–	–	2	–	3	4	–	1
CHUMANI	5	2	2	1	–	4	1	1	2	2	5	–	–	–	–	5	5	–	–	–	–	5	4	1	–
TOTAL	39	31	4	4	6	25	8	24	9	6	30	7	2	5	16	18	32	4	3	4	11	24	29	10	2
%		79	10	10	15	64	20	62	23	15	77	18	5	13	41	46	82	10	8	10	28	62	69	26	5
% Correct from total responses	89.0%				19.0%			73.0%			81.0%			24.0%			89.0%			27.0%			73.0%		

C-CORRECT ANSWER W—WRONG ANSWER NR—NO RESPONSE

APPENDIX
Radio Language Arts Project
FORMATIVE EVALUATION LESSONS 61—65

Be sure to tick the appropriate ( ) and write in the child's answer where required on the answer sheet.

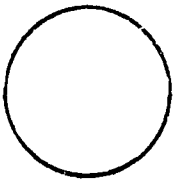
Needed for this test: test booklet, cover sheet, answer sheet, ten cent piece, piece of chalk, shilling, student assistant.

1. Greet the child in English with "Good Morning." Have the child sit down. Do what you can to help the child relax. Explain that you will be asking the child some questions and requesting the child to do some things. Explain to the child that he or she should answer in English, if spoken to in English. Provide the information requested on the answer sheet.

   Rehearse your student assistant to respond to the English command, "Kneel," outside the room where you are testing. When you are sure that your assistant can respond to the command, get your assistant's name. You will need it for the test. Now, bring your assistant into the room where you are testing. Say to your assistant, "Kneel." Ask the student being examined, "What is (NAME of assistant) doing?" Correct answers are: "He/she is kneeling, Kneeling."

2. Give the child a book, a ten cent piece and a piece of chalk. Say to the child, "Put the book there," indicating a place distant from both you and the child. If the child puts the book in the right place, consider this a correct answer.

3. Show the child the two shapes drawn here. Ask the child, "Is No. 1 the same as No. 2?" You should point to No. 1 while saying, "No. 1" and at No. 2 while saying, "No. 2."

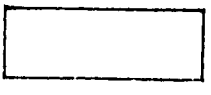


1

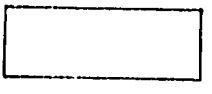
2

If the child responds, "No, it isn't," OR "No," tick the correct answer ( ).

4. Show the child the two shapes drawn below. Ask the child, "Is No. 3 the same as No. 4?" You should point at No. 3 while saying, "No. 3" and at No. 4 while saying "No. 4."



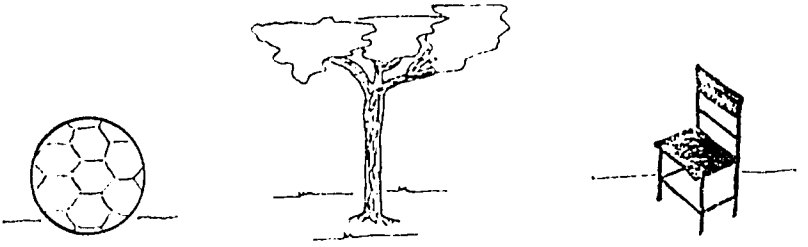
3



4

If the child responds, "Yes, it is," OR "Yes," tick the correct answer ( ).

5. Say to the child, "My name is (use your name). What's your name?" If the child gives you his or her name, tick the correct answer ( ).
6. Clap for a while. Make it look like you enjoy clapping. Say to the child, "I like clapping. Do you like clapping?" Correct answers are: "Yes, " OR "Yes, I do," OR "No," OR "No, I don't."
7. Show the child the following pictures. Ask, "Which one is a ball?" If the child answers, "This," OR "This one," AND/OR points at the correct object, tick the ( ) for correct answer. Write the child's answer in the space provided. If the child does not provide a verbal answer, indicate this as well.



8. Hold up a shilling for the child to see. Place it within sight somewhere in the room where both you and the child can see it. Ask the child, "Where's my shilling?" "It's there," OR "There," OR "Your shilling is there," are correct answers. If the child gestures appropriately, consider this a correct answer, too.
9. Ask the child to clap. While the child is clapping, ask, "What are you doing?" "I am clapping," OR "Clapping," are correct answers.
10. In mother tongue, ask the child to touch his or her nose. Then ask, in English, "Is that your foot?" Correct answers are "No," OR "No, it isn't," OR "No, it isn't. It's my foot," OR "No, it's my foot."
11. In mother tongue, ask the child to touch his or her hand. Then ask, in English, "Is that your hand?" Correct answers are "Yes," OR "Yes, it is."
12. Say to your student assistant again in English, "Kneel." While your assistant is doing this, ask the student being examined, "What is he/she doing?" Correct answers are: "He/she is kneeling," OR "Kneeling."
13. Tell the child the name of your student assistant. Make sure that your assistant is in the room. Then gesture toward your student assistant and ask the child, "Who's that?" Correct answers are: "That's (name of assistant)" OR "(name of assistant)."
14. Ask your student assistant to stamp his or her feet. While your assistant is doing so, ask the child, "Is he/she clapping?" Correct answers are: "No," OR "No, he/she isn't."
15. Have your student assistant continue stamping his or her feet. While your assistant is doing so, ask the child, "Is he/she stamping his/her feet?" Correct answers are: "Yes," OR "Yes, he/she is."

16. Give the child the book, the ten cent piece and the piece of chalk. Now, using the child's name, say, "NAME, give me the chalk." If the child does so, consider this a right answer.

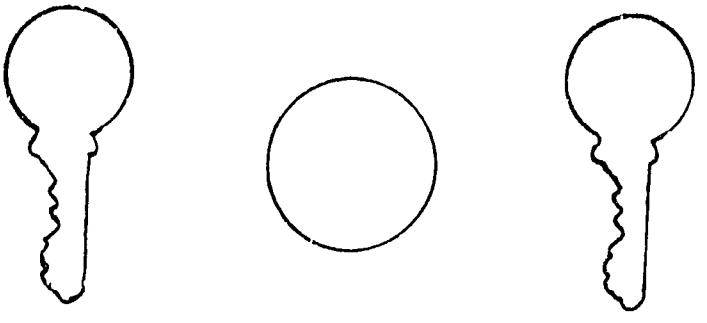
17. Now take the other objects from the child. Hold up the book. Ask the child, "What's this?" Correct answers are: "A book," OR "It's a book," OR "That's a book."

18. Ask your assistant to touch his or her nose. Ask the child being examined, "Is that the boy's/girl's hair?" Correct answers are: "No," OR "No, it isn't."

19. Ask your assistant to touch his or her hair. Ask the child being examined, "Is that the boy's/girl's hair?" Correct answers are: "Yes," OR "Yes, it is."

20. Say to the child, "Touch your left foot." If the child does so, consider that a correct answer.

21. Ask the child to look at the following pictures. Tell the child to touch the two pictures which are the same. Do this in mother tongue. If the child touches the two pictures which are the same, consider this a correct answer.



APPENDIX
RADIO LANGUAGE ARTS PROJECT OBSERVATION SHEET

Lesson: 102 **Block:** C **Segment:** 2 **Description:** What time is it? It's one o'clock. **Segment Number:** 1&2 of 2

	Ratings	Common Mistakes	Comments
1. Teacher preparation:	very good / adequate / poor / Not applicable ( )		
2. Teacher involvement:	very effective / adequate / poor / Not applicable ( )		
3. Pause length:	Too long / Just right / Too short		
4. % of pupils participating:	100% / 75% / 50% / 25% / 0% / Not applicable ( )		
5. Pupils enthusiasm/interest:	High / Medium / Low / Not applicable ( )		
6. % of participating pupils responding correctly by the end of the segment	100% / 75% / 50% / 25% / 0% / Not applicable ( )		

Chapter 6
WRITING BROADCAST SCRIPTS

David Edgerton and Margaret Ojuando

It is difficult to convey the liveliness and pace of an interactive radio lesson on the printed page, yet that is how the lessons begin—on the printed page. This chapter outlines the RLAP process of script development, and describes the scripts themselves in detail. Through the specific script segments discussed below, the chapter demonstrates the instructional principles discussed in Chapter 3. We hope the discussion will be of interest to the general reader and of particular use to writers, instructional designers, and others interested in English as a second language (ESL) instructional radio broadcast scriptwriting. We assume that scriptwriters developing similar materials are familiar with the basic concepts in ESL methodology, and we do not address methodological considerations here as separate concerns.

To provide the reader with a feel for the lessons, we first look at the development of a typical "block" of instruction.

COMPOSING THE PRINCIPAL BLOCKS OF INSTRUCTION

Here is an example, with annotations of a listening/speaking block of instruction taken intact from the production script for *English in Action*, Standard 2, Lesson 102. The entire script is in the final Appendix at the end of this book.

1. Drama Theme 3, Under and Hold
2. Safiri: Children, today I'm going to tell you a story about Sara and Rono.
3. Tina: But first let's practice the words "somebody" and "nobody."
4. Drama Theme to End

Instruction begins with the use of a classroom pupil-participant, "Juma," to help review the meaning of the words "somebody" and "nobody" and allied structures.

1. Rono: Juma, come to the front.
2. FX Travel Music 5
3. Sara: Juma, stand in the corner at the front of the room.
4. PPR 3

Sara and Rono model target material.

5. Rono: Sara, there's somebody in the corner, isn't there?
6. Sara: Yes.
7. Rono: Who is it?
8. Sara: It's Juma.

Then the class repeats the first modeled utterance while Rono carries out the appropriate meaning-giving action—standing in the corner.

9. Rono. Children, say, "There's somebody in the corner."
10. PPR 5
11. Rono: There's somebody in the corner. Again.
12. PPR 4

Juma comes back to the center of the room and the process is repeated with the contrasting utterance, "There's nobody in the corner."

1. Sara: Now, Juma, come out of the corner. Stand in the front of the room, in the middle.
2. Rono: Teacher, please help Juma.
3. PPR 2
4. Rono: Now there's nobody in the corner.
5. Sara: Children, say, "There's nobody in the corner."
6. PPR 5
7. Sara: There's nobody in the corner. Again.
8. PPR 4

Juma is sent back to his desk.

9. Rono: Good, Juma. Sit down.
10. FX Travel Music

The class' attention is directed to the blackboard, where the teacher has written and boxed a cluster of vocabulary items: the words "light," "dark," "light/lit," and "lamp." The teacher will point to these words as appropriate.

1. Sara: Now, children, look at the words in the box on the blackboard.
2. PPR 2
3. Rono: Look at the word "light."
4. PPR 2
5. Sara: Children, say, "light."
6. PPR 2
7. Sara: Light. Again.
8. PPR 1
9. Rono: Sara, is it light during the day?
10. Sara: Yes, it is.
11. Rono: Is it light now?
12. Sara: Yes, Rono. It's daytime now.
13. Rono: Children, say, "It's light during the day."
14. PPR 4
15. Rono: It's light during the day. Again.
16. PPR 3

17. Sara: Children, look at the second word in the box . . . the word "dark."
18. PPR 2
19. Rono: Children, say, "Dark."
20. PPR 2
21. Rono: Dark. Again.
22. PPR 2

At this point a guitar chord, a two-line exchange between Tina and Safiri, and student repetition of the target structure from the exchange form a transition into a familiar song.

1. Guitar: Strum C Major Chord
2. Tina: Safiri, is it dark now?
3. Safiri: No, Tina. It isn't dark now. It's dark at night.
4. Rono: Children, say, "It's dark at night."
5. PPR 4
6. Rono: It's dark at night. Again.
7. PPR 3
8. Tina: Yes. . . . It's dark at night. . . . (A little dreamily) . . . and I'm sleepy. (Maybe a small yawn.)
9. Xylophone Intro: "Sleepy Song"
10. Tina (singing): At night it is dark and I'm sleepy,
    There is darkness all around.
    At night it is dark and I'm sleepy
    And the rain falls softly down.
11. Xylophone: "Sleepy Song" Refrain Under Line 12
12. Safiri: Children, sing with Tina.
13. Tina (singing): At night it is dark and I'm sleepy,
    There is darkness all around.
    At night it is dark and I'm sleepy
    And the rain falls softly down.
14. Xylophone: Refrain Around Again
15. Tina (singing): At night it is dark and I'm sleepy,
    There is darkness all around.
    At night it is dark and I'm sleepy
    And the rain falls softly down.
16. Xylophone Outro

Now attention returns to the remaining items on the blackboard.

1. Rono: Now, children, look at the words "light" and "lit" in the box, and look at the word "lamp."

Light/lit is new. Students have encountered *lamp* in reading, but it's likely many will not recognize it. The teacher is asked to provide mother-tongue translations.

2. Sara: Teacher, please point at these words and explain them to the children in mother tongue.
3. FX Drum and Ring Music 8

A repetition drill is used to reinforce the presentation of the irregular *light/lit*.

4. Rono: Thank you, teacher.
5. Sara: Children, let's drill.

6. Rono: Children, say, "He lights the lamp."
7. PPR 3
8. Rono: He lights the lamp.
9. PPR 3
10. Rono: He lit the lamp.
11. PPR 3
12. Rono: He lit the lamp.
13. PPR 3
14. Rono: He lights the lamp every night.
15. PPR 4
16. Rono: He lights the lamp every night.
17. PPR 4
18. Rono: He lit the lamp last night.
19. PPR 4
20. Rono: He lit the lamp last night.
21. PPR 4
22. Rono: He lights the lamp every night.
23. PPR 4
24. Rono: He lit the lamp last night.
25. PPR 4
26. Rono: He lights the lamp every night.
27. PPR 4
28. Rono: He lit the lamp last night.
29. PPR 4
30. Rono: He lights the lamp every night.
31. PPR 4
32. Rono: He lit the lamp last night.
33. PPR 4
34. Sara: Good drill, children.

The day's study to this point is now summarized in the form of a dramatized story.

1. Drama Theme 3, Under and Hold
2. Safiri: Children, I'm going to tell you a story. Listen carefully.
3. Drama Theme to End
4. Safiri: Last night Sara and Rono were asleep. It was dark. Sara woke up. She said . . .
5. Sara: Rono! Wake up! There's somebody in the room! (Tense, excited whisper—She thinks there's an intruder in her house)
6. Safiri: Rono woke up. He lit the lamp.
7. FX Match Striking
8. Rono: No, Sara. There's nobody in the room.
9. Sara: Then, what *is* it? (Still worried)
10. FX Cat Meow
11. Rono: It's a cat!
    Sara: It's a cat! (Laughingly, relieved as they discover together what's in the room)

A brief modeled discussion of the story follows.

1. Tina: Now, children . . . let's talk about the story.
2. Tina: Last night Sara woke up. Safiri, what did Sara say.

3. Safiri: She said, "Rono, wake up."
4. Tina: And then she said, "There's somebody in the room."
5. Safiri: Children, say, "She said, 'Rono, wake up.' "
6. PPR 4
7. Safiri: She said, "Rono, wake up." Again.
8. PPR 3
9. Tina: That's right, children.
10. Safiri: Rono woke up. Tina, then what did he do?
11. Tina: He lit the lamp.
12. Safiri: Children, say, "He lit the lamp."
13. PPR 3
14. Safiri: That's right! He lit the lamp.

The modeled discussion is capped with an unmodeled comprehension question.

15. Tina: Children . . . what was in the room?
16. PPR 4
17. Tina: That's right! A cat.
18. Safiri: Children, *what* was in the room?
19. PPR 2
20. Tina: That's right! There was a *cat* in the room!

And the block ends.

21. Safiri: Good work, children.

Analyzed in this way, no two major blocks of the many hundreds written would reveal exactly these elements in exactly this order. RLAP scripts are not mechanically stitched together; they result from the imaginative labors of a team of writers. Still, the blocks and segments, like the complete production scripts, are indeed constructed for the most part out of a limited array of distinguishable parts.

THE RLAP TEAM WRITING SYSTEM

Good language teaching is dramatic. This characteristic makes the scripting of ESL radio broadcasts a particularly inviting challenge for the instructional writer. The writer's goal, of course, is a script that is both an efficient language lesson and a listenable radio program.

In interactive radio, the ESL scriptwriter provides drama through very frequent pauses for active student response. What do we mean by "very frequent?" Every few seconds—a half-dozen responses per minute, a good 150 response pauses in the course of a half-hour broadcast is the target. If more than, say, 20 seconds of air time has elapsed without a pause for student response, the writer should begin to worry.

This is the same relentlessly interactive atmosphere that is a principal distinguishing feature of any good teacher-led language class. It is crucial to the success of English teaching by radio. In ESL scriptwriting, we found that with a little practice, all the elements of a good broadcast—variety, pace, plot and character, tension and resolution, the arousal and satisfaction of curiosity—were fully available.

During the first broadcast year, three staff members worked full-time as scriptwriters. One writer handled all the listening/speaking material. Another worked exclusively on reading and writing. The third writer acted as script coordinator and was responsible for writing music, songs, and games, and for developing continuity between instructional segments.

In the second broadcast year, two project staff members were occupied full time, and several others part time, with scriptwriting. In Year Three a third staff member assumed full-time writing duties.

Scriptwriters, both Kenyan and American, had a variety of experience, but none had previously written instructional radio lessons. All had experience as teachers, either working with young children or teaching English specifically. In general, the scriptwriters learned how to write interactive radio lessons by writing them.

Each writer was responsible for designated "blocks" or "segments" of each script (See "Script Format," below) and made a specialty of one of the principal skill areas. There are marked differences in particular in the way oral practice and reading practice were handled, so this skill-area specialization had the effect of making the writer's daily work a good deal easier. The writing team planned and developed a week's work—five broadcast scripts—at a time.

All scripts were based on two documents: the Scheme of Work and the Lesson Plan. The Lesson Plan referred the writer to the Scheme by a coded letter and number system. It broke the instructional content described in the Scheme into specified amounts of weekly broadcast time, by segment, and recommended an order in which the material was to be presented. These two documents made the instructional principles and methods specific to teaching English in Kenya. It was the job of the scriptwriters to employ these methods in their lessons.

Each writer began his or her weekly planning by referring from the Lesson Plan to the Scheme and studying the Scheme prescriptions. The cover sheet on every finished script also carried a Scheme code and a synoptic description of the competencies or structures

covered in that segment. The writers were thus able to locate and retrieve from the script files any old production scripts they wanted to refer to. This is especially important for carrying out future revisions.

With these documents in hand, the writer planned his or her segments for the week, roughing out tentative choices of instructional approaches, running themes, plots, characters, and settings.

Near the beginning of the week a script conference was held at which the writers presented to each other their intentions for the week's work and resolved conflicts and inconsistencies. During this working meeting, the groundwork was laid for the week's script continuity—both internal continuity within each script and continuity among running themes and instructional sequences from program to program over the course of the week.

One of the full-time writers served as script editor and continuity writer. As the week's work unfolded, this person gathered and collated the other writers' draft segments, supplied musical and spoken continuity, adapted copy as necessary, gave the script a first copy editing, and passed the assembled script along for review and final approval.

When script material was returned from the review process for revision, writers incorporated this additional work into their weekly schedules. Other influences on the week's writing included formative evaluation feedback, provided at Monday-morning project staff meetings, based on project field observers' reports and the writers' own field observations in project observation classrooms. Although the Scheme and Lesson Plans, along with the instructional principles, gave guidance to the script planning and writing, it was the formative evaluation which confirmed success or failure of instruction. As one of the instructional principles, formative evaluation affected at one time or another every aspect of scriptwriting and production. Not only were individual segments influenced by this feedback, but also the scriptwriting process itself was partially shaped by the formative evaluation results. This feedback was especially important in the first year and a half as we gained experience and confidence. After that we began to get a feel for what would work, but the feedback was always used to confirm our intuition.

While these weekly work cycles resulted in a complex and detailed product—the week's production scripts—the RLAP writing staff was in no sense a hierarchy, but rather an "action team," motivated by shared professional commitment and the demands of the workload itself. The working atmosphere at the RLAP office

was characterized by intense, intimate, and very informal daily collaboration. This aspect of RLAP project operations—that the writing staff was not a bureaucratized hierarchy, but an agile, flexible team of peers—was, we feel, important to the project's success. The use of an action-team concept for script development is among our principal recommendations to anyone intending to engage in undertakings similar to ours. The assembly, at the outset, of a professional staff capable of this kind of collaboration is obviously the most important requirement for such a system to succeed.

The remaining pages of this chapter are devoted to a detailed description of the RLAP scripts. Our further advice to writers takes the form of notes, cautions, and asides sprinkled liberally throughout those pages.

RLAP SCRIPT FORMAT

The RLAP script format system evolved over the first project broadcast year. It was basically fixed in its final form at a planning

FIGURE 12
RLAP Year Two Script Format

Block	Segment	Timing	Running Time	Description
A		1:05	1:05	Standard opening; "Good Morning" song
C	1	0:15	1:20	Continuity
	2			Listening/speaking segments: maintenance
	3	4:30	5:50	Song game/pace change
	4	1:15	7:05	Drill based on maintenance material
D	1	0:10	7:15	Continuity
	2	1:00	8:15	"Enhancement" (song or game)
E	1	0:15	8:30	Continuity
	2	3:40	12:10	Reading: maintenance
	3	1:00	13:10	"Enhancement" (song or game)
	4	3:40	16:50	Reading: new material
F	1	0:10	17:00	Continuity
	2	1:00	18:00	"Enhancement" (song or game)
G	1	0:15	18:15	Continuity
	2			Listening/speaking: new material
	3	5:00	23:15	Song/game/pace change
	4	1:15	24:30	Drill based on new material
H	1	0:10	24:40	Continuity
	2	3:00	27:40	Writing practice
J		0:50	28:30	"Goodbye" song; standard close

meeting just prior to broadcast Year Two. Adjustments to the format were made in preparation for Year Three, but the Year Two and Year Three formats are similar, and our general comments on script organization apply equally to both unless otherwise stated.

RLAP scripts were divided into major "blocks" of material. The blocks, in turn, were divided into "segments" of several kinds. This format is shown below in Figure 12, "RLAP Year Two Script Format" and Figure 13, "RLAP Year Three Script Format."

FIGURE 13
RLAP Year Three Script Format

Block	Segment	Timing	Running Time	Description
A		0:50	0:50	Standard opening; "Good Morning" song
B	1	0:10	1:00	Continuity
	2	3:40	4:40	Listening/speaking: maintenance
	3	0:10	4:50	Continuity
	4	3:40	8:30	Listening/speaking: new material
	5	0:10	8:40	Continuity
	6	1:00	9:40	"Enhancement" (song or game)
C	1	0:10	9:50	Continuity
	2	6:45	16:35	Reading: new material
	3	0:10	16:45	Continuity
	4	1:00	17:45	"Enhancement" (song or game)
	5	0:10	17:55	Continuity
	6	6:45	24:40	Reading: maintenance
	7	0:10	24:50	Continuity
D		3:00	27:50	Writing practice
E		0:50	28:40	"Goodbye" song; standard close

Writing assignments were divided among the members of the writing team by means of these "blocks" and "segments."

A fixed portion of air time was allotted to each block and segment, as shown. The writer of each block or segment was responsible for timing it accurately. In practice, the writing team exercised a good deal of flexibility regarding the use and placement of the indicated segments within the blocks. These internal segment divisions are not intended as rigid prescriptions, but as general formulae. Writers often moved Year Two segments "C-3" and "G-3", for example, from the middle to one end or the other of the block, or omitted it

entirely. Similarly, the pattern drills specified in Year Two were often lengthened, shortened, omitted, or woven into the body of a segment and timing recalculated accordingly.

There are several reasons, in addition to pedagogical considerations, for developing scripts by means of a formulaic system of this kind. First, the regularity of each day's broadcast is a convenience to teacher and students, who can easily tell when one task is finished and another of a known kind is about to begin. Second, a segmented script structure helps to generate lively, varied pacing. Third, a segmented, formulaic system is a good way to team-write a very heavy load of broadcast material efficiently.

What instructional devices do we commonly use in these principal blocks? Most principal blocks of instruction included several of the following devices:

- Choral and individual question-and-answer exchanges between students and the radio.
- Structured conversational engagements between the radio and chorally responding students, and between the radio and individual students.
- Spoken and nonverbal transactions among students, posited and reinforced by radio voices.
- Dialogues, vignettes, and stories that engage students as participants, or otherwise require them to respond by speaking or acting.
- Exercises based on worksheets or blackboard material; exercises involving the display or manipulation of common classroom objects.
- Songs and games.
- Pattern drills and similar exercises.

What structural elements hold together the bits and pieces of the principal blocks of instruction? The major techniques for unifying the blocks into a whole lesson included:

- Stock characters and settings
- Stock musical, verbal, and sound effects cues
- The response-pause system
- The pupil-participant system.

CHARACTERS AND SETTINGS

In Year One, the radio voices had names, but they were not distinct, individuated characters. This was in part because the development of dramatic characterization techniques within the strict confines of the project's instructional realities was part of the evolu-

tion of the project itself. Experience soon taught us, as well, that the English available to us during most of the first year simply remained too meager to develop much character identity through scripting. In addition, we felt that characters who spoke with the authority and dignity of teachers would be more acceptable to teachers and parents.

The Year One characters were called Juma, Rosa, Chege, Akinyi, and, at a later stage, Mumbi, and a "Mr. B," who was in charge of teaching the alphabet. Rosa and Juma were the principal characters. Mumbi and Akinyi were ancillary characters who appeared as necessary.

Year Two and Year Three scripts used four principal characters, named Safiri, Tina, Sara, and Rono, and an array of secondary characters. All were played by the project's company of two male and two female actors. The main secondary characters comprised "the Hamisi family"—mother, father, target-age son and daughter, grandmother, grandfather, and several aunts, uncles, and cousins. Along with a small constellation of other minor characters—a fisherman and his son, for example—these characters populated an unnamed rural community in Kenya, intended to parallel loosely the sort of rural environment where the audience lived.

Safiri and Tina were the designated program co-hosts, but this role could be filled at the writer's convenience by Sara and Rono. Sara and Rono are a youngish couple who keep a little rural general goods shop. Safiri and Tina intentionally were left less specific as regards age, occupation, family status, and so forth, for the sake of scripting flexibility.

The settings most often used in RLAP broadcasts were: Rono and Sara's shop; the Hamisi family's house and its environs (the garden, a journey by *matatu* from house to hospital, in front of the house, and so forth); on the way to school (a walk that takes David and Anna through the village); and a classroom.

Specified settings are only one of several techniques writers can use. When there was no need for that kind of specificity, the setting was simply not posited. Often a two- or three-line dialogue, with no setting stated, was all that was needed. With established familiarity of setting and characters, an implied setting was often apparent to listeners—Rono and Sara are usually in their shop, for example.

1. Musical Bridge No. Four
2. Sara: Rono, please lift this box for me.
3. Rono: Uhhfff . . . . . (Straining to lift it)
   I can't, Sara. It's too heavy!

Implicit in a great deal of RLAP script material was an additional setting, the student-listeners' own classroom. Dramatic license in this regard was established early and firmly, both because the writers knew from experience that this kind of dramatic extrapolation was natural to listeners, and out of the necessity for the radio voices to be "present" at will, "seeing" and "hearing" what happens in student-listeners' classrooms, in order to conduct the lesson.

Thus, the radio characters could speak directly about "visiting" the students in their classroom.

1. Drama Theme No. One: 3, Under and Hold
4. Sara: Rono! Wake up!
5. Rono: I'm awake. (Sleepily)
6. Sara: Get up!
7. Rono: I'm up. (Less sleepy)
8. Sara. Get dressed!
   Brush your teeth!
9. Rono: I'm getting dressed! (Excited)
   I'm brushing my teeth! (Frantic—brushing his teeth while he says the line)
10. Sara: Good! Now let's visit the children.
11. Drama Theme to End

Or, when this kind of prefacing was not needed, radio voices could begin by simply initiating instruction.

1. Musical Bridge No. Six
2. Tina: Children, look at the words in the box on the blackboard.

At the writer's discretion, then, the radio characters become classroom presences, with a flexible array of traits and perceptive limits governed by common sense and the needs of the lesson. Students were not confused by assertions of the radio characters' presence among them. Listeners in general, and children in particular, are unlikely to distract themselves with abstract musings about whether or not they are "really" conversing with a radio, or whether or not radio characters can "really see what's on the blackboard," or by face-value inconsistencies in these premises. No one cared if Rono could apparently see what was on the blackboard and at the same time Sara could not. No one was troubled when Tina, already "present" in the classroom, needed to ask the students to confirm that they had carried out a task.

1. Safiri: Now let's look at Worksheet 14.
2. Tina: Children, are you looking at Worksheet 14?

CONTINUITY DEVICES

A total of one minute, 15 seconds (1:15) in Year Two and one minute (1:00) in Year Three in each script was allotted to the conti-

nuity writer for creating transitions as needed between blocks and segments. (The assignment of 10- and 15-second slots for continuity as shown in Figures 12 and 13 was intended only as a general guide to script flow and timing. In practice, the placement and length of continuity material varied greatly from script to script.)

These continuity passages included both spoken transitions and the use of four-second "musical bridges." RLAP programming was produced without the benefit of studio equipment for playing prerecorded music or sound effects on cue during production. The "musical bridges" consisted of a predetermined set of seven guitar riffs played live by a studio musician.

Often a musical bridge alone was all that was needed for continuity. Students recognized the musical bridges as transition signals and were ready to respond appropriately—by reaching for the first of the day's worksheets, for example—since the various kinds of instruction occurred at about the same points in each day's broadcast.

A musical bridge was used for transition out of any segment that did not end with a musical passage of its own. The musical bridge was often accompanied by a single line or a two- or three-line exchange. The whole transitional passage, including four seconds for the musical bridge, generally covered no more than 10 or 12 seconds of air time.

There were several types of typical continuity segments. They might have consisted simply of a statement of the next activity.

1. Musical Bridge No. One
2. Safiri: Children, it's time to read.

* * * * * * * *

1. Musical Bridge No. Seven
2. Sara: Let's sing the "Clapping Song!"

They might state the next activity together with instructions about how to prepare for it.

1. Musical Bridge No. Five
2. Tina: It's time to write.
3. Safiri: Children, take your exercise books and pick up your pencils.
4. FX Writing Music Up 4, Under and Hold

Or they might combine this kind of preparatory dialogue with a modeling of the pattern just practiced or about to be practiced.

1. Drama Theme No. One: 3, Under and Hold
2. Rono: Sara, the cups are on the top shelf. Can you reach them?
3. Sara: No, Rono. The shelf is too high. I'm not tall enough.
4. Drama Theme to End

The most elaborate continuity segment in an RLAP script was often the first, since it introduced the day's first block of instruction. Continuity Segment "C-1" (Year Two)/"B-1" (Year Three) immediately followed the standard opening. To that point all that the students had done was sing the opening song and chorus "Good Morning!" on cue. This continuity segment was often a vignette 10 to 15 seconds long, with a special running guitar theme, "Drama Theme No. One," behind the dialogue. The two script excerpts above with cues for "Drama Theme No. One" are examples of program-opening continuity segments.

Here is another example from Year Two of an opening continuity segment, together with the material that immediately followed it:

1. Drama Theme 3, Under and Hold
2. Safiri: David and his grandfather are walking. David wants to run. (Safiri close to mike; soft, confiding tone)
3. David: Come on, grandfather! Run with me!
4. Grandfather: I can't run, David. I'm too old. (David and Grandfather a little off mike, voices louder, as if we're overhearing a conversation outdoors from a distance)
5. Drama Theme to End
6. Safiri: Children, look at worksheet 2.
7. David: Worksheet 2 has pictures of Grandmother and Grandfather.
8. Grandfather: Worksheet 2 has pictures of David and Anna, too.

The "Drama Theme No. One" was originally intended to signal the beginning of dramatic material, but evolved into a musical-bridge cue with a variety of specialized functions, some only dimly related to anything that could be considered "drama." The "drama theme" was generally used in Year Two, to introduce Blocks C and G even when the spoken continuity was not dramatic. It also was used sometimes within blocks as a back-up theme for transitions of various kinds, dramatic or not.

1. Drama Theme 3, Under and Hold
2. Sara: Rono, what's that on the blackboard?
3. Rono: A story.
4. Sara: Let's read it.
5. Rono: All right!
6. Drama Theme to End

In Year Three, two more stock "drama themes" for the guitar—a major-key "running theme" and an "ominous" minor-key theme—were introduced to complement increasingly complex dramatic material. The original "Drama Theme No. One" became exclusively the musical key to open Listening/Speaking Block B. With increas-

ing frequency in Year Three, connected dramatic vignettes recurred throughout a program, both as an instructional tool accompanying practice and as a thematic continuity device. "Drama Theme No. Two" and "Drama Theme No. Three" were useful in helping listeners follow this connected, recurring dramatic material.

1. Safiri: David ran to find Anna.
2. FX Water Lapping: Under and Hold: and:
3. FX David's Running Footsteps Under Line 4
4. David: Anna! Anna!! (Excited: Calling out) Onyango is going to take us for a ride in his father's boat!!
5. FX Fade Footsteps
6. Anna: But David . . . I can't swim! (Nervously—The idea of a boat ride frightens her)
7. Guitar: Strum Firmly an AM or AM7 Chord (This is supposed to be an "ominous" chord)
8. David: *I* can swim, Anna! (Trying to encourage her)
9. Anna: But *I* can't! (It's not working)
10. Guitar: AM or AM7
11. Safiri: Children, can David swim?
12. PPR 3
13. Safiri: Yes, he can. That's right. Can Anna?
14. PPR 3
15. Safiri: No, she can't. Anna can't swim.
16. Drama Theme No. Three: Under and Hold
17. David: I'm a good swimmer, Anna!
18. Anna: But I'm not!
19. David: Oh, come on, Anna. . . . Onyango is very good at sailing the boat . . . and he'll be careful.
20. Anna: All right, David. (A reluctant little voice—she really doesn't want to)
21. Drama Theme No. Three: End Fast on Relative Minor
22. Safiri: Children . . . is Anna going to ride in the boat?
23. PPR 3
24. Safiri: Yes, she is . . that's right . . .
25. Guitar: Strum AM or AM7
26. Safiri: . . . . but she doesn't want to.
27. Drama Theme No. Two: Under Line 28 and Hold
28. Safiri: Tomorrow, children, I'll tell you what happened when David and Anna went for a ride in the boat.
29. Drama Theme No. Two: End Fast and Firmly on Dominant Chord

Note that the passage immediately above is excerpted from the midst of a "block" of instructional material. It is not one of the "continuity" passages added to a script during script assembly.

A general cautionary note on continuity: writers should scrupulously avoid the temptation to build continuity "from the ground up," turning transitional passages into small independent dramas. Such temptations result from a misplaced desire to satisfy adult native-speaker needs for plausibility. This kind of overwriting is deadly for language learners gener-

ally, and for children in particular. Transitions should always be kept as quick and spare as possible.

Here are some guidelines for continuity writing: writers should limit themselves to 15 or 20 seconds of transition total, including music, and less time whenever possible; to dialogue that directly, precisely models the preceding or following instructional material; and to instructions or statements necessary to prepare students for the work that's about to begin.

Here are several further examples of continuity passages from Year Two scripts:

1. Drama Theme 3, Under and Hold
2. Mrs. Hamisi: Anna, who's repairing your toy?
3. Anna: I'm repairing it *myself*! (Proudly—and stress "myself")
4. Mrs. Hamisi: Your*self*?
5. Anna: Yes, mother! Myself!
6. Drama Theme to End

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1. Musical Bridge No. One
2. Safiri: Tina, what's on the blackboard?
3. Tina: A story.
4. Safiri: Ah! It's time to read!
5. Tina: Yes!

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1. Musical Bridge No. Three
2. Safiri: Let's buy some things at Rono's shop!

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1. Musical Bridge No. One
2. Sara: Let's sing!

Here are two examples of longer continuity passages from Year Three scripts.

1. Musical Bridge No. Seven
2. FX Soft, Gentle Rain: Under Low and Hold
3. Sara: Goodbye, Tina and Safiri!
4. Tina: Goodbye! (Ad lib, off mike)
   Safiri: Goodbye!
5. Rono: It's dark, Sara. Let's close up the shop.
6. Sara: Mmmm . . . good idea (Sleepily—maybe a little yawn) This rain is making me sleepy.
7. FX Fade Rain Out Very Slowly During "Sleepy Song"
8. Xylophone: Intro: "Sleepy Song"

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1. Drama Theme No. Five
2. FX Fade Running Footsteps in Slowly and Out Again Under Lines 3—6
3. Sara: Here comes David, Rono! (Amused)
4. Rono: He's late for school again!
5. David: What time is it, Rono!? (Off mike—panting, running hard)

6. Rono: It's almost eight o'clock! Hurry, David!
7. FX Fade Footsteps
8. Sara: David can tell the time, but he's (with a laugh) always late!
9. Guitar Intro: "Time Song"

OTHER MUSICAL CUES

All live instrumental music and song accompaniments in the RLAP studio were played by a single musician equipped with a steel-string acoustic guitar, a Casiotone miniature electronic organ, a small xylophone, a drum, and a slide whistle.

RLAP scripts used other kinds of stock musical cues in addition to the "musical bridges" and "drama themes."

Writers called for incidental musical transitions as needed. A guitar or Casiotone cue, for example, was sometimes used in mid-segment to signal the end of a story or vignette and to indicate transition to a related exercise.

4. Tall Man: I want to cut paper. Please give me your scissors, George.
5. FX Fade Scissors
6. Safiri: George gave the tall man the scissors.
7. Casiotone: Arpeggio
8. Tina: Now let's talk about the story.

Rising or falling slide-whistle tones were used whenever students were told to stand up or sit down.

1. Rono and Sara: (Singing)
   These are my hands
   And these are my feet
   These are my eyes
   And these are my ears.
2. Guitar: Outro
3. Safiri: Sit down, children.
4. FX Sit-Down Whistle

A guitar-and-drum theme, cued as "FX Travel Music," was played when students were told to go to the front of the room for an activity and when they were told to return to their desks. "Travel Music" was timed as follows: four seconds for a single student to come to the front of the room; four or six seconds for two students; eight seconds for three or more students.

Taped patches of Kenyan instrumental folk music were used as follows:

- A theme cued as "FX Mother Tongue Music," or "FX Drum and Ring" to fill air time during which the teacher is requested to provide instructions or a translation in student's first language (generally between two and eight seconds long).
- Themes cued as "FX Reading Music," "FX Writing Music," "FX Kayamba," or "FX Rimba" to fill empty air time or more than nine seconds duration during reading and writing exercises.
- The program "intro" and "outro" musical themes, cued as "FX Mserego" and "FX Rimba, Kayamba, and Kivoti."

VERBAL CUES

In addition to the musical and transition cues already discussed, RLAP broadcasts used the following standard verbal cues:

Speaking/Listening Cues:

Listen.
Say, . . .
Ask, . . .
Read, . . .
Again. (For modeled repetitions)
Let's drill!
Let's sing!
Let's play, . . .
Now *you* do/say it!

Action Cues:

Come to the front.
Go back to your desk(s).
Stand up.
Sit down.
Walk to the (door, corner, etc.)
Take your exercise books and pick up your pencils.
Point at . . .
Hold up . . .
Pick up . . .
Put down . . .
Touch . . .
Give. . .
Put the . . . in/on/behind/beside/under the . . .
Stand behind/beside/between. . . .

In Year Three, a system was developed to cue the classroom teacher to call on one child to respond. In this system, the radio

voice initiated a stimulus with the words "one child" (or "same child," or "another child," as appropriate). Then the radio voice presented the stimulus. Then a single xylophone note sounded, which was the teacher's signal to point to a child. Two or three seconds were added to the pause for pupil response (PPR) to give the teacher time to call on someone. This "teacher-appointed response system" was used increasingly as Year Three progressed, particularly to elicit extended or open-ended responses.

1. Safiri: One child . . . who stole the vegetables?
2. Xylophone: 1 note
3. PPR 5
4. Grandmother: That's right! *Hare* stole them!
5. Tina: Same child . . . *why* do you think Hare stole the vegetables?
6. PPR 6

Additional repetition cues evolved during Year Three. "Say it again," "What did you say," and "once more" were the cue variations most often used. These variations were adopted in the interest of generating more natural and varied speech.

Students heard these cues regularly. The cues were used consistently and unvaryingly. Much of the success of a radio lesson is the result of dependable cueing. Students who have not mastered a consistent set of verbal, musical, and sound effect cues cannot concentrate fully on the tasks at hand.

SONGS AND GAMES

There were four or five songs or games in most RLAP scripts. Mid-block songs or games were used at the discretion of the writing staff. We treated the designated "enhancement" blocks as untouchable, and tried to avoid finished scripts with only two songs or games. We preferred active "stand-up" games or clapping songs for use in the "enhancement" slots, to ensure that every script included some physical movement.

The writing staff followed the principle that all songs and games should carry instructional content, and not be used simply as random diversions. Songs were written to accompany the introduction of a new pattern or notional cluster, and were likeliest to appear thereafter as an adjunct to further study of that pattern or cluster. For example, the first presentation of the adverb "too" resulted in the following song:

It's too high, I can't reach it.
It's too high, I can't reach it.
It's too high, I can't reach it.
It's too high for me!

The following songs were among those that appeared during Year Two for purposes of contrastive tense review:

I'm washing my hands.
I'm washing my hands.
I wash them every day!
I'm washing my hands.
I'm washing my hands.
I washed them yesterday!
* * * * * * * *
I go, you go every day!
He, she, and they went yesterday!
We'll go tomorrow, to learn and play!
We all go to school!

In Year Three, practice in manipulating indirect objects was often accompanied by a "plug-in" song consisting simply of repetitions of a model direct/indirect object transformation—"Tell me a story, tell it to me," for example, or "Send me a letter, send it to me."

A unit on mass and count nouns resulted in the "Dinner Song," which was then often sung when dinnertime was used as a dramatic setting.

We need a few cups and a little tea,
A little meat, a few potatoes, don't you see,
Some milk and some maize and, one, two, three!
Dinner is ready!
Dinner is ready!
Dinner is ready for the family!

Standard principles of children's writing and ESL instructional writing apply to writing songs for broadcast: repetitiveness, melodic simplicity, learnability, cultural appropriateness, and as close a focus on target syntax and vocabulary as can be managed. ***A song, for ESL purposes, should amount to a repetition drill set to music.***

All RLAP songs consisted of only a single verse—more would surely be too much for students to learn—but many, like the "Indirect Object Song," were constructed to accept patterned plug-ins. The "It's Too High" song (above) was another example. Yet another was a Year Two song developed for use in accompanying exercises with the verb *fill*, the adjectives *full* and *empty*, and nouns constructed with the suffix-*ful*.

1. Rono: Sara, do you want a cup of tea?
2. Sara: Yes, please!
3. Guitar: "Please Fill My Cup" Intro
4. Sara: (Singing)
   Please fill my cup.
5. FX Cup Filling (Time to Guitar, Line 6)

6. Guitar: 4-Note Echo of First Line Under FX (Line 5)
7. Sara: (Singing)
   Now my cup is full.
   I have a cupful,
   A cupful of tea!
8. Guitar: Refrain and Hold Under
9. Rono: Children, let's sing with Sara!

Variants of this song were achieved with plug-ins such as "fill my glass/glassful of water" and "fill my hand/handful of nuts."

A cautionary note: students must be taught to expect plug-ins, when the writer intends to use them, or new plug-ins are likely to be ignored. If children thoroughly learn a song one way and then are asked to alter the words, they are inclined simply to sing the song as they first learned it, running over the radio voices' new version, even if the proposed alteration is a simple and obvious pattern substitution.

When a new song was introduced, a radio voice sang the song through once or twice and then students were instructed to join in. The first time a song was heard in any broadcast it was sung by a single voice. The full cast often sang subsequent repetitions, to add vigor to the singing, but the combined voices of the full cast singing a song tended to render the words indistinct.

1. Musical Bridge No. Two
2. David: My friend is tall!
3. Anna: My friend is taller!
4. Rono: My friend is tallest!
5. FX Guitar or Casiotone Intro: "Tall, Taller, Tallest" Song
6. Safiri: (Singing)
   His friend is tall.
   Her friend is taller.
7. Rono: My friend is tallest,
   The tallest friend of all!
8. Guitar of Casiotone Refrain, Under and Hold
9. Safiri: Let's all sing, children!
10. Whole Cast: (Singing)
    His friend is tall.
    Her friend is taller
    My friend is tallest,
    The tallest friend of all!

11. Guitar or Casiotone Refrain, Under and Hold
12. Safiri: Once more, everybody!
13. Whole Cast: (Singing)
    His friend is tall.
    Her friend is taller.
    My friend is tallest,
    The tallest friend of all!
14. Guitar or Casiotone Outro

"Games," in RLAP broadcasts, were often movement exercises. These too were designed to carry instructional weight, in addition to the obvious value in getting young children out of their seats for movement breaks at least once or twice during a half-hour of intensive language study.

Rehearsing names for body parts was one obvious device for movement games. These activities also combined singing and movement.

1. Safiri: Children, stand up.
2. FX Stand-up Whistle
3. Rono: Children, touch your hands.
4. Drum: Boom Boom
5. Sara: Touch your feet.
6. Drum: Boom Boom
7. Rono: Touch your eyes.
8. Drum: Boom Boom
9. Sara: Touch your ears.
10. Drum: Boom Boom

One of the most enduringly popular RLAP games, however, required nothing but that students stand up, turn around, and sit down again on command.

1. Guitar: "Boys And Girls Stand Up" Intro
2. Safiri/Rono: (Singing)
   Boys, stand up.
3. FX Stand-Up Whistle
4. Sara/Tina: (Singing):
   Girls, stand up.
5. FX Stand-Up Whistle
6. Cast: (Singing)
   Boys and girls, sit down.
7. FX Sit-Down Whistle
8. Sara/Tina: (Singing)
   Girls, stand up.
9. FX Stand-Up Whistle
10. Safiri/Rono: (Singing)
    Boys, stand up.
11. FX Stand-Up Whistle
12. Cast: (Singing)
    Girls and boys, sit down.
13. FX Sit-Down Whistle
14. Guitar: Outro

PAUSES FOR STUDENT RESPONSE

One of the most subtle tasks for writers was timing the length of pauses for pupil response ("PPRs," in RLAP usage, for "Pauses for Pupil Response"). Students respond at different rates of speed;

classrooms manifest a surprising variety of local styles in the speed of choral responses. It was hard to predict the shortening in response rates that took place over time as learners progressed. The writer often had to allow for an unknowable quantity of "think time" in addition to actual delivery time. In some cases it appeared that students needed an additional second of response lead time to make sure that the radio had finished cueing them. The hazards of failure in accurately timing PPRs were considerable—too short a pause and the response overlapped the broadcast; too long, and there was dead air and a loss of lesson momentum.

Writers simply must use intuition in estimating PPRs. The systems we used in timing our PPRs changed as our learners improved and our materials became more complex. The RLAP system for timing PPRs was as follows: the writer spoke the predicted student response, imagining a likely rate of delivery, and timed himself or herself. One second was then added to this timing for the first time a response was generated, and taken off again for subsequent immediate repetitions.

5. Rono: Good, children. Now, Chege . . . look at the letter "B" on the blackboard.
6. PPR 2
7. Sara: Chege, try to touch the letter "B."
8. PPR 2
9. Rono: Children, can he touch it?
10. PPR 3
11. Rono: Yes, he can. Again.
12. PPR 2

A second or more of "think time" was added when the expected response appeared to warrant it. Students clearly needed less "think time" for a simple modeled-and-repeated question and answer.

1. Sara: Rono, is he tall enough?
2. Rono: Yes, he is.
3. Sara: Children, is he tall enough?
4. PPR 3
5. Sara: Yes, he is. Again.
6. PPR 2

They needed more for an unmodeled response—or a response requiring a complex transformation.

3. Sara: Akinyi, where is the soap?
4. PPR 6
5. Sara: *There* it is! . . . (*Now* she sees it)
6. Rono: On the bottom shelf . . . .
7. Sara: . . . . in the middle.
8. Rono: Thank you, Akinyi!

* * * * * * * *

2. Sara: Rono, is the third line as long as the second line?
3. Rono: No. It's longer.
4. Sara: Juma . . . . is the *first* line as long as the second line?
5. PPR 5
6. Sara: No. It's shorter.
7. Rono: Children, is the first line as long as the second line?
8. PPR 4
9. Rono: No. It's shorter. Again.
10. PPR 3
11. Rono: Again.
12. PPR 3

TIMING YEAR 2 READING SEGMENTS

Timing the PPRs in reading segments is even more difficult. Idiosyncrasies among individual classrooms and learners vary enormously, and these variations can have many different causes—teachers who encourage odd styles in choral reading, for example, or a very wide gap between the good readers in a given classroom and the poor ones. PPRs must be generous enough so that when students are reading aloud chorally—a very common expedient, or necessity, in broadcast lessons—the chorused responses do not break down in chaos because the radio is leaving too many students behind. The timing must allow for the balance of familiar and unfamiliar vocabulary in a text. Poor readers need adequate "hesitation" time for word-by-word decoding. Even good beginning readers can get lost when a sentence on a worksheet extends across two or three lines.

As was the case in timing pauses in listening/speaking practice, apt timing of pauses in reading practice depended on the writer's experience and discretion.

The writer always began by cueing the reading—that is, by drawing students' attention to a worksheet or to material on the blackboard. He or she generally allowed three to five seconds for this initial locating. Next, students were directed to the place in the text where they were to begin working—a second distinct step. A radio voice led them to locate "the first word in Box Q on Worksheet 12," for example, or "sentence 5 under the picture." Two PPRs of two seconds each were generally required to lead students to find their place in a text.

Here is a very general rule of thumb for arriving at a PPR for students' first attempt to read aloud a given chunk of material—a word, phrase, or sentence—on their first encounter with it: the writer speaks the material aloud, trying to produce some sort of

reasonable "average-student" rate of delivery, and times this delivery. He or she then adds 50 percent to this timing to arrive at the PPR.

We discovered that this 50 percent, for our materials, in our teaching context, was usually sufficient time to allow for most students' initial decoding struggles. Then, when the radio provided a correct model and children were asked to repeat it—the usual practice—the 50 percent additional time was removed.

1. Safiri: Children, touch sentence 1 under Box A.
2. PPR 2
3. Safiri: Read that sentence aloud, children.
4. Music: Soft Kayamba 12
5. Safiri: Again.
6. Music: Soft Kayamba 12
7. Tina: Mr. Hamisi is riding his bicycle along the path. Again.
8. PPR 8

* * * * * * * * *

1. Safiri: Children, look at the blackboard. Tina, read all the words under letter "a."
2. Tina: "Ate," "race," "face."
3. Safiri: Children, look at the words under the letter "a." Read the first word aloud.
4. PPR 3
5. Tina: "Ate." Again.
6. PPR 2
7. Safiri: Read the second word under the letter "a."
8. PPR 3
9. Tina: "Race." Again.
10. PPR 2
11. Safiri: Now read the third word under the letter "a."
    After: Ask children to identify and read out individual words in the group.
12. PPR 3
13. Safiri: Now read all the words under the letter "a."
14. Music: Soft Kayamba 10
15. Tina: "Ate," "race," "face." Again.
16. Music: Soft Kayamba 10

It was often easier for children to read from the blackboard than from worksheets. Since all eyes were on the same copy, the teacher could control the pace of choral reading—a significant consideration for broadcast lessons—by touching each word as the children read.

RLAP reading exercises that focussed on units of material more than two sentences long were generally accompanied by "comprehension questions." These were simple questions, or complex question sequences designed to lead students to grasp the main idea of a passage or to respond to inferences embedded in it. PPRs

for responses of this kind were timed according to length and difficulty, like listening/speaking PPRs, except in cases were the text had been read silently. Comprehension responses accompanying silent reading were timed more generously.

The following script excerpt shows reading PPRs of several kinds.

1. FX Bicycle Bell 3
2. Tina: Whose bicycle is that, Safiri?
3. FX Bicycle Bell 3
4. Safiri: It's my bicycle. I'll ride to town after this lesson. Children, put worksheet 22 in front of you.
5. PPR 4
6. Safiri: Do you now have worksheet 22 in front of you?
7. PPR 3
8. Tina: Yes, we do. Again.
9. PPR 2
10. Safiri: Good. Now look at Box A on the worksheet, children.
11. PPR 2
12. Tina: Look at Mr. Hamisi, children. What's he riding?
13. PPR 3
14. Tina: A bicycle. Again.
15. PPR 2
16. Safiri: Children, touch sentence 1 under Box A.
17. PPR 2
18. Safiri: Read that sentence aloud, children.
19. Music: Soft Kayamba 12 (Should not interfere with children's concentration.)
20. Safiri: Again.
21. Music: Soft Kayamba 12
22. Tina: Mr. Hamisi is riding his bicycle along the path. Again.
23. PPR 8
24. Safiri: Good. Now read sentence two, children.
25. PPR 6
26. Tina: He is going to the city. Again.
27. PPR 5
28. Safiri: Now read sentence three.
29. PPR 7
30. Tina: He rides and rides and rides. Again.
31. PPR 6
32. Safiri: Who's riding to the city, children?
33. PPR 3

Note that line 32 qualifies as a comprehension question, since the answer to the question is not immediately adjacent to it. PPR 3 is adequate timing, since the expected response—"Mr. Hamisi"—is a brief utterance.

A further note: even reinforcement repetitions in reading need to be timed as reading, *not as listening/speaking repetition practice. The writer must do all he or she can to hold children's attention to the text, and to inhibit*

their tendency simply to repeat modeled answers without focusing on the reading task. PPRs must allow time for children to focus and read, a longer process than mere listening and repeating.

The RLAP system for timing writing response pauses is as follows: for copying exercises, we allowed two seconds per letter, plus three seconds between each word. Additional generous focusing time was allowed for copying material that included extra lexical tasks—material that continued across more than one line, for example, or that required looking back and forth repeatedly between the exercise book and a dense block of text. In general, we found that students needed less processing time to copy from the blackboard than to copy from a book or a worksheet.

We timed dictation exercises by allowing four seconds per letter in addition to one second for the utterance of the letter—a total of five seconds for each word dictated.

Other kinds of structured writing exercises were timed according to the writer's best guess about the difficulty of the task.

PPRs are dead air time unless they are filled up with incidental music or sound effects. As a rule, RLAP broadcasts cover all dead air over nine seconds long with music. Reading and writing material generated most pauses of this length. To fill long reading and writing PPRs we used the soft, unobtrusively rhythmic sound of a *kayamba*, a rattle made of small seeds enclosed in a bamboo case.

We were anxious to avoid broadcasting even short expanses of dead air as much for the sake of our incidental listeners as for our school users. Our broadcast service, the Voice of Kenya National Service, is one of only two frequencies, both state controlled, available on the AM/FM dial. The National Service is the only service on the air during School Broadcasts hours, so our audience of incidental listeners was sizable. Too much dead air can cause both school users and incidental listeners unnecessary concerns. Some may begin to fumble with their receivers, thinking that their tuning is faulty. Others may think things have gone wrong at the station.

PATTERN DRILLS

The Year Two RLAP script format allowed 2:30 per program for pattern drills. The continuity writer wrote these drills as part of his script-assembly work, after he had the draft script segments in hand, and after he had written the continuity segments. There was usually time left over from the continuity time allotment. The continuity writer added this surplus time to the total allotted for drills. He then apportioned this time to the two drill segments, "C-4," and

"G-4," writing drills based on the day's speaking/listening study in the "C" and "G" block.

In addition to this prescribed drill material, pattern drills were used as needed throughout the radio lessons for additional review as identified by formative evaluation.

In keeping with much contemporary practice in language teaching, RLAP programming made use of a broad variety of instructional devices. Formal pattern drilling had an established but relatively minor place in our radio language lessons. RLAP pattern drills were always closely connected to other immediately adjacent material, and always relied on freshly established meaning drawn from those surrounding contexts.

Several of the old audiolingual techniques, rote drilling among them, can be tempting to ESL scriptwriters. Writers need to be vigilant against any tendency to crank out rote drills inadequately grounded in meaningful real-language contexts.

The drills we used were standard patterned language exercises: repetition, substitution, and transformation drills, and combinations and variants of these.

In RLAP scripts, simple repetition drills were cued with the words, "Children, let's drill," and ended with the line, "Good drill, children," or simply, "Good, children."

1. Musical Bridge No. One
2. Tina: Children, let's drill again.
3. Safiri: Children, say, "I'm washing myself."
4. PPR 4
5. Safiri: You're washing yourself.
6. PPR 3
7. Safiri: He's washing himself.
8. PPR 3
9. Safiri: She's washing herself.
10. PPR 3

* * * * * * * *

3. Safiri: They're washing themselves.
4. PPR 3
5. Tina: Good drill, children!

Outside of the drill context, repetitions must be generated by means of the cue "again," or another stock repetition cue. Repetition drills have the advantage of establishing a sustained cadence of repetitions without the intervention of a cue.

Substitution and transformation drills are introduced with the words, "Children, listen," followed by 10 or 15 seconds of modeling, followed by the line, "Now children . . . *you* do it," followed by

the drill itself, and ending with a short repetition drill tag to model the correct pattern of responses.

1. Musical Bridge No. Two
2. Tina: Children, listen.
3. Safiri: I'm washing myself.
4. Tina: I'm washing myself.
5. Safiri: He.
6. Tina: He's washing himself.
7. Safiri: They.
8. Tina: They're washing themselves.
9. Safiri: She.
10. Tina: She's washing herself.
11. Safiri: Now, children . . . . *you* do it.
    (Pause)
    I'm washing myself.
12. PPR 4
13. Safiri: They.
14. PPR 4
15. Safiri: She.
16. PPR 4

* * * * * * * * *

1. Tina: Children, say, "She's washing herself."
2. PPR 4
3. Tina: They're washing themselves.
4. PPR 4

* * * * * * * * *

17. Tina: Good, children!

RLAP drills ranged from 0:20 to 1:30 in length. Less time usually was not enough to establish and sustain momentum. Drills more than 1:30 long were found to be trying for young learners, even in Year Three.

Drill PPRs were timed as they were in other kinds of segments, but tightness was particularly important in the drills. Empty air time is deadly anywhere in the radio lesson, but is especially damaging to pattern practice, where the cadence of the drill helps students to perform successfully.

During Year Two we began distributing the texts of substitution and transformation drills to teachers as part of the teacher's notes, with the correct responses written into the PPR slots. We then asked teachers in RLAP classrooms to have these texts in hand during the drills and to help their students perform the drills correctly. Our original device had been to model the correct response after every substitution or transformation. We believe this might be an acceptable expedient for radio language lessons that do not include a related print component; but we found that it tended to confuse students, and that it lessened the effectiveness of the drills by disrupting the drilling cadence.

THE PUPIL-PARTICIPANT SYSTEM

The pupil-participant system was a cornerstone of RLAP broadcasts. It was used whenever any individual response or action was desired.

In Year One, pupil-participants were referred to by numbers, as "Girl 1," "Boy 1," "Girl 2," "Boy 2," and so on. The advantages of number references were several. Among other things, the device helped us to teach numbers up to 10 early in the first term, far more easily than we could have done otherwise. It was a simple, convenient way, at the outset of the project, to call on individual participants.

Classroom teachers were asked to make permanent labels reading "Boy 1," "Girl 1," and so on, up to 10, and to affix those labels to children each day as indicated in the pre-broadcast teachers' notes. During the broadcast, the teacher could then instantly spot pupil-participants as the radio called on them.

1. Rosa: Girl 1, stand up.
2. FX Stand-Up Whistle
3. Rosa: Girl 1, take your pencil.
4. PPR 2
5. Rosa: Girl 1, put your pencil on your desk.
6. PPR 2
7. Rosa: Girls, ask, "Boys, where's her pencil?"
8. PPR 8
9. Rosa: It's on her desk. Boys, again.
10. PPR 4
11. Rosa: Girl 1, sit down.
12. FX Sit-Down Whistle
13. Juma: Boy 2, stand up.
14. FX Stand-Up Whistle
15. Juma: Boy 2, take your book.
16. PPR 2
17. Juma: Boy 4 and Girl 4, stand up.
18. FX Up Whistle 4
19. Juma: Teacher, remind Boy 4 and Girl 4 to speak up when saying their names.
20. FX Drum and Ring 10
21. Juma: Boy 4, what's your name?
22. PPR 4
23. Juma: Boy 4, speak up. What's your name?
24. PPR 4
25. Juma: Children, what's his name?
26. PPR 4
27. Rosa: Girls, what's his name?
28. PPR 4
29. Rosa: Girl 4, what's your name?
30. PPR 4
31. Rosa: Children, what's her name?
32. PPR 4

33. Juma: Boys, what's her name?
34. PPR 4
35. Rosa: Children, look at Boy 4. (PAUSE) Group 1, what's his name?
36. PPR 4
37. Juma: Group 3, what's his name?
38. PPR 4
39. Rosa: Children, look at Girl 4. (PAUSE) Group 2, what's her name?
40. PPR 4
41. Juma: Group 3, what's her name?
42. PPR 4
43. Juma: Children, what's Boy 4's name?
44. PPR 4
45. Juma: Children, what's Girl 4's name?
46. PPR 4
47. Juma: Boy 4, Girl 4, sit down.
48. FX Down Whistle

The pupil-participant system, which was used for Year Two and for the duration of the project, is the following:

At the beginning of the broadcast Year Two, teachers were asked to make signs bearing six designated pupil-participant *names*. At the beginning of each week, at his or her convenience, the teacher appointed pupil-participants as specified in the teacher's notes. During pre-broadcast preparations the teacher hung the appropriate sign around the neck of each pupil-participant who was called on during that day's broadcast. During broadcasts the radio addressed individual students by the designated pupil-participant names—"Rosa, "Mumbi," and "Akinyi" for girls, "Juma," "Chege," and "Owino" for boys. These students, in a sense, became radio characters themselves for the duration of the broadcast.

They performed several important functions. For one, they carried out many defining and contextualizing actions—movement, pantomime, blackboard work. The use of pupil-participants was the most common device in RLAP broadcasts for insuring that students had clearly before them the meaning of the words and structures they were practicing. This was often accomplished by instructing a pupil-participant to manipulate classroom objects or other common objects as an accompaniment to the performance of a language exercise by the rest of the class. (The teacher is asked in the Teacher's Notes to gather the needed items in advance of the broadcast and have them ready.)

1. Sara: Rosa, put the duster in the box.
2. PPR 2
3. Rono: Sara, is there anything in the box?
4. Sara: Yes, there is.

5. Rono: Children, is there anything in the box?
6. PPR 3
7. Rono: Yes, there is. Again.
8. PPR 2
9. Sara: Children, ask Rosa, "Is there anything in the box?"
10. PPR 7
11. Rono: Yes, there is. That's right, Rosa.
12. Sara: Children, ask Rosa again, "Is there anything in the box?
13. PPR 6
14. Rono: That's right, Rosa. There's something in the box.
15. Sara: Children, say, "There's something in the box."
16. PPR 5
17. Sara: There's something in the box. Again.
18. PPR 4
19. Sara: There's something in the box. Again.
20. PPR 4
21. Sara: Again.
22. PPR 4
23. Rono: Now, Rosa . . . . take the duster *out* of the box.
24. PPR 2

Pupil-participants also often model a pattern orally themselves while they carry out appropriate actions.

1. Rono: Owino, what are you doing?
2. PPR 5
3. Rono: I'm walking backwards. Juma, again.
4. PPR 3
5. Sara: Children, what's Owino doing?
6. PPR 4
7. Sara: He's walking backwards. Again.
8. PPR 3
9. Sara: Again.
10. PPR 3

SUMMARY

The tension between the dramatic and the static aspects of language learning makes ESL instructional broadcast scriptwriting particularly challenging. When the challenge is met successfully, the result is intensely interactive programming which maintains consistent standards of learner appeal.

The assembly at the outset of an ESL broadcasting project of a writing staff capable of flexible, cooperative teamwork is important to success. We recommend a non-hierarchical "action team" approach to organizing the scriptwriting staff.

RLAP scripts were developed with a set format. They were team-written in sections and subsections ("blocks" and "segments"). This system was used for the sake of efficiency in generat-

ing very large amounts of material; but the RLAP staff exercised a good deal of flexibility in modifying the format as necessary for each finished script.

Short musical and spoken passages were used to achieve smooth transitions between the finished blocks and segments. This transitional material was added by a single member of the writing team, who also assembled and copy-edited the scripts.

RLAP scripts made use of stock characters and settings and a standard set of verbal, musical, and sound-effect cues.

The "PPR" ("pause for pupil response") system was the project term for the scripting device by means of which air time is allowed for active learner responses. There are generally about 150 response pauses in a half-hour *English in Action* broadcast. Response pauses can very in length from two seconds to a full minute.

The "pupil-participant" system is the device in RLAP programming for eliciting individual learner responses. It is carried out with the help of the classroom teacher, who appoints pupil-participants for each broadcast. The radio addresses these children by a set of designated names. They become, in a sense, radio characters themselves for the duration of a broadcast.

The types of exercises most often used in RLAP scripts include:

- Question-and-answer exchanges between students and the radio.
- Structured conversational engagements between students and the radio.
- Conversations and other transactions among students, posited and reinforced by radio voices.
- Vignettes and stories that engage students as participants.
- Vignettes and stories with exercises, follow-up questions, or discussion.
- Exercises involving the use of worksheets or material copied onto the blackboard by the classroom teacher.
- Exercises involving display or manipulation of classroom objects or other common objects.
- Songs and games.
- Pattern drills and similar exercises.

Ongoing formative evaluation by scriptwriters and field observers provided information on lesson effectiveness. Ineffective segments were analyzed and language competencies were retaught in upcoming lessons. Major problems concerned pedagogy, such as

length of practice, number of new linguistic items in a lesson, balance between receptive and productive skills, and so on. Other problems included broadcast techniques, such as the use of sound effects, timing for pupil responses, cueing devices, and so on.

It is the scripts which bring the curriculum to life. They must provide the excitement that very good classroom teachers normally provide. They must guide the learners and provide the examples that very good textbooks normally do. The scripts only achieve life when the children listen to the radio and participate in the lessons. We have tried to convey how this works by showing the structure of scripts and the process we used in writing them. Each new educational setting will require creative adaptation, but the techniques of interactive radio can be used anywhere.

Chapter 7
PRODUCING RADIO LESSONS

Kurt Hein, Margaret Ojuando, and Mary Karue

THE PRODUCTION SCHEDULE

The elements of preparing and producing the script for broadcast that are described in this chapter are distributed throughout the production process described in some detail in Chapter 3. The process that takes the lesson from the printed page to the actual broadcast is described in this chapter. These activities are indicated in italics in the following overall production schedule.

Week 1—	Methodology written; lesson plan written
Week 2—	Draft segments written
Week 3—	**Script review**
Week 4—	Draft segments revised as necessary
Week 5—	**Final script approved, copied, and distributed**
Week 6—	Teacher's Notes and complementary lessons written Formative evaluation materials written **Pre-production completed** **Studio production, tapes reviewed**
Week 7—	**Post-production completed** Teacher's Notes reviewed, revised Formative evaluation materials reviewed, revised Printing of materials completed
Week 8 to 10—	Print materials assembled and distributed Final tapes and scripts copied and filed
Week 11—	Teacher prepared for lessons **Broadcast**
Week 12—	**Revisions**

SCRIPT REVIEW

The production of an *English in Action* lesson begins when the draft script has been completed. Even though the working script has been carefully composed by a team of skilled writers, it is still necessary for the script to undergo intensive review. While there are many technical reasons for reviewing the script (described in detail below), one important reason is that the review process has helped to establish and maintain the unity of the team.

As mentioned throughout this book, developing a successful instructional radio program is a collaborative, creative effort. It requires constant reflection, evaluation, and analysis of what the project is attempting to accomplish and how best to accomplish it. It requires that all members of the team be willing to subject themselves to constructive criticism; it also requires that each person be willing to sacrifice his or her opinions to the view of the majority. Considerable dialogue and constant cooperation among all members of the production team are essential if the scripts are to reflect even the *minimum* standards of the project. It is primarily through the consultative script review process that our standards improved.

Draft Script Review

In its technical aspects, the script review process can be likened to the process of "quality control" commonly practiced on production lines in manufacturing plants. In a processing plant, "quality control" safeguards against the production and distribution of inferior goods. Similarly, with the Radio Language Arts Project, the primary purpose of the review process was to correct any errors and weaknesses in the script. It was in the review process that the raw material brought forth by the writers was transmuted into a cohesive, final form, ready to be produced. The elements of draft scripts most subject to "transmuting" might include any of the following:

Errors in script convention. Errors in spelling, spacing, formatting, etc.

Omissions. Unintentional deletions of words, phrases, sound effects, etc. Typical errors included forgetting to include PPRs, forgetting to include the "Sit-down Whistle" sound effect after the students had been on their feet, or forgetting to instruct children to return to their desks. A related issue concerns segments written in conjunction with worksheets. Frequently, changes will be made to a draft worksheet that need to be coordinated with the script changes.

Consistency of content with previous scripts. This entails checking to make sure that information about events, characters, locations, and the like is consistent from one script to the next. For example, if the character Onyango is introduced as being 14 years old and living in Kisumu, it is important that such information remain consistent in Onyango's subsequent appearances. Of course, characters may visit other locales, grow older, and acquire new attributes, but their identities will remain essentially the same.

Consistency with Kenyan situations and values. Because the scripts were collaboratively written by a team, it was sometimes

necessary to revise the content to conform to situations that were uniquely Kenyan. This was true both for the type of English used and for the cultural acceptability of the scripts.

Kenyan English is more similar to British English than to American English. (On this project, standard Kenyan English was defined most often as the English spoken by educated Kenyans.) There were occasions when a segment contained idioms, colloquialisms, or other language uncommon or unfamiliar to the Kenyan professional staff. For example, an American will say, "Take me to the hospital," where a Kenyan is more likely to say, "Take me to hospital." In such cases, revisions were made to conform to the Kenyan standard.

Another consideration is the manner in which the radio characters address or request assistance from the classroom teacher. In Kenya, the English used in a classroom is more formal than the English used in a social context and is certainly more formal than that used in an American classroom. This had special significance for the forms of address between the teacher and the pupils, between the radio characters and the pupils, between pupils in the classroom, and even between characters on the radio.

If reviewers encountered what they considered to be a problem with the language in a segment, they usually consulted the writer and perhaps one or two other colleagues. If the problem still could not be resolved, the issue was discussed and resolved in the weekly meeting of the entire professional staff.

Consistency with the Scheme of Work and the syllabus. Thanks largely to the constant dialogue among writers and lesson planners, script segments usually reflected the structures designated by the Scheme of Work. When discrepancies did occur, however, they were caught during the review process. For example, a writer wrote a segment that effectively taught the word "either" as an adjective (as in, "The flowers can bloom on either side of the house"), but when the segment was reviewed, it was discovered that the Scheme of Work had specified that the word be taught as a conjunction with *or* (as in, "He will be here either today or tomorrow"), so the segment had to be revised.

To improve the pedagogy. One of the most challenging tasks when writing instructional scripts is to provide a variety of ways to teach repetitive or difficult material. Occasionally, the review process will reveal a segment that attempts to teach materials in a manner that is cumbersome or ineffective. Improving it might be as simple as extending the prescribed pupil response time, or more difficult, such as simplifying the complexity of a drill. Where this

kind of problem most commonly occurred was where there was not enough interaction between the radio and the pupils. Most often, this was because the segment had too much unbroken dialogue between radio characters. At such times, the value of having several minds considering appropriate ways to teach the material becomes apparent. Usually, the writers were relieved to receive assistance on a segment that they already recognized to be difficult, awkward, or weak. In fact, collaboration was such an essential element of the process that the writers frequently consulted with one another *prior to* drafting their segments.

Internal continuity of the script. Because of the segmented nature of the lessons, disparate activities occur in the same script (such as an oral segment that locates the action on the beach and a worksheet that is about planting maize). Such disparities are most usually resolved by the continuity writer, but on some occasions the reviewers are likely to suggest a manner in which they can be more effectively treated.

Suitability for radio production. Writing for radio is different from any other form of writing. Because radio relies solely on auditory discrimination, it is important that what is written can be translated into comprehensible sounds. Sounds are often difficult to identify on the radio. This problem is exacerbated in areas where children's exposure to media is very limited; they are unaccustomed to both the forms and the styles of mediated communication. Habitual radio listeners can be considered "radio literate"—they are familiar with the conventional sounds associated with radio programs and they can more readily perceive what is happening on the radio. Especially at the beginning of Standard 1, the project's target audience did not yet have that capacity. Therefore, part of the review process focussed on whether or not the written material would make effective radio for the specific audience.

One way in which we kept the broadcast comprehensible was by carefully monitoring the sound effects. We attempted to ensure that the sound effects were purposeful—that they helped to establish a context, brighten the content, or alert the children to a task (such as a written response to a question). If a sound effect did not serve to enhance the meaning of what was being presented, it was preferable not to use one.

During the first term of Standard 1, the lessons relied heavily on the use of sound effects to compensate for the children's lack of English. For example, early segments introduced new vocabulary items through the juxtaposition of a sound and the vocabulary item as follows:

1. FX Cow Mooing—2 seconds
2. Juma: That's a *cow*.
3. FX Cow Mooing—2 seconds
4. Mumbi: Children, say, "cow."
5. PPR 2
6. Mumbi: Cow. Again.
7. PPR 2
8. Juma: Cow.
9. FX Cow Mooing—2 seconds

To rural children, the sound of a cow mooing provides strong association between the sound, the English word "cow", and the word they already know in their mother tongues and serves as a memory aid.

As the children's English skills developed, dialogue and the spoken language became the central content of the programs. We were then able to produce effective programs with a minimum of sound effects. Nonetheless, they are still essential to effective radio lessons, such as when a writer needs to use sounds for the very necessary purpose of establishing actions and locations. For example, in a dramatic incident occurring on Lake Victoria, sound effects were used to establish the sounds of water lapping against the boat, the creaking of the boat, the flapping of the sails, and the splashing of a person who fell overboard. For children familiar with life along rivers, lakes, and the ocean, these sounds were familiar and meaningful. For other children who live on the arid plains, the sounds helped to create excitement and tension but were not "instructional" in the sense of providing clues to the meanings of the words.

Non-instructional effects should be kept to a minimum since over-produced segments can confuse the listener and detract from the teaching. Simple effects may be used effectively, however, to provide continuity and to alert the listener to a change of activities. A single note on an instrument, a whistle, a bell, or a gong is all that is needed to signal a change of pace.

The script review process will not catch everything before the broadcast. One problem arose when a writer wanted to describe the action of walking around a table. The initial script called for the sound of footsteps and for a character to say, "Sara is walking around the table." A listener might be able to understand the concept of *walking* from the sound effect, but he could not determine either the *location* or the *manner* of the walking. The segment had to be revised because the concept we were attempting to teach was the prepositional phrase "around the table," not the verb "walking." The revised segment called for the teacher to select a child to come to the front of the room to demonstrate the activity.

Recordkeeping and Checklists

Two additional, essential (if somewhat arduous) parts of the review process are the tasks of monitoring the content of the scripts and charting the flow of the production cycle. Types of detailed records that must be maintained for each script include the following:

Conflict Charts. As explained in the previous chapter, the segments frequently call for the participation of selected pupils, the use of a blackboard, or the provision of other materials for modeling language in the classroom. To avoid problems such as using too many model students, too many sentences and pictures on the blackboard, and too many materials on the teacher's desk, it was necessary for the writers to maintain a daily record of these elements of their segments. A chart was posted in a prominent position in the office for this purpose. When a segment required that something be written on the blackboard, the writer recorded the sentences on the chart. If another writer was putting words on the blackboard in that same lesson, he would be alerted to the necessity of distinguishing his material from the sentences prepared by the other writer. (A common solution in this case was for the first writer to number his group of sentences and locate them on the left side of the board. The second writer's words could be ordered using sequential letters of the alphabet, and positioned on the right side of the blackboard, or surrounded by a box, if necessary.) Similarly, if the first writer has called for a "Chege" and a "Rosa" as model students, a second writer could use the same names in his segment, thereby simplifying the classroom preparation.

Vocabulary Records. The writers were responsible for presenting all the vocabulary words listed in the Scheme of Work, which attempted to ensure that the vocabulary used in the lessons was consistent with the syllabus. Without an accurate record of the vocabulary used in the lessons, writers would not know if the words they used were consistent with the syllabus. It was necessary, therefore, to maintain a word exposure count and to determine (subjectively) when the children had received adequate exposure to a vocabulary item. When introducing new vocabulary, the writers provided contextual or direct definitions for the new items. A vocabulary item was considered adequately taught after it had been deliberately used in 15 lessons. (Note that this does not specify 15 *occurrences* of a word but rather the word's deliberate inclusion in 15 *lessons*, where it may occur any number of times.) After the word had occurred in 15 lessons, the word count stopped and the word was treated as "known" by the students. If, on looking at the

vocabulary record, a writer found that the word was new or had been used only infrequently, he would know that the word needed some initial or additional instructional attention before being treated as an item the children were likely to understand.

The weekly formative evaluation tests also checked mastery of vocabulary, and items were resequenced when mastery fell below the 70 percent criterion.

Songs, Activities, and Games. There were two principal reasons for keeping records of the songs, games, and activities used in each lesson. The first was to help the writers maintain a rich variety of material in the enhancement segments. Diversity in these sections of the script helped to maintain the students' enthusiasm and interest. Having the same activity or song repeated too frequently or too many times in succession can have a stultifying effect on children. On the other hand, it is also important not to neglect "old favorites," for children everywhere derive a sense of security and continuity from singing and playing familiar songs and games.

A second important reason for keeping a record of these materials was to assist the writers to find and select songs that could enhance instructional material. For example, in Standard 3, segments that were to take place in Rono's shop were able to make use of a song about shopping, "We want to buy some things," that originally had appeared late in Standard 1. The song was written and used in mid-1982, prior to the arrival of a new scriptwriter. Having a song list enabled the new writer to include the song in a segment written 18 months later. Not only did this strengthen the continuity of the series, but it also avoided the unnecessary trouble of writing an entirely new song when an appropriate one already existed.

Steps in the Review Process

Normally, the first people to review the script were the lesson planners—for Standard 3, one Kenyan and one American. They were the team members most familiar with the curriculum and objectives. Their primary review function was to ensure that the script conformed to the specified lesson plan and to make sure that the patterns, vocabulary, and structures were being taught in an effective and appropriate manner. If they thought it necessary to make any content changes, they made a note on a blank cover sheet, indicating the location in the script, the nature of the problem and, occasionally, some options on how to correct the problem. If the problem was sufficiently large, they usually went directly to the segment writer to make the necessary changes. After the planners had read the entire script and noted any desired changes, it was

passed on to another Kenyan member of the staff to be reviewed for cultural appropriateness. For example, this might include ensuring that the forms of address used between adults and children on the radio were consistent with a normal classroom or home setting.

After the script had been approved as culturally appropriate, it was sent to the producer who checked to see that it could be produced as written, that the prescribed format was maintained throughout, that the timing was reasonably accurate, that the writer's directions to the actors were clear, that the pauses, songs, and musical bridges were correctly specified, and that the sound effects were feasible and appropriate. The producer also verified that the characters' attributes and actions were consistent with their roles.

As with the other reviewers, the producer noted any recommended changes on the cover sheet and, whenever possible, discussed the recommendations with the writer. When this review was completed, the script was sent to the final reviewer, who was responsible for approving the script. (The final reviewer should be one person with the best overall sense of the entire scriptwriting process. In Standard 3 our final reviewer was the script coordinator, who was responsible for putting the draft script together.)

Before approving the script, the final reviewer read it through, watching for any problems or errors that might have been overlooked by the previous reviewers. (While primarily responsible for one particular aspect of the script content, each reviewer was alerted to any other problems that might exist. For example, the producer might suggest changes in the language or methodology of a segment.) The final reviewer was responsible for verifying that any changes in content recommended by the previous three reviewers (as noted on the cover sheet) had been discussed with the writers and either implemented, revised, or withdrawn. Frequently, this required the writer and the reviewer to work together until a satisfactory resolution was achieved. When recurring problems with a particular format or inconsistencies in the writers' methods were noticed, the final reviewer sometimes called the writers together to examine the problem and design a solution. This was especially meaningful at the beginning of the year, when the script format was being finalized.

FINAL SCRIPT APPROVED

When the review process was complete, the final reviewer assembled the original and revised drafts into the final script and completed the cover sheet, which provided a specific description of each

program's contents. Most of the information on the cover sheet was taken from the segment headers. (A sample cover sheet is an appendix to this chapter.) The cover sheet included the following data (numbers correspond to circled numbers on the sample cover sheet): 1—lesson number; 2—production date; 3—air date; a description of each segment, including 4—script pagination, 5—block numbers, 6—Scheme of Work code, 7—a brief description of the structures, 8—segment number, and 9—approximate duration; 10—cast; 11—script duration; 12—new oral vocabulary; 13—new reading vocabulary; and 14—worksheets used in the lesson.

The cover sheet was used to complete a series of content records, including a composite tabulation of vocabulary, songs, activities, and worksheets used in each lesson. With the cover sheet complete, the final script was reproduced and distributed. The original script was given to the producer, with copies going to the studio technician, the four actors, the musician, the Teacher's Notes writer, and the feedback coordinator. Once the scripts were distributed, the studio production team began the pre-production process.

PRE-PRODUCTION

The production team received the completed script approximately five days prior to recording. During this time, the producer reviewed the script once more and made notations about special cues, directions, and the like. (In Kenya's Educational Media Services (EMS), a producer usually served as producer/director.) The producer made sure that the studios were scheduled and that the personnel necessary for the production were notified and available, and arranged for any extra props that were required. In addition, if there was a new song or other script element, the producer consulted with the writer on how it was to be produced. This might include requesting a scratch-tape (a draft cassette recording made by the writer) of the new song. Having the tape well in advance allowed the actors and the musician ample time to rehearse the song. Frequently this involved some revisions as well, either to simplify the tune to make it more suitable for children, or to match the song to the singing ability of the talent.

In studios where both facilities and time are scarce, the studio technician (recording engineer) prepares an "effects tape" ahead of the recording date. An effects tape is the tape used during the recording of the lesson to provide all the sound effects and music that cannot be easily reproduced live in the studio. For each RLAP lesson, the technician copied the opening and closing themes and the reading and writing music from a tape of traditional music

recorded especially for the broadcast. Unusual effects, such as rain, a roaring lion, a crying baby, or a bus were either copied from commercial sound effects records or pre-recorded live by the technician. The RLAP did not have access to any cart machines, so a complete prerecorded effects tape was necessary for each production. Some of the more common effects, such as a door, the "travel music," a slide whistle, and a bell were handled by the musician and the actors in the studio during the recording session.

During the pre-production period, the actors reviewed their scripts and practiced their lines. In addition to rehearsing the tunes, the musician might assist a writer in composing music for a new song. After all these preparations had been made, the production team was ready to record the program.

STUDIO PRODUCTION

The Radio Language Arts Project, as a branch of the Educational Media Services, was allotted three mornings a week at the Schools Broadcasts studios at the Voice of Kenya to produce five one-half hour lessons (one week's programs).

The production facilities consisted of a control room and a sound studio. Equipment provided by EMS at the Voice of Kenya included a Philips 12-track mixer and an Ampex reel-to-reel recorder (used for the pre-production tape). The project provided three AKG D222 microphones, an Ampex ATR-700 reel-to-reel recorder (for recording the master), tape stock, props, and musical instruments.

Pre- and post-production were done on the project site at EMS. EMS provided Ampex ATR-700 reel-to-reel recorders for editing and copying. RLAP provided a Nagra-E portable reel-to-reel recorder (for recording in the field and for reviewing the master tapes) and a high-speed Telex-300 reel-to-cassette duplicator.

On the days of production, the producer, technician, actors, and musician arrived at the studio between 8:30 and 8:45 a.m. The studio was already set up. The two actors sat at one table at a right angle to each other, sharing a directional microphone. The two actresses sat at another table, also sharing a microphone. The actors and actresses were separated for acoustic reasons—the microphones respond differently to higher and lower voices. Because the equipment was limited, this arrangement allowed us to cover all four actors using only two mikes. A third microphone was placed on a stand next to the musician, who used a guitar, an electronic keyboard, and a xylophone. One of the actors played a drum for the travel music and some of the activities.

The actors took their seats and the producer began the rehearsal of the first of the day's two productions. (The actors had received their scripts a few days in advance.) Rehearsal consisted of a full read-through of the script, including music, songs, and, where necessary, sound effects. The primary purpose of the rehearsal was to familiarize the actors with the material and to give them an opportunity to prepare their cues, practice their characterizations, and determine the correct pacing, delivery, pronunciation, stress, and intonation for their lines. Functioning during the rehearsal as the producer/*director*, the producer frequently stopped the rehearsal to provide guidance to the actors. The producer's role in these preparations is extremely important, for the effectiveness of the lesson is dependent upon the actors' ability to deliver their lines with absolute clarity and accuracy. The same clarity is necessary for all other aspects of the program as well (music, songs, games, sound effects, etc.). This process ensures that the carefully constructed elements of the final script are faithfully reproduced in the studio. It also provides the producer with one last opportunity to review the script for any errors or omissions (frequently, the actors or the musician will find these).

Before the rehearsal, the technician sets up the control board, the tape recorders, the effects tape, and the master recording tape. He checks all the equipment to make sure it is functioning properly. During the rehearsal, he reviews his copy of the script to make sure he has marked all his cues and that his effects tape is properly prepared. He also checks voice levels. When the producer is satisfied that the actors are sufficiently rehearsed and the technician is ready, the recording of the lesson begins.

Because of time pressures and the limited production facilities, the lessons were produced following a variation of the "recorded as live" principle. (In a live production, a half-hour program is produced in one-half hour. There is no opportunity to stop the production to make corrections.) Although not produced live, the tight production schedule required that the *English in Action* lessons follow a similar principle. Each lesson was produced as a complete and final lesson, stopping production only when absolutely necessary (to re-record over missed cues, coughs, incorrect delivery of lines, to allow the musician to pick up another instrument or put a capo on the guitar, and so on).

During the actual production and recording of the lesson, the producer joins the technician in the control room and, using hand signals, directs the actors and the musician through a glass window. The producer must follow each line of the script, cue the

talent, cue the technician, and monitor the quality of the recording. The producer also listens carefully to the delivery of each line, to insure that the proper meaning is conveyed and that the stress, pronunciation, and intonation are accurate and clear. (For example, it is especially difficult to discern sybillants over the air. This is important for many parts of speech, such as the production of plural forms.) At the same time, care must be taken that the actors' speech is not unnaturally exaggerated, for this too would present an inaccurate model to the students. The producer also times each segment as it is being recorded and specifies whatever cuts may be necessary to keep the program roughly 28 minutes and 30 seconds long. Most cuts are made during the production; if necessary, others are made during the post-production process (described below).

Many demands were made on the actors during production. The actors were all paid performers, selected on the basis of their performance at try-outs conducted by the project. The two men were news readers for the Voice of Kenya; one of the women was a housewife, the other a university student. None had previous professional acting experience. Because of such constraints as a limited budget and the difficulty of procuring capable talent experienced in instructional radio, they were frequently required to change roles and assume different voices. For example, the two female actors played several characters in addition to their main roles, including young children and an elderly grandmother. (Using children as primary characters on the program proved unfeasible, not only because of the intensive, rigid schedule that conflicted with school sessions, but also because of the dramatic demands of the roles.)

For both social and pedagogic reasons, it was unsuitable for the lessons to be presented using British or American voices; it was absolutely essential that the radio characters sound authentically Kenyan. Like most Kenyans, however, the actors' mother tongues were not English; they had learned English as a second language. Therefore, they had to be very conscious of their delivery and knowledgeable about the requirements of an instructional language broadcast.

The musician is another important member of the production team. He composes tunes that are used for the songs and the incidental music. During the recording, he must keep up with a variety of cues, for his playing provides the basic continuity and enhancement to the sound of the broadcasts. His job is further complicated by the fact that he alternately plays a variety of instruments.

While the producer focuses on the educational quality of the program content, the technician is responsible for making sure that the program sounds good technically: seeing that the microphones are properly placed, that their levels are correctly adjusted, that the effects cues are clear and on time, that the re-recording and dubbing are clean, that all the equipment is providing a good sound. The "recorded as live" production method places unusual demands on the technician, for during production he must be able to handle the board, control the levels, follow the script, edit segments, and mix the effects "on the run."

Having a skilled production team enabled the project to rehearse and produce five half-hour lessons in less than 10 hours of studio time. Rehearsal usually took less than half an hour. Recording a lesson usually took between an hour and an hour and a half. An additional two hours per week of studio time were devoted to revisions of previously recorded lessons (see below). Equally impressive was the team's ability to maintain such a schedule successfully for 39 weeks a year.

POST-PRODUCTION

When the producer returned to the project offices from the studio, he gave the producer's copy of the script and the tape master to a fifth reviewer, who re-read the script to see what additions or deletions had been made to it. Any changes requiring a change in the Teacher's Notes were handed on to the Teacher's Notes writer.

The reviewer then listened to the master tape and followed along in the script. The primary purpose of this review was to designate any further cuts that needed to be made to make the lesson the appropriate length. The target running time is 28 minutes and 30 seconds (28:30), although it is acceptable if the program falls within approximately 15 seconds of that mark. Occasionally the program was shorter than 28 minutes and more material had to be added. Usually this was handled by giving more time to the writing activity, adding an extra verse to a song, or lengthening an enhancement activity.

If a cut was necessary, the reviewer timed each segment and selected material that could be cut. Ideally, cuts were taken from the non-instructional parts of the broadcast, principally the songs and activities. If more cuts were needed, they usually were taken from a drill or an oral maintenance segment. This was done so that new material would not be affected. Cuts were seldom made from reading segments because they were more rigidly structured to coincide with the worksheets.

The reviewer also listened to the tape to determine if any sections needed to be re-recorded. On average, two lessons a week needed some repair—deletions, additions, or changes. Sometimes it was necessary to re-record some of the dialogue. This most often happened when an actor's stress, pronunciation, or intonation did not accurately convey the meaning of a sentence. For example, a scripted dialogue might read as follows:

Safiri:	Anna gave the ball to David.
Tina:	She gave it to David?
Safiri:	Yes, Anna gave the ball to David.

In this exchange, both Tina's line, "She gave it to David?," and Safiri's line, "Yes, Anna gave the ball to David," can have a variety of meanings depending upon which word is stressed. If the word "she" is stressed, it becomes apparent that what is significant about the action is that Anna, not someone else, gave David the ball. Conversely, stressing the word "David" would ascribe significance to the fact that David, and not someone else, received the ball. If the word "gave" was stressed, it would imply that the act of giving the ball was the most significant aspect of the narrative (David didn't take it or buy it, it was a gift). Tina's line also could be delivered in such a way as to indicate that she had not heard what Safiri said and was asking him to repeat it. Obviously, this is one of the most challenging aspects of teaching the English language by radio. Of course, the writers will usually attempt to provide directions to help the actors and the producer understand which meaning is desired.

After listening to the master tape and following along in the script, the reviewer wrote the suggested cuts and/or material to be re-recorded on a cover sheet. If re-recording was necessary, the reviewer returned the script and the master tape to the producer, along with the editing indications. The producer marked the location of the cuts in the script and made duplicate copies of the sections that needed to be re-recorded for himself, the technician, the actor(s) and musician, and the files. Ideally, re-recording will occur within a week or two following production, certainly well before the program is to be broadcast.

If no re-recording was necessary, the reviewer gave the script and tape to the technician. In the post-production facilities of EMS, the technician made the specified cuts and splices, re-timed the lesson, and made a reel copy and two cassette copies of it.

The tapes, scripts, and edit sheets were returned once again to the producer, who labelled and filed the master tape, the reel copy, one cassette copy, the original script, worksheets, Teacher's Notes, and weekly complementary lessons.

THE BROADCAST

Master tapes were stored at the project offices until the week of broadcast. Every Monday morning, the continuity announcer for the Schools Broadcasts arrived at the office and collected the five tapes for the week. At 9:30 a.m., Monday through Friday, lessons from the *English in Action* series were broadcast on the Voice of Kenya's National Service.

The continuity announcer aired the tapes and introduced each lesson. If any special announcements were to be made to the project teachers, such as advising them of a revision in the broadcast schedule, he made this announcement prior to the broadcast.

Broadcasting in Kenya is government controlled and highly centralized. Radio frequencies are very limited; there are no private broadcast stations and there are only two national channels, which are run by the government. The more popular National Service broadcasts in Swahili. The General Service broadcasts primarily in English. Vernacular language programs are broadcast during specified hours on regional repeater channels. Broadcasting on AM and FM, the two major channels cover the entire country and comprise the nation's principle broadcasting services. (A large percentage of Kenyan listeners also can tune in Radio Tanzania, or international shortwave frequencies, such as Deutschewelle.)

Except for a two-hour period at midday, when the General Service broadcasts popular international music and English-language news, people who want to listen to the radio during the day have no choice but to tune to the National Service. Therefore, as the Schools Broadcasts were aired on the National Service, *English in Action* was heard by a large audience.

No empirical study has yet been conducted on the nonformal audience, but anecdotal data indicate that the English lessons are well known and popular. Several members of the staff have been in shops, taxis, and other public areas where they heard the program. In many of these instances, the program was well attended by a large number of people, adults and children alike.

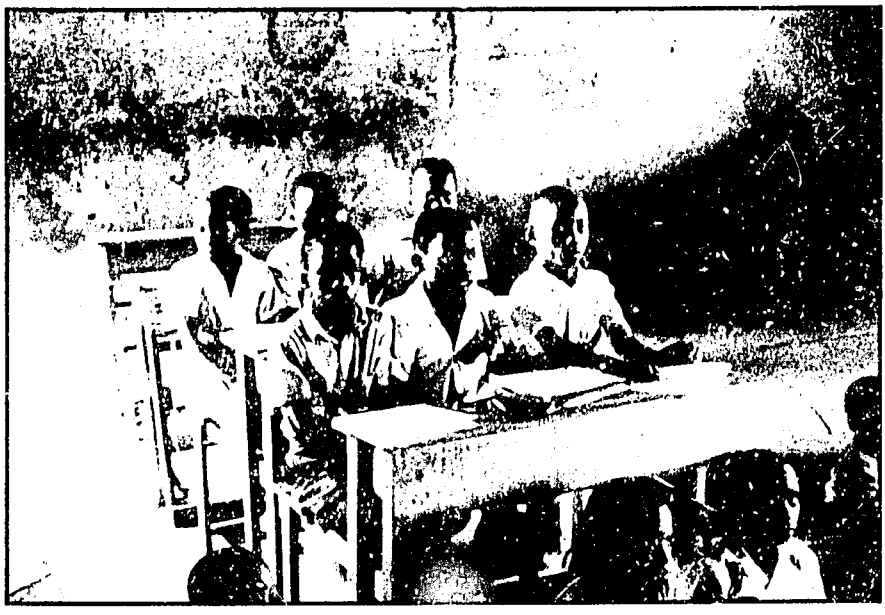
REVISIONS

In many educational broadcasts, airing the lesson is the final step in the process. In the Radio Language Arts Project, however, the process continued as the formative evaluation results influenced the writing of future lessons (the "feedforward" method described in Chapter 5). They also identified two kinds of problems that were handled in the post-production phase of the cycle. The first type of

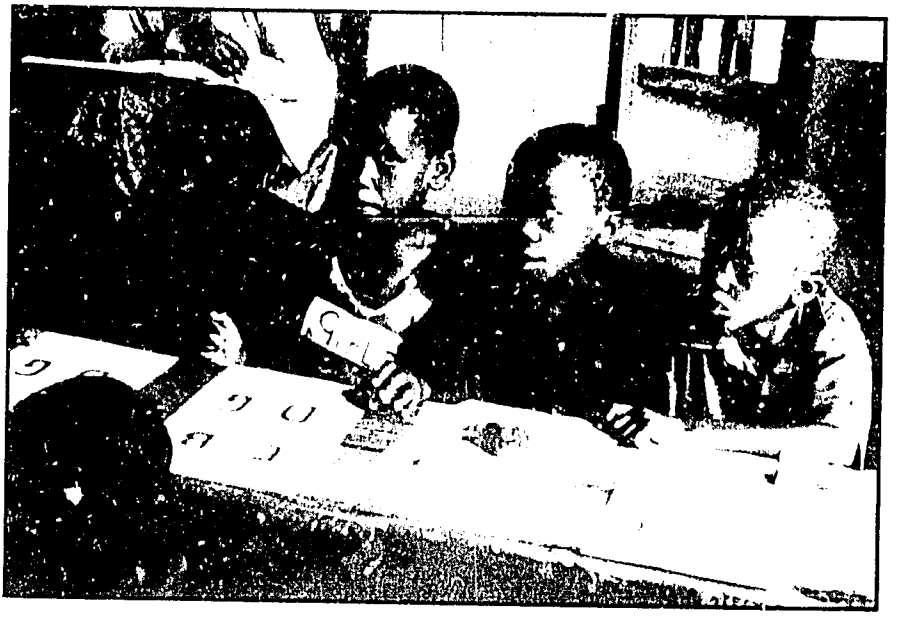
problem was simple errors of the sort already described in the script review process. The more complex problems usually dealt with the content of a segment or the way material was presented and addressed during the weekly staff meeting. When the formative evaluations indicated a major problem with a particular segment, the staff determined how the problem should be handled. The producer took notes on the type of revision required and was responsible for seeing that the script was changed and the affected sections of the master tape corrected. In some cases, it required only that the technician edit out a section of the tape or add extra pupil response time (using either blank tape or tape prerecorded with the background music for reading or writing). Occasionally, it was necessary to alter or rewrite lines or to revise a segment substantially. When this was necessary, the producer rewrote the materials in consultation with the writers and distributed copies to the actors and the technician in advance of the recording session. (As necessary, re-recordings and revisions were conducted on Thursday mornings, following the completion of the regular recording cycle for a week. During Standard 3, when we were most efficient, re-recording revised segments took approximately one hour a week.) Revised script pages also were given to the Teacher's Notes writer, as the revision might require changes in the Notes, and were added to all archival script copies. The original revised pages were filed with the original script. Once the revised material had been recorded, it was edited into the master tape, and a new reel copy, cassette master, and archival cassette copy was made. When the revision process was completed, usually within four to six weeks of the date the lesson was broadcast, the lessons were considered to be in their final form.

Producing radio lessons is a several-step process that checks the quality of the lessons through review, evaluation, and revision. The process draws on the collective experience of the entire team to anticipate possible errors or difficulties and to correct any mistakes that slip through at any step of the process. It brings the programs to life and gives them polish, but more importantly, it ensures that the medium of radio is used most effectively in implementing the instructional system.

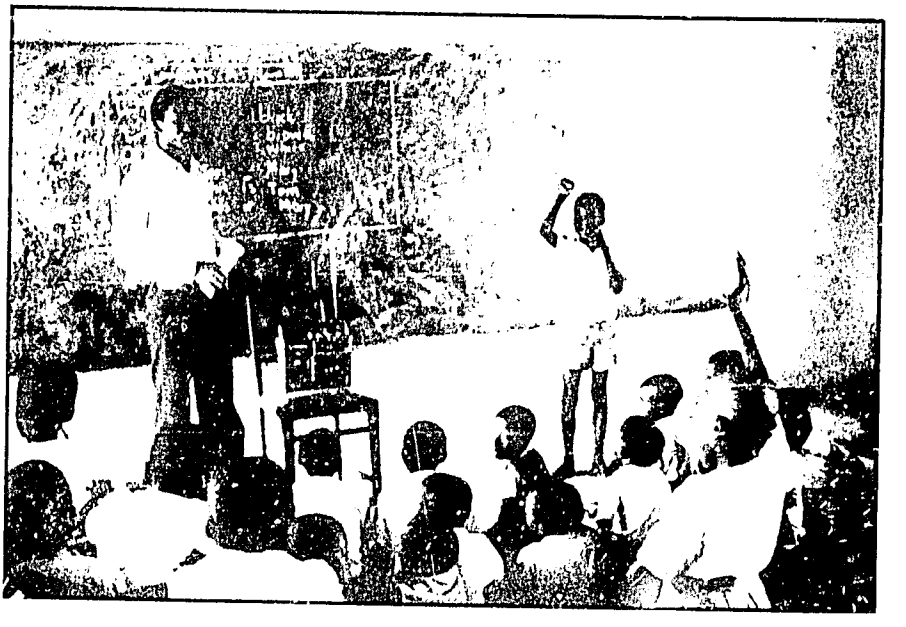
Most children attend rural schools.



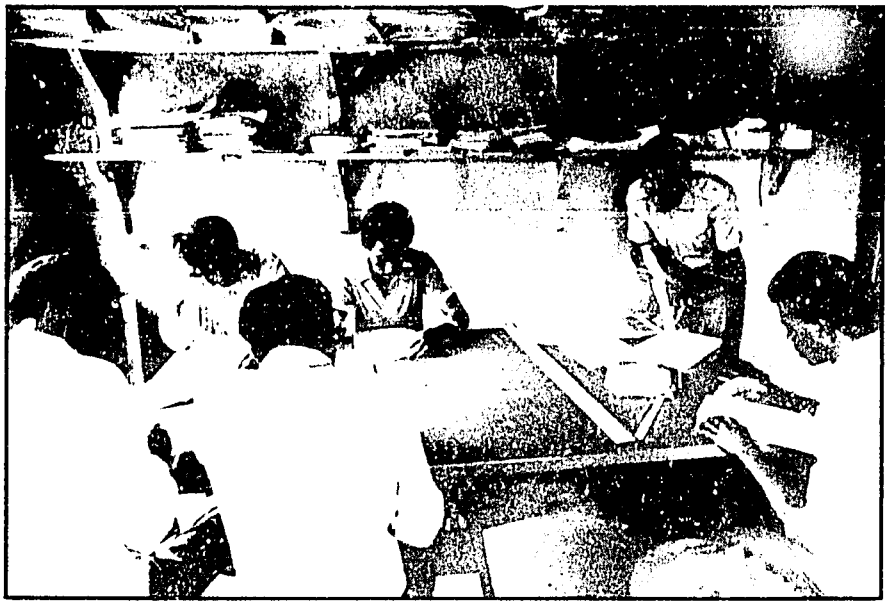
Communities build schools and equip classrooms.



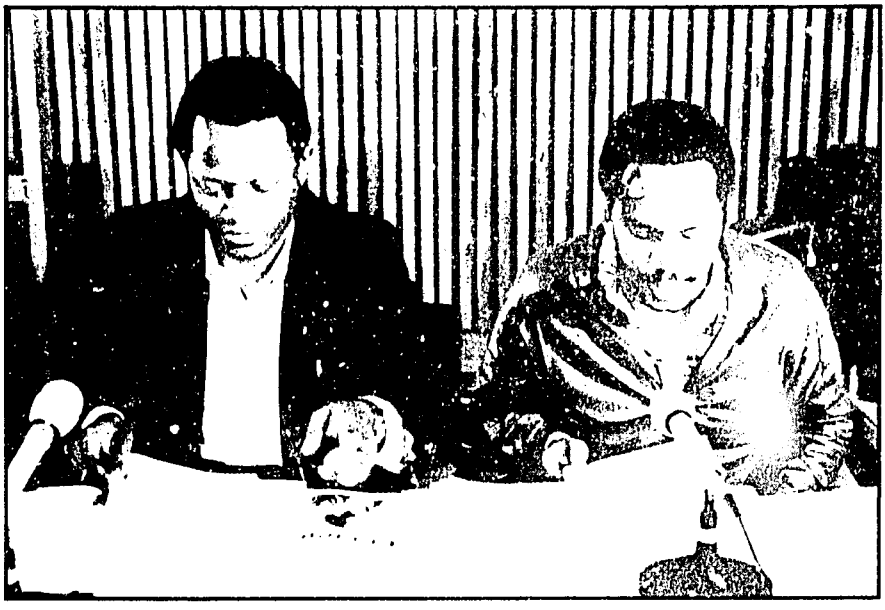
Children study English from first grade.



Interactive radio improves English instruction.

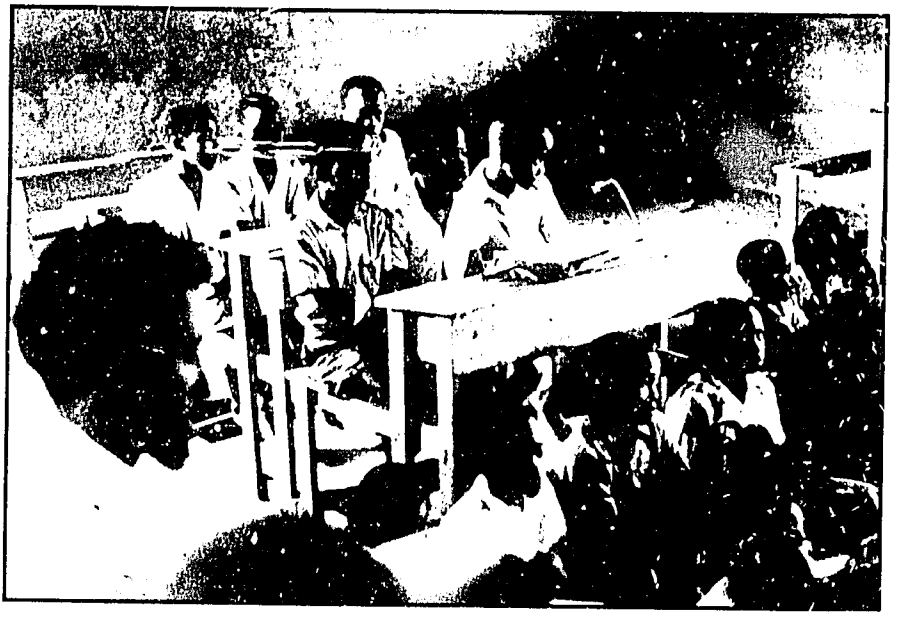


Kenyan educators check the radio curriculum.



Radio actors teach Kenyan standard English.

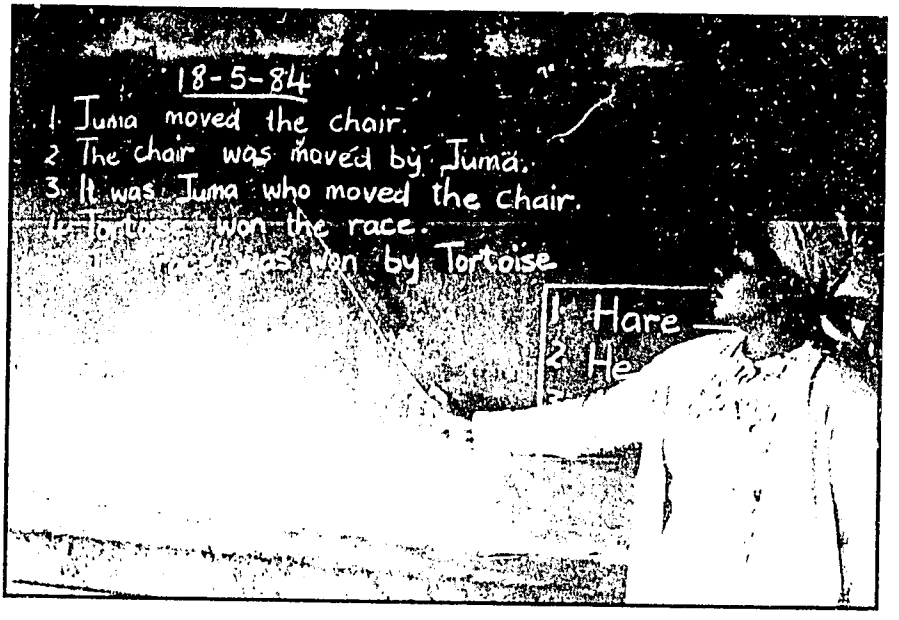
Teachers attend one-day orientation to interactive radio.



Observers monitor broadcasts in classrooms.

Individual children are tested for formative evaluation.

Team members discuss formative evaluation results.



Teachers participate in radio instruction.

Teachers assist pupils during radio lessons.

Students help demonstrate language concepts.

Children interact individually and in groups.

Students work hard at reading and writing.

Children enjoy the interactive lessons.

PART II

RESEARCH AND EVALUATION

Description of results of the Radio Language Arts Project
The Research Design and the Evaluation Process
Answers the Questions: How well did we do it?
How do we know that?

Chapter 8
RESEARCH DESIGN

Greg Owino and Maurice Imhoof

OVERVIEW

The research design of the Radio Language Arts Project gives weight to two discrete evaluation strategies—one formative, the other summative. The two strategies have quite different purposes in the project. Formative evaluation is of major benefit to the development team. Summative evaluation helps to document success (or failure) for educators and other policy makers.

Formative evaluation asks the question, "Is each segment of the radio programs teaching effectively?" It is an ongoing process, assessing the effectiveness of the instructional materials through observation of the lessons and periodic testing. Lesson planners and writers use this information for mid-course correction to modify instruction in future lessons and make them more effective.

Summative evaluation asks the question, "Did the instructional program have the desired effect?" It measures the overall success of the instructional program. It looks at the cumulative effect on students and to some extent, on teachers.

To accommodate both kinds of evaluation, the RLAP research design used a sample of 31 schools drawn from seven Kenyan districts. These 31 project schools were divided into two subsets. Twenty-one schools were designated as summative evaluation schools. These schools were visited only once a year by professional staff for the sake of post-testing, and bimonthly by a driver to deliver and collect print materials. This minimized the possibility of any Hawthorn effect artificially improving results.

The remaining 10 schools (matched to summative schools by academic performance and linguistic makeup) were designated as observation schools for formative evaluation purposes. Formative evaluation data were collected from these schools several times each week. Because of anticipated intervention effects, observation schools were excluded from the summative evaluation sample.

In light of the mission to reach rural children, these schools were chosen to represent Kenya's rural population. Districts were

selected which represent seven different languages and approximately 70 percent of the Kenyan population linguistically. Within districts, schools were chosen by means of a stratified random sample on the basis of performance on the standardized primary school leaving examination, with representation of high, medium, and low scoring schools. The RLAP sampling procedure was designed with the primary aim of ensuring the greatest possible ability spread, which also enhanced reliability of measurement.

This chapter describes the collection of baseline data used to refine the research design and discusses the summative evaluation processes.

COLLECTING BASELINE DATA

Sociolinguistic Survey

Although the linguistic situation in Kenya had been extensively studied and described, the project needed to confirm knowledge about language and language use in the administrative regions of Kenya in which we wished to pilot-test the project. Regional boundaries are, to a considerable extent, drawn along language lines as are districts within regions. To ensure maximum generalizability of the final results, the project wished to identify a sample primary school population that was manageable, statistically adequate, and representative. To confirm the representativeness of the sample and to collect additional baseline data, a cultural-sociolinguistic survey was undertaken during the initial stages of the project.

In multilingual nations, the use of a particular language can signify a range of social, political, cultural, and economic implications. It can be identified with a particular social domain, for example, or denote a particular political stance. It may reveal a strong cultural tradition or an economic hierarchy. The access of speakers of one language to services available through the use of another can often determine which groups benefit from national development or educational policies. An educational intervention must take these factors into account.

The sociolinguistic survey was originally intended to provide sociolinguistic and cultural data to aid the project in selecting pilot schools that would be representative of the linguistically complex nation as a whole. In fact, this was not quite what happened. Since the project was implemented later than anticipated, it was impossible to conduct the sociolinguistic survey prior to the project field team's arrival in Kenya. The field team, therefore, tentatively select-

ed linguistic regions and school districts on the basis of information available from the Ministry of Education and the Central Bureau of Statistics. The survey then served the purpose of confirming what other sources led us to believe about the language situation on a regional basis, to study the actual situation at the school-community level, and to recommend final selections.

This more focused survey was conducted by the Center for Applied Linguistics (CAL) in January and February 1981. During the survey team's preliminary reconnoitering trip to Kenya in the autumn of 1980, CAL worked closely with the project team in determining the kind of information necessary to select the most representative schools. The survey was aimed at collecting baseline information concerning language use and language attitudes from a sample of respondents similar to those who would ultimately be affected by the RLAP. It was conducted by interviewing parents, teachers, and students from the tentatively selected 21 pilot schools with respect to their patterns of language use and language attitudes towards English, Swahili, and their mother tongue. The survey collected three kinds of data:

- Information from diverse individuals concerning their language use and language attitudes.
- Information from individuals about previous experiences with radio as a vehicle for formal instructional purposes.
- Anecdotal and other supplemental information concerning school and community environment, school facilities, and receptivity of headmasters, parents, and teachers (Fallows 1981).

The major instruments used in gathering the necessary information included separate questionnaires for students, teachers, and adults. Sample questionnaires are appended to this chapter. Other supplemental information was secured informally by talking with teachers and through observation in the schools and communities.

School Selection Procedures

Schools for the evaluation were selected from seven districts, embracing major languages spoken by about 70 percent of the Kenyan population. The districts were chosen because of their linguistic heterogeneity and accessibility for purposes of distribution and formative evaluation. The major ethnic-language groups included Kipsigis, Maasai, Luo, Kamba, Swahili, Luhya, and Kikuyu.

The procedure followed in selecting the schools was aimed at securing a sample of representative Kenyan rural schools. The Cen-

tral Bureau of Statistics (CBS) provided the CAL team with a list of 10 randomly selected schools from each of the seven districts. For each school, CBS provided statistics on the number of students, teacher qualification, and mean scores on the Certificate of Primary Education (CPE) Examination which is the terminal national examination for the primary cycle. On the basis of these statistics, the CAL team selected three matched pairs of schools, one pair at each rank of high (rank 1), middle (rank 2), and low (rank 3). School visits and discussions with school staff resulted in CAL's recommended list of 21 schools (three in each district, one each of high, middle, and low). These schools constituted the summative schools, used exclusively for summative evaluation purposes.

Since summative and formative evaluation strategies are fundamentally different in the techniques used and the purposes they serve, we decided that another set of 10 schools should be selected from the same districts for formative evaluation purposes. This set of schools was designated "observation schools." Observations and formative tests from these schools were intended to provide regular biweekly feedback to the RLAP team in Nairobi on the effectiveness of each broadcast lesson in an actual classroom situation. Six observation schools were located close to Nairobi (i.e., within an hour's drive) and four in the outlying districts (i.e., near the coast and in the far West).

In selecting observation schools the following criteria were taken into account:

- Rurality of the school
- Quality of radio reception
- Willingness of the headteacher and staff to participate in the project
- Proximity to observers' headquarters
- Accessibility
- Match with summative schools

Formative and summative schools were matched for language and for academic rank. That is, in the districts around Nairobi, the top observation school (in terms of CPE performance) was matched with the rank 1 summative school and the bottom observation school was matched with the rank 3 school. In the outlying districts, where there was only one observation school per district, the observation school was matched with the rank 2 (or middle) summative school.

Some modifications in the list of project schools were necessary as a result of further first-hand contact. The major modification was the rejection of the surveyed schools in Kwale district, since they

turned out not to be predominately Swahili-speaking. Swahili-speaking schools were tentatively identified in Kilifi district and these schools were surveyed using the sociolinguistic methodologies and included in the project. Substitutions for three additional schools had to be found for different reasons, again using the sociolinguistic methodology.

Throughout the entire school-selection process, the Kenyan education authorities were most cooperative. The District Basic Education Officers were always helpful; the personnel in the CBS provided information promptly, responsively, and in a clearly understandable format.

Other Information-gathering Strategies

In addition to the formal sociolinguistic survey, a large number of less rigorous information-gathering strategies were employed to set the stage for the whole project's implementation. Knowledge of local history, institutions, and the wider structural contexts of central, provincial, and district educational administration was critical to the project's understanding of the nature of the Kenyan educational system.

Visits to schools and District Basic Education Offices. These visits not only elicited information but helped to develop support from the District Education Officers (DEOs), headteachers, and teachers. DEOs also helped to recruit observers from the Teachers Advisory Centers (TAC). These trained and experienced teachers became part-time classroom observers for evaluation; the Ministry of Education, Science and Technology contributed the observers' time.

Anecdotal notes. Whenever team members went out to a school to observe a lesson or on a routine check on how things were going, they made notes about conditions not surveyed in more formal ways. These included a wide variety of topics ranging from general impressions of school management to the effect of rain on a tin roof during radio broadcasts.

Correspondence. Correspondence also played a part in the information-gathering process. There were occasions when districts and schools indicated what they needed, or commented on procedures adopted or problems encountered in the process of using our materials. In this way, we received some constructive criticism which helped in developing stronger logistical support to project schools.

Headmaster and teacher orientation. Several workshop/seminars were held for headteachers, teachers, observers, and media special-

ists. All were two-way discussions. We informed participants about the project and provided modest training. They informed us about a variety of situations and issues involved in participating in the project. This helped to shape the team members' thinking and gave them an opportunity to ask questions pertaining to relevance of the materials' content, suitability, and cultural sensitivity.

All of the baseline data collection and informal information gathering was an attempt to strengthen the two evaluation strategies.

SUMMATIVE EVALUATION

Decisions about the research design for summative evaluation affected the instructional system design, including formative evaluation, and the entire production cycle. The summative evaluation was a fairly conventional educational experiment, comparing two groups of learners, one receiving standard classroom instruction (as practiced in Kenya), the other receiving the treatment (in this case, interactive radio instruction). The broad research question was whether the children receiving instruction by radio learned as much or more English as children in conventional classes.

The basic choice for the design was between:

1. A simultaneous two-group design, matching control and experimental schools, administering a post-test in both sets of schools simultaneously at the end of each broadcast year, or
2. Using the same set of schools for both control and experimental purposes, administering a post-test one year to children who had not been exposed to the treatment and the next year to children in the same classroom who had been exposed to the treatment.

The second, lapped-year, research design was chosen. This approach has two major advantages:

- It circumvents the difficulty or the impossibility of producing an adequate match between control and experimental groups.
- It avoids the problem of contamination of control schools.

First, the lapped-year design avoided having to match two separate groups. The paucity of reliable data on school, teacher, and pupil quality would have cast doubt on any attempt to construct a comparable set of control and experimental schools. The lapped-year design was intended to ensure a closer match between control and experimental groups at the same schools than would be the

case if two different sets of schools were used. Two factors were involved in the lapped-year design to ensure this match:

- Control of the teacher variable by trying to keep the same teacher in the classroom from one year to the next and exposing both experimental and radio children to that teacher.
- Control of the pupil variable by avoiding schools in areas where significant changes in the socioeconomic and educational profiles of entering pupils were likely to occur from one year to the next.

Second, the lapped-year design completely avoided the problem of contamination of control schools. There were no separate control schools. Control groups were tested *before* the broadcasts to their Standard began, so there was no chance that they could be exposed to the radio treatment unintentionally. Were a matched set of control and experimental schools used, it is possible that children in the control schools might have listened to the radio lessons, thereby contaminating the results. Indeed, there are indications of widespread listening to the project lessons among non-project schools, and it may well have proven impossible to keep the control sample free of such interference in a two-group design.

The summative evaluation design is summarized in Figure 14 for one classroom, which is the basic project unit (RLAP 1981). The design calls for the same teacher to teach first a control class and then, in the following year, an experimental (radio) class. The design also requires that students stay in either the radio group or the control group across all the years of the project.

In November 1981, pupils in the alpha cohort in classroom one (Standard 1) of this school (school A), having been taught for a year by teacher X *without* the radio English lessons, were given a posttest based on the Kenyan syllabus. Results from this test provided a pupil achievement record for the control group (Owino and Christensen 1983). In November 1982, the same test was administered to pupils in the beta cohort. These children had spent a year in the same classroom (classroom one) with the same teacher (teacher X), but *with* the radio English lesson treatment. Their test results provided a pupil achievement record for the experimental group. The amount of time devoted to English each week was held constant from 1981 to 1982. A comparison of results between the control and experimental groups could then be used to evaluate the effectiveness of this use of instructional radio.

FIGURE 14
Summative Evaluation Design for One Classroom

Year	Radio Classrooms (experimental)	Control Classrooms (control)
1981 (no broadcasts)		School A Classroom 1 Teacher X Pupil cohort alpha
1982 (Standard 1 broadcasts)	School A Classroom 1 Teacher X Pupil cohort beta	School A Classroom 2 Teacher Y Pupil cohort alpha
1983 (Standard 2 broadcasts)	School A Classroom 2 Teacher Y Pupil cohort beta	School A Classroom 3 Teacher Z Pupil cohort alpha
1984 (Standard 3 broadcasts)	School A Classroom 3 Teacher Z Pupil cohort beta	

The same pattern was followed during 1983 and 1984. The same set of schools was used for both control and experimental purposes. Pupil achievement and other variables were measured in one year for control purposes and in the subsequent year, after treatment, for experimental purposes. The same control and experimental cohorts of children were followed because the RLAP was interested in cumulative results (i.e., the effects of three years of radio-based instruction versus three years of conventional instruction).

The major summative evaluation strategy was to test student achievement. Summative evaluation tests, developed by the Center for Applied Linguistics and project staff, were used for this purpose. Supplementary data were collected on the test forms and through instruments such as surveys of teacher and headmaster attitudes. Test answer sheets were coded in Nairobi and sent to CAL for all data analysis.

ISSUES

There are always threats to any project design. Two potential problems threatened the summative design:

- Idiosyncrasies in the placement and transiency of teachers

- Lack of comparability in the amount of time spent per week on English instruction in radio and control classes.

Teachers were stable as planned in more than half of the streams in the project, implying that they were unstable in a large minority of streams. Differences between control and experimental classes in the amount of time spent on English in a given week appeared to be as much a function of poor reporting as anything else, and these differences did not seem to be serious. Teacher instability appeared to be more of a potential problem than timetable instability. However, given the lapped-year design wherein the same teachers teach both the radio group and the control group in different years, one might speculate that teacher instability might have equally affected the radio group and the control group.

In addition to these possible threats to the design, the project experienced some difficulties with the data. Student-related variables, such as name, stream, nursery school attendance, school, sex, and attendance during the project, all showed varying degrees of unreliability caused by poor reporting. This unreliability—along with actual pupil transiency—made many students untrackable during the life of the project, thereby sharply reducing the number of students who could be labeled "normal progression" according to the specifications of the project design and causing the checking and editing of the database to be a very difficult task for both field and CAL staff. Efforts to clean up the data—other than achievement test scores—was a continuous process throughout the project. Because of the distances between project schools, the project office in Nairobi, and CAL in Washington, D.C., it was time consuming and costly to confirm and correct data from the schools.

This raises the issue of conflicts between research and development in an R&D project. The tremendous energy and time required for development of the treatment, where no materials existed and only limited principles from previous radio projects were available for guidance, made it difficult for project personnel to devote adequate time to collection of baseline data and to supplementing, correcting, or improving that data. The immediate demands were to meet deadlines for production and broadcast of lessons. The longer range goals of summative evaluation did not receive the daily attention they should have had in the field. The evaluators, several thousand miles distant, had to rely on field personnel for this information if their evaluation was to be valid and comprehensive. This problem could be partially alleviated with a larger staff, but the conflict resulting from dual purposes would probably remain.

SUMMARY

The summative evaluation measured the effect of instruction by radio over the life of the project, but also included testing at the end of each school year. The process that we followed, with the assistance of CAL, included:

- Test development, item writing, and field trials
- Item analysis and final selection of items by CAL in Washington, D.C.
- Revision and final test development in Nairobi
- Orientation for test administrators
- Test administration by observers
- Coding of pupil tests in Nairobi
- Analysis by CAL in Washington, D.C.
- Continuous clean-up of data.

Test development is discussed in the next chapter and results are reported in Chapter 10.

REFERENCES

Fallows, Deborah Z. 1981. "A Sociolinguistic Survey of Selected Kenyan Communities." Washington, D.C.: Academy for Educational Development and Center for Applied Linguistics.

Owino, Greg, and Philip R. Christensen. 1983. "The Radio Language Arts Project Results from the First Year of Broadcasting: A Preliminary Report." Washington, D.C.: Academy for Educational Development.

RLAP. 1981. "Implementation Plan." Washington, D.C.: Academy for Educational Development.

APPENDIX

OBJECTIVE INFORMATION TEACHER QUESTIONNAIRE

1. What Standard do you teach? _____

2. How many years have you taught? _____

3. How many years have you taught English? _____

4. Do you have plans for seeking another job or do you expect to remain a teacher? Plans _____ Remain teacher _____

5. Did you train formally to become a teacher? No: _____ Yes: _____

6. (If answer to #5 is yes) Where did you do your teacher training? _____

7. How many years did you study at the teacher training institute? _____

8. What did you major in at the teacher training institute? _____

9. Did your teacher training prepare you adequately for teaching English language arts? No: _____ Yes: _____

10. (If answer to #9 is no) What was lacking in your training? For example, practice teaching, training courses, specialization in teaching English, etc. _____

11. What language do you usually use in the English language arts period (circle one)

to present information	a)	E	S	O
to give directions	b)	E	S	O
to answer questions	c)	E	S	O
to give clarifications	d)	E	S	O

12. What did you study? _____

13. (If so) What did you most like and dislike about it? _____

14. Would you do it again if you had the opportunity? No: _____ Yes: _____

15. What materials do you use now for English instruction? _____

16. By the time students in your school complete Standard 3, how would you rate their ability to do the following tasks in English?

		Poor	Fair	Good	Excellent
write a simple paragraph	a)	____	____	____	____

		Poor	Fair	Good	Excellent
read a simple story	b)	_____	_____	_____	_____
follow oral instructions about homework assignments	c)	_____	_____	_____	_____
discuss their daily routines	d)	_____	_____	_____	_____
give a class report	e)	_____	_____	_____	_____

17. Do you think students in your school are ready to handle English as the sole medium of instruction after Standard 3? No: _____ Yes: _____

18. (If no) What do they need? _____

19. What language do you usually use at school outside the classroom with (circle one)

students	a)	E	S	O
other teachers	b)	E	S	O
headmaster/mistress	c)	E	S	O

20. What language do you usually use when talking with parents of your students about school matters? (circle one) a) E S O

21. Have you used radio for instruction in your classroom? No: _____ Yes: _____

22. (If yes) for what subjects? _____
for how many years? _____

23. (If x has radio experience) How would you rate the usefulness of radio instruction in the classroom?

Hindrance	No effect	Somewhat helpful	Extremely helpful
_____	_____	_____	_____

24. (If x has used radio in class) How would you rate the students' reaction to radio instruction?

Very neg.	Somewhat neg.	Neutral	Somewhat pos.	Very pos.
_____	_____	_____	_____	_____

25. How is the radio reception at your school?

Poor	Fair	Good
_____	_____	_____

26. Have you studied via radio yourself? No: _____ Yes: _____

27. Which of the following themes do you think would be interesting

to students in Standards 1-3 in their English studies:

stories about holiday	No: _____	Yes: _____
folk tales	No: _____	Yes: _____
stories about America	No: _____	Yes: _____
stories about England	No: _____	Yes: _____
animal stories	No: _____	Yes: _____
other	No: _____	Yes: _____

	Insufficient	Adequate	Very Helpful
28. (If teacher uses TKK) Would you rate the TKK teacher's edition sufficient for your needs?	_____	_____	_____

29. What improvements would you make? _____

_____

_____

30. In using radio broadcasts for English language arts instruction, which of the following formats would you prefer:

a. self-sufficent materials or materials supplementary to classroom instruction — a) self-sufficient: _____ supplementary: _____

31. b. materials totally in English or supplemented by instruction in another language — b) solely English: _____ supplemented: _____

32. c. (If answered b.) which language? — c) _____

33. Would you like to have the following supplementary aids to the class lessons provided?

printed materials	No: _____	Yes: _____
visual aids	No: _____	Yes: _____

34. Would you like to have the following supplementary aids for teacher preparation?

additional radio broadcasts	No: _____	Yes: _____
printed teachers' manuals	No: _____	Yes: _____

35. How could radio instruction improve on the present methods of English language classroom instruction? _____

36. What can classroom instruction offer that would be missing if radio broadcast were the sole method of English instruction? _____

37. In what way do you think the children's English would most benefit by radio instruction? _____

38. What kinds of school events do the parents of your students participate in? _____

school building contruction or improvements	No: _____	Yes: _____
fundraising (*harambee*)	No: _____	Yes: _____
parent/teacher meetings to plan curricula or discuss problems	No: _____	Yes: _____
social events	No: _____	Yes: _____
other	No: _____	Yes: _____

OBJECTIVE INFORMATION STUDENT QUESTIONNAIRE

1. Respondent No. _____
2. Region (name) _____ (number) _____
3. School (name) _____ (number) _____
   Name _____ Address _____
4. Interviewer (Name) _____ (number) _____
   in company of _____
5. Sex _____
6. Grade _____
7. Native language _____
8. Father's occupation _____
9. Mother's occupation _____
10. No. of brothers and sisters _____
11. Position within siblings _____
12. Religion _____
13. Father's education _____
14. Mother's education _____

STUDENTS

		0	1
1. What language(s) do you speak?	a) Eng	No ___	Yes ___
	b) Swa	No ___	Yes ___
	c) Other	No ___	Yes ___

(If more than one) put them in order, beginning with the one you know best and ending with the one you know least.

a) _____
b) _____
c) _____
d) _____

2. What language do you usually speak with your teacher (in the English class)? (circle one)	a)	E	S	O
(outside the classroom, for example, at lunch break)	b)	E	S	O
3. What language do you usually speak with your school mates (in the classroom) (circle one)	a)	E	S	O
(outside the classroom for example, after school or on weekends)	b)	E	S	O
4. If you don't understand what is said in class, what language do you use to ask for explanation?	a)	E	S	O
5. What language do you usually speak? (circle one)				
at church	a)	E	S	O
at the market	b)	E	S	O
at home with your siblings	c)	E	S	O
with your parents	d)	E	S	O
with your other relatives	e)	E	S	O
with a doctor or nurse	f)	E	S	O
with the headmaster of your school	g)	E	S	O
at a shop, for example, when you are buying your school uniform	h)	E	S	O

		0	1
6. Is there any place where you must speak English, besides school?	a)	No _____	Yes _____

If yes, where? b) _____

	1 School	2 Home	3 Radio	4 Other
7. Where did you learn most of your English?	____	____	____	____

	0 No	1 Yes
8. Did you also learn some (exclude one mentioned):		
at school	a) _____	_____
at home	b) _____	_____
listening to the radio	c) _____	_____
from reading signs or labels	d) _____	_____
other	e) _____	_____

	0 Not at all	1 Not very well	2 Fairly well	3 Very well
9. How well would you say you				
speak English	a) ____	____	____	____
understand English	b) ____	____	____	____
read English	c) ____	____	____	____
write English	d) ____	____	____	____

	0 Worse than	1 About the same	2 Better than
10. Would you say your English is better than, worse than, or about the same as your classmates' English?	____	____	____

11. What would you like to be when you grow up? a) _____

12. What language do you think you'll use most in that work? (circle one) a) E S O

13. What is the most important reason for you to learn:

Swahili a) _____

English b) _____

	0 Not at all	1 Not very well	2 Fairly well	3 Very well
14. How well would you say you				
speak Swahili	a) _____	_____	_____	_____
understand Swahili	b) _____	_____	_____	_____
read Swahili	c) _____	_____	_____	_____
write Swahili	d) _____	_____	_____	_____

	0 Worse than	1 About the same	2 Better than
15. Would you say your Swahili is better than, worse than, or about the same as your classmates' Swahili?	_____	_____	_____

	0 Not at all	1 Not very well	2 Fairly well	3 Very well
16. How well would you say you				
read—your native language if different from	a) _____	_____	_____	_____
write—Swahili	b) _____	_____	_____	_____

17. Have you ever had radio instruction in your classroom? 0 No 1 Yes

(If yes) for what subjects? a) _____ _____

In what language?		0	1
	a) Eng	No	Yes
	b) Swa	No	Yes
	c) Other	No	Yes

	1	2
Which do you prefer?	Radio	Teacher

18. How is it better than teacher instruction? (worse)
a) _____
a) _____
a) _____

	0	1
19. Do your parents own a radio?	a) No _____	Yes _____
20. Do you listen to the radio?	a) No _____	Yes _____

(If yes) do you listen	0	1
to the news	a) No _____	Yes _____
for entertainment	b) No _____	Yes _____
educational programs	c) No _____	Yes _____

21. If you listen to		1	2	3
news	a)	E	S	O
entertainment	b)	E	S	O
educational programs	c)	E	S	O
what language do you usually listen to each type of program in?				

OBJECTIVE INFORMATION ADULT QUESTIONNAIRE

1. Respondent Number _____
2. Region (name) _____ (number) _____
3. School (name) _____ (rank number) _____
4. Interviewer name _____ (number) _____
   in company of _____ _____
   Name _____
   Address _____
5. Sex _____
6. Responding as a teacher: Yes _____ No _____
7. Grade taught _____
8. Occupation _____
9. Spouse's occupation _____
10. Native language _____
11. Position in household _____
12. Number of Children _____
13. Where brought up (16 yrs) _____
14. Religion _____
15. Last year school attended _____

ADULTS

		0	1
1. What language do you speak?	a) Eng	No _____	Yes _____
	b) Swa	No _____	Yes _____
	c) Other	No _____	Yes _____

2. (If answer to #1 is more than one) Put them in order, beginning with the one you know best and ending with the one you know least.

a) _____
b) _____
c) _____
d) _____

		0	1
3. What language do you speak at work?	a) Eng	No _____	Yes _____
	b) Swa	No _____	Yes _____
	c) Other	No _____	Yes _____

		1 Few times a week	2 Few times a day	3 Many times a day	4 Nearly all the time
4. (If answer to #3 is more than one) How often do you speak					
English at work	a)	_____	_____	_____	_____
Swahili at work	b)	_____	_____	_____	_____
Other at work	c)	_____	_____	_____	_____

5. Describe a typical situation where you would use each at work. For example—with your employer, or at break time with your friends or with subordinates.

a) _____

b) _____

c) _____

		0 No, not at all	1 Yes, it is somewhat helpful	2 Yes, it is very helpful	3 Yes, it is essential
6. Do you need to know					
English	a)	_____	_____	_____	_____
Swahili	b)	_____	_____	_____	_____

in order to do the work that you do?

		0	1
7. What language do you speak at home?	a) Eng	No _____	Yes _____
	b) Swa	No _____	Yes _____
	c) Other	No _____	Yes _____

		1 Few times a week	2 Few times a day	3 Many times a day	4 Nearly all the time
8. (If answer to #7 is more than one) How often do you speak					
English at home	a)	_____	_____	_____	_____
Swahili at home	b)	_____	_____	_____	_____
Other at home	c)	_____	_____	_____	_____

9. (If answer to #7 is more than one) Describe a typical situation where you would use each one at home, for example when people come to visit, or with your children.

a) _____

b) _____

c) _____

10. What language do you usually use (circle one)

at the post office	a)	E	S	O
at the bank	b)	E	S	O
with the doctor, at a hospital or clinic	c)	E	S	O
at the police station	d)	E	S	O
at the market	e)	E	S	O
when shopping at a store	f)	E	S	O
with your clergyman at church	g)	E	S	O
with your employer	h)	E	S	O
with your children's teacher	i)	E	S	O
at political or union meetings	j)	E	S	O

11. What language do you usually use for (circle one)

writing personal letters	a)	E	S	O
writing business letters	b)	E	S	O
filling out official forms (like driver's license or birth certificate)	c)	E	S	O
writing notes or messages to someone else	d)	E	S	O
making lists or notes to yourself	e)	E	S	O
writing in a diary	f)	E	S	O

12. In what language do you usually listen to (circle one)

news broadcasts on the radio	a)	E	S	O
educational programs on the radio	b)	E	S	O
programs for pleasure, like music, on the radio	c)	E	S	O

13. How many hours a week do you listen to the radio? _____ _____

14. Do you own a radio? a) No _____ 0 Yes _____ 1

15. (If yes) where else do you listen to the radio besides at home? _____

16. In what language do you usually read (circle one)

		1	2	3
books	a)	E	S	O
magazines	b)	E	S	O
newspapers	c)	E	S	O

17. How well would you say you

	0 Not at all	1 Not very well	2 Fairly well	3 Very well
speak Swahili	____	____	____	____
understand Swahili	____	____	____	____
read Swahili	____	____	____	____
write Swahili	____	____	____	____

18. Would you say your Swahili is better than, worse than, or about the same as the Swahili of the people you work with?

0 Worse than	1 About the same	2 Better than
____	____	____

19. How well would you say you

	0 Not at all	1 Not very well	2 Fairly well	3 Very well
read your native language	____	____	____	____
write your native language	____	____	____	____

20. How did you learn English? Did you—

	0	1
study it in school	No ____	Yes ____
study it on your own	No ____	Yes ____
speak it at work	No ____	Yes ____
speak it with your friends	No ____	Yes ____
speak it with family	No ____	Yes ____

21. (If studied English in school) How many years did you study English? _____

	0 Not at all	1 Not very well	2 Fairly well	3 Very well
22. How well would you say you				
a) speak English	_____	_____	_____	_____
b) understand English	_____	_____	_____	_____
c) read English	_____	_____	_____	_____
d) write English	_____	_____	_____	_____

	0 Worse than	1 About the same	2 Better than
23. Would you say your English is better than, worse than, or about the same as the English of the people you work with?	_____	_____	_____

24. Are you satisfied with your English language skills?

No 0 _____ Yes 1 _____

	0 Not at all important	1 Somewhat important	2 Very important	3 Essential
25. Do you feel it is important to improve the following skills in English?				
listening	_____	_____	_____	_____
reading	_____	_____	_____	_____
writing	_____	_____	_____	_____
speaking	_____	_____	_____	_____

26. Are you currently studying English in any way?

a) No 0 _____ Yes 1 _____

b) _____

_____

27. Do you find yourself in any situations where you must use English?

a) No 0 _____ Yes 1 _____

28. (If yes) Please describe a typical situation

b) _____

_____

29. What do you think should be the language of Parliment? (circle one)

1 E 2 S 3 O

30. What language do you think traffic signs should be written in? (circle one)

E S O

31. What language do you think billboards and public advertisements should be posted in? (circle one)

E S O

32. What languages would you like your child to know?

	0	1
a) Eng	No _____	Yes _____
b) Swa	No _____	Yes _____
c) Other	No _____	Yes _____

33. What is the most important reason for your child to know

English a) _____

Swahili b) _____

35. Have you taught your child any songs, rhymes, stories?

	0	1
a)	No _____	Yes _____

36. (If answer is yes) In what language?

	0	1
b) Eng	No _____	Yes _____
c) Swa	No _____	Yes _____
d) Other	No _____	Yes _____

37. Do you help your child practice or study English at home?

No _____ Yes _____

Chapter 9
TEST DEVELOPMENT

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Did the instructional program have the desired effect? In keeping with the basic investigative goal of the project, the language skill assessment instruments used in the Radio Language Arts Project were intentionally and explicitly designed as measures of pupil achievement over the subject matter presented in the official Kenyan curriculum for these grade levels. As is characteristic of achievement test development in general, the development strategy for the project language tests was to sample, fairly rigorously, particular items of instruction within the English language arts syllabus and to prepare test questions incorporating these items. As a consequence of the sampling procedure, pupil performance on the subset of instructional items included in the test materials could be considered indicative of probable performance on other similar items within the overall syllabus.

Test development took place in several cycles as dictated by the overall chronology of the project, which involved the sequential testing of pupils in Standards 1, 2, and 3 over a three-year period.[1] The following table shows the specific tests developed and used at each Standard.

FIGURE 15
Tests Used at Each Standard

	Listening	Reading	Writing	Speaking
Standard 1	X	X		
Standard 2	X	X	X	X
Standard 3	X	X	X	X

The testing of writing was not undertaken at Standard 1 because writing is not emphasized as a curriculum goal at this grade level;

speaking also was not tested in recognition of the already appreciable psychological and physical burden on pupils of this "beginning school" age that was posed by administration of the listening and reading tests.

Within Standard 1, the overall format and question types for the listening and reading tests differed in several respects from the corresponding instruments for Standards 2 and 3, both because of the differing technical orientations of the two test development groups and because of the feedback that development, administration, and analysis of the Standard 1 tests provided in the planning and preparation of the Standard 2 and 3 tests. The general format and content of the Standard 1 tests are described below, followed by a description of the Standard 2 and 3 instruments.

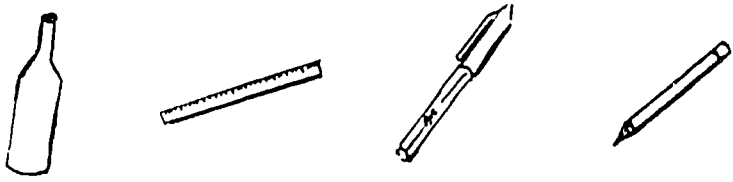
DESCRIPTION OF TESTS

Standard 1—Listening

This test is divided into two parts. In the first part, the pupil listens to a spoken English word (either a noun or a verb in present participal form), which is repeated once. The pupil then chooses, from among four line-drawn pictures in the test booklet, the one that is "like the English word" and draws a line through that picture. Examples:

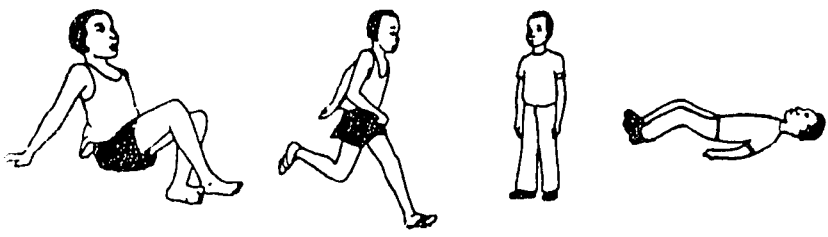
[Spoken stimulus: ruler, ruler]

Response:



[Spoken stimulus: sitting, sitting]

Response:



In the second part, for each question, the pupil looks at one or more pictures and lines through or draws in some other way on the picture as directed by the master voice. For example:

[Spoken stimulus: Put an X on the line. Put an X on the line.]

Response: (Pupil draws an X on the line provided.)

[Spoken stimulus: Give some hair to the baby. Give some hair to the baby.]

Response: (Pupil draws appropriately on the picture provided.)

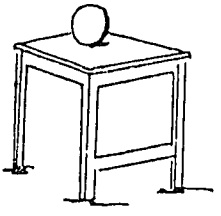
In both parts of the test, the spoken material (both nouns and verbs) is pulled from the master vocabulary list for the Standard 1 syllabus.

Standard 1—Reading

The Standard 1 reading test also is in two parts. In the first part, the pupil sees, for each question, a line drawing followed by four printed English words, and is asked to "draw a line through the written word that is like the picture." Nouns, verbs, prepositions, and pronouns are tested, all drawn from the Standard 1 syllabus. Examples:

cap ear car chair

reading sitting opening running



in under on of

we she they he

In the second part of the reading test, the pupil sees printed partial sentences followed by four suggested completions, and is asked to draw a line through the correct completion, based on the master voice's rendering of the entire sentence. For example:

[Master voice: That's a pencil. That's a pencil.]

Pupil response:

That's a ____ .

pen book table pencil

[Master voice: Where is John? Where is John?]

Pupil response:

____ is John?

Who Where What How

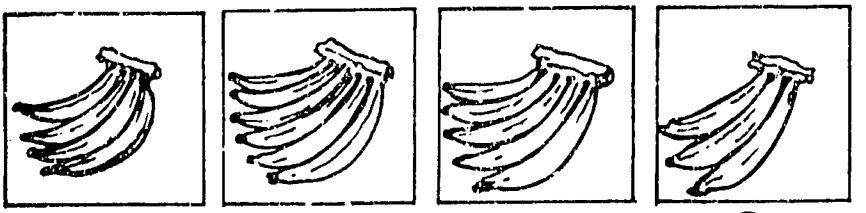
Standard 2—Listening

For each question in the first part, the pupil sees four line drawings in the test booklet and listens to a short spoken English sen-

tence which correctly characterizes one of the pictures. The student selects the appropriate picture and marks the corresponding letter (A-D) immediately below the picture. The following examples show the testing of numbers, noun vocabulary, verbs, and language items identified in the syllabus as "structures" (e.g., "too + adjective"—big, small, heavy, etc.).

[Spoken stimulus. There are three bananas.]

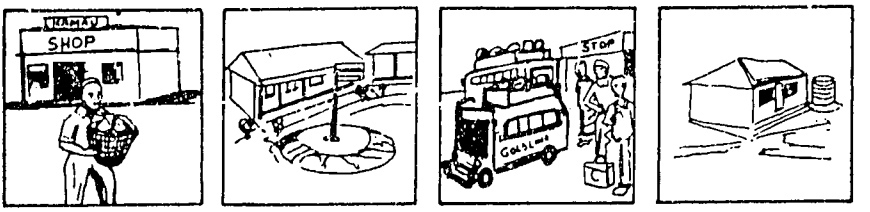
Shown in test booklet:



(A) (B) (C) (D)

[Spoken stimulus: This is a station.]

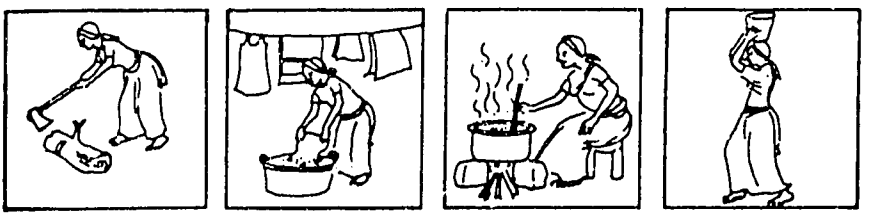
Shown in test booklet:



(A) (B) (C) (D)

[Spoken stimulus: She's washing.]

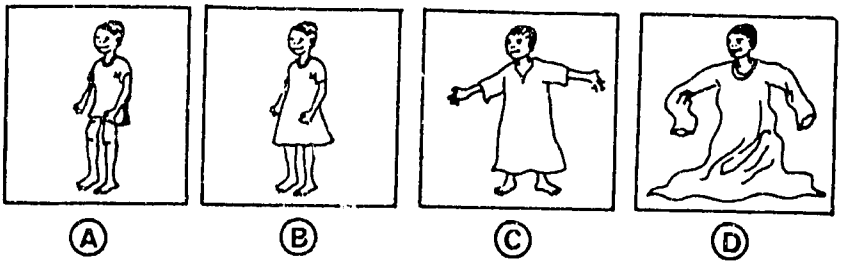
Shown in test booklet:



(A) (B) (C) (D)

[Spoken stimulus: The dress is much too big for Mary.]

Shown in test booklet:



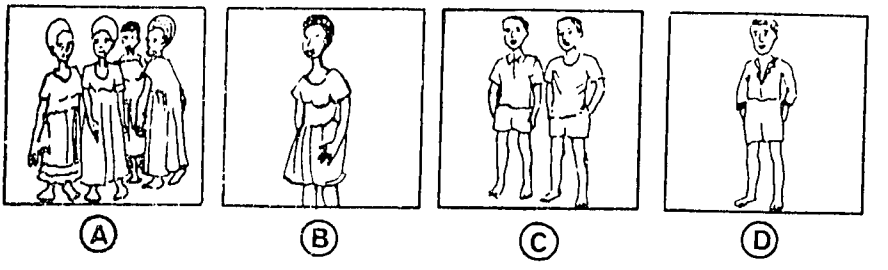
For greater linguistic realism, throughout this part of the Standard 2 test, the stimuli are presented in complete-sentence form (e.g., "There are three bananas") rather than as single-word citations ("three") as is the case with the Standard 1 instruments. It may be noted that although more linguistic material is presented to the pupil in the Standard 2 format, those components of the utterance that are not actually being tested remain constant across all four pictures. (For example, in the "She's washing" question above, there is a "she" carrying out some action in each picture, with the only salient difference being the tested verb "washing".)

In the second part of the Standard 2 test, intended to test general comprehension of somewhat more extensive utterances, the pupil hears a short story followed by spoken questions and marks the appropriate picture from among four options given in the test booklet. For example:

[Spoken question: The old lion walked past a boy and some cows. The boy shouted loudly at the cows. He chased them away to save them from the lion.]

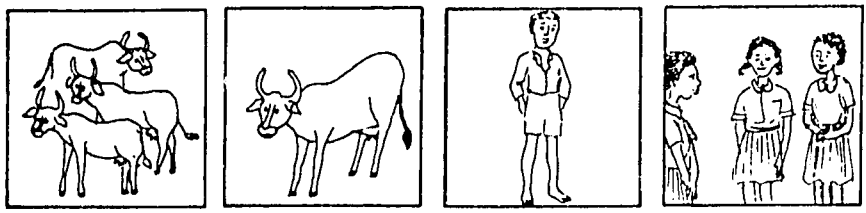
[Spoken question: Who chased the cows away?]

Shown in test booklet:



[Spoken question: What did the boy shout at?]

Shown in text booklet:



Ⓐ Ⓑ Ⓒ Ⓓ

The third part of the test addresses structures or other language aspects formally covered in the Standard 2 syllabus that do not lend themselves well to pictorial representation. The student hears a spoken question or statement in English and marks, in the test booklet, the one of four short printed options that best answers the question. The following example tests the expression "made of . . ." (i.e., composition):

[Spoken question: What's it made of?]

Printed options:

Ⓐ David made it.

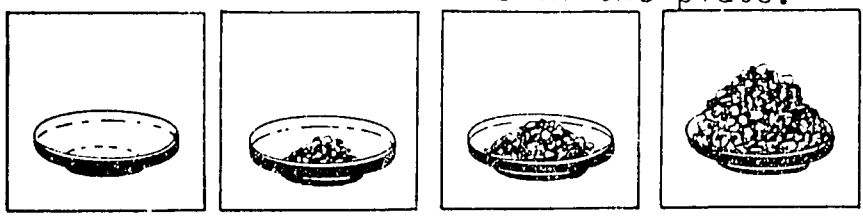
Ⓑ It made noise.

Ⓒ It's blue.

Ⓓ It's wood.

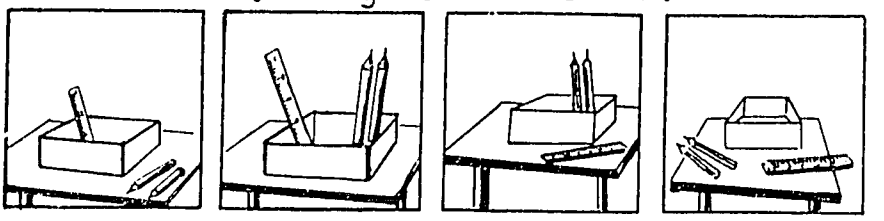
In the fourth and final part of the test, the pupil again listens to a short narrative story and answers questions about it by marking the appropriate word or short phrase from among four printed options.

There is much food on the plate.



Ⓐ Ⓑ Ⓒ Ⓓ

Everything is in the box.



Ⓐ Ⓑ Ⓒ Ⓓ

Standard 2—Reading

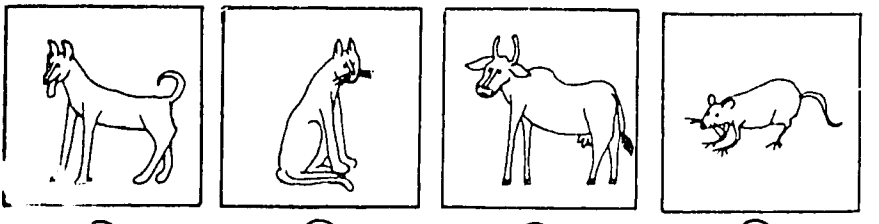
The Standard 2 reading test is similar in format to the listening test, except that for each question the stimulus material is printed in the test booklet rather than being spoken aloud. Examples:

A cat came into the room. It saw Mary on the bed. It jumped onto Mary's bed. It said "Miaow." Mary opened her eyes.

Where was Mary?

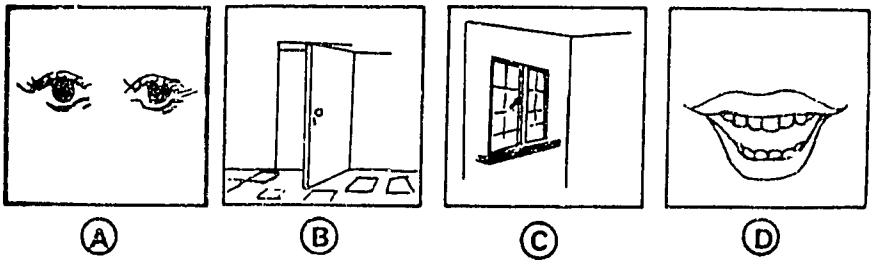
Ⓐ Ⓑ Ⓒ Ⓓ

What came into the room?



Ⓐ Ⓑ Ⓒ Ⓓ

What did Mary open?



Standard 2—Writing

The first part of this test is a rudimentary writing exercise involving the copying of short words (printed in the test booklet) into the appropriate spaces of a series of partial sentences. For example:

The _____ mouse ran past a cat.

The _____ started to chase the mouse.

They _____ past a dog.

The dog chased _____ cat.

The mouse _____ a hole in the ground.

It ran down the hole _____ hide.

ran found small the to cat

The second and final part of the test is a simple dictation exercise in which the student writes, in the test booklet, short sentences spoken by the master voice. For example:

The cow is big.
Read with us.
She is eating.

Standard 2—Speaking

For practical and financial reasons it was not considered possible or even desirable to attempt to assess the speaking ability of all pupils in the Standard 2 radio and control groups. Instead, a 10 percent sample, drawn at random from project schools, was identi-

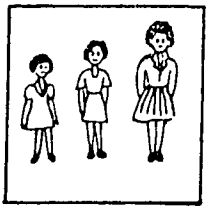
fied and administered an individual face-to-face, conversationally based speaking test by selected members of the project observation team, each of whom were extensively trained ahead of time in the proper administration techniques.

The first part of the speaking test, administered "live" by the examiner following a printed script, consists of short conversational questions, such as:

> Good morning, [pupil name].
> How are you?
> Do you have any brothers?
> Who's your friend at school?
> What games do you like playing?
> What will you do after school today?

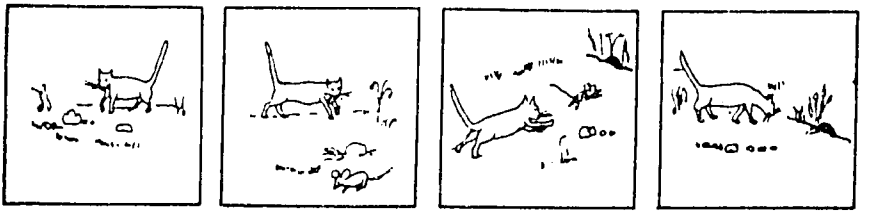
In the second part of the test, which assesses the pupil's ability to produce orally lexical items covered in the Standard 2 syllabus, the pupil is asked to look at each of several line drawings showing, for example, a leaf, a wheel, or actions such as running, washing, sawing, and in each instance answer the spoken question "What's this?" or "What is he [she] doing?" A few drawing/question combinations near the end of this part were intended to elicit somewhat more complex responses, such as:

> [Spoken question: Girl one is big. Girl two is bigger. What about girl three?]
>
> Printed in test booklet:



> Anticipated spoken response: "Girl three is biggest./She's bigger./She is biggest."

In the final part of this test, the pupil is asked to tell a story about each of two series of pictures. For example, a typical response to this series of pictures might be: "A cat is walking. She sees a mouse. The cat chases the mouse but the mouse runs into a hole."



Scoring of the speaking test responses was carried out by a team of graduate students in linguistics from the University of Nairobi who were trained in the process over a three-day period which included both detailed discussion of the scoring procedure and group and individual rating of sample test responses. For each question on the test (with the series-of-pictures questions rated separately for response to each picture), the student's response was evaluated on each of three criteria: (1) the number of English words spoken in reply to that question (as a general measure of fluency); (2) the extent to which relevant information had been conveyed, regardless of grammatical accuracy; and (3) the grammatical correctness of the response.

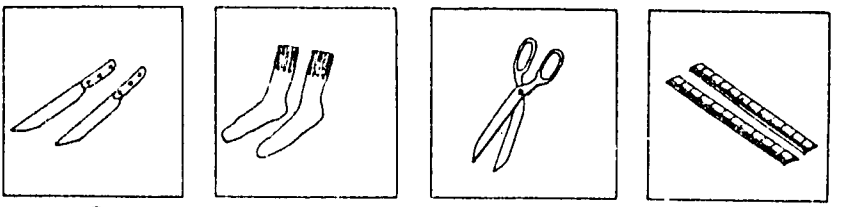
Extent of information conveyed was rated on a three-point scale, with one point assigned to a response that conveyed no comprehensible meaning or a meaning completely unrelated to the question asked; two points for a meaning that was "approximately" correct (related to some extent to the field of discourse involved, but not directly answering the question posed); and three points for an answer that was "on target" in that it comprehensibly and directly responded to the informational request involved. Grammatical accuracy was judged in terms of whether the response was one that would be made in that context by a reasonably well-educated native speaker: for example, to the question "How are you?," the one-word answer "Fine" would be considered grammatical, but "I fine," ungrammatical.

In addition to the individual question scoring, a separate dichotomous rating for "continuity" was also made for each of the two picture series. The pupil's response was considered to have continuity if the reply contained temporal adverbs or other cohesive elements that indicated some attempt to recount the story as a continuous narrative; responses which simply described each picture individually without an attempt at narrative integration were scored as lacking continuity.

The achievement tests for Standard 3, including separate instruments for reading comprehension, listening, writing, and speaking, were developed with closely similar formats to those for Standard 2, but drawing for lexicon and structure from the corresponding syllabus lists for Standard 3. The following are typical of the type and range of questions included in the Standard 3 tests.

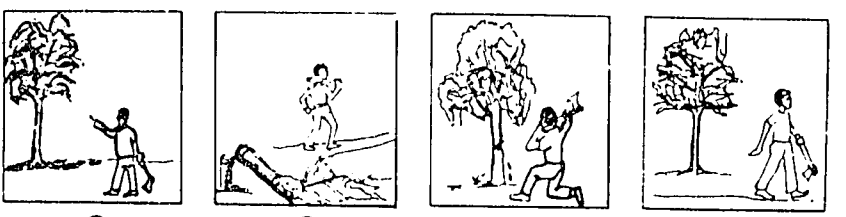
Standard 3—Listening

[Spoken stimulus: This is a pair of scissors.]
Shown in test booklet:



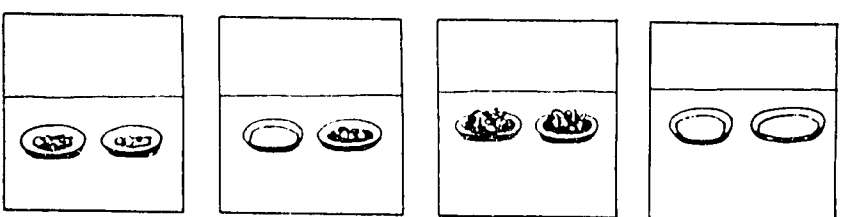
Ⓐ Ⓑ Ⓒ Ⓓ

Spoken stimulus: The tall tree has been cut down.]
Shown in test booklet:



Ⓐ Ⓑ Ⓒ Ⓓ

[Spoken stimulus: There isn't any food on the plates.]
Shown in test booklet:



Ⓐ Ⓑ Ⓒ Ⓓ

[Spoken stimulus: What's he called?]
Shown in test booklet:

Ⓐ No, I called.

Ⓑ Yes, he did.

Ⓒ Juma.

Ⓓ Very loud.

[Spoken stimulus: Are these books yours?]
Shown in test booklet:

Ⓐ They are books.

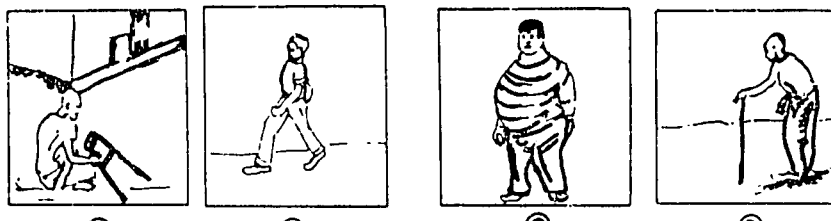
Ⓑ No, they are David's.

Ⓒ No, they are papers.

Ⓓ There are many books.

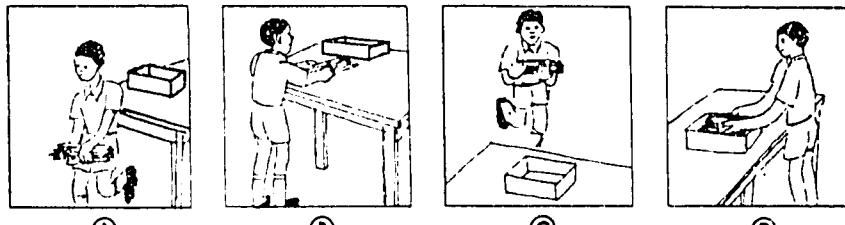
Standard 3—Reading

He is able to run.



Ⓐ Ⓑ Ⓒ Ⓓ

Juma is taking the pencils which are in the box.



Ⓐ Ⓑ Ⓒ Ⓓ

What would you do if you had a pencil?

Ⓐ Write a letter.

Ⓑ I would do it.

Ⓒ I had some paper.

Ⓓ Ask for a pencil.

Did you know that Anna is coming tomorrow?

Ⓐ No, yesterday.

Ⓑ No, she's not coming.

Ⓒ No, I didn't.

Ⓓ No, I'm coming.

(Listening and reading tests both conclude with spoken or written passages of two to three sentences and accompanying comprehension questions.)

Standard 3—Writing

[Student copies appropriate words into spaces provided.]

More birds came to the tree.

They all started _____ nests.

_____ five days the birds had finished their nests. They _____ their eggs in the nests. After twelve more _____ baby _____ came out of the eggs. They _____ fly.

After birds making

laid couldn't days

[Dictation: Sample sentences:]

That is Juma.
Those are books.
I hope she'll come.

Standard 3—Speaking

(Questions are generally similar to Standard 2, but based on Standard 3 vocabulary.)

Prior to being included in the final version of each test form, all questions were extensively pretested on groups of approximately 200 pupils at each of the grade levels. Available statistics for the final selection of questions include information on: (1) the number of pupils choosing each of the response options (useful for eliminating or suitably revising questions for which one or more of the incorrect options did not serve to attract at least some of the less proficient pupils; (2) the percentage of pupils answering the question correctly (as an overall measure of question difficulty); and (3) the item's r-biserial correlation. The latter statistic provided an indication of the extent to which generally proficient pupils (as shown by their performance on the test as a whole) were also tending to answer the particular question correctly. Questions which the more proficient students were found to answer incorrectly (or conversely, questions which the less capable pupils were observed to answer correctly with an unanticipatedly high degree of frequency) were very carefully examined and either removed from candidacy for the final form of the test or suitably revised, provided that the problemmatical aspect of the question was fairly evident on reinspection (e.g., a potentially ambiguous line drawing, unclear question phrasing, etc.).

Figure 16 provides summary information on the content, format, number of questions, reliability, and other statistical characteristics of the final operational versions of each of the project tests.

NOTES

1 The Standard 1 tests were developed collaboratively by Dr. Grant Henning, then of the American University in Cairo, and project staff at the Nairobi office. The Standard 2 and 3 tests were prepared with the collaboration of Dr. John L. D. Clark of the Center for Applied Linguistics, working with the Nairobi office staff and with teams of question writers drawn from school observers and other Kenyan adjunct personnel.

FIGURE 16
Test Characteristics

Test	Total No. of Questions	Maximum Possible Score	Reliability[2]
Standard 1 (FSET1)[1] Listening	40	40	.93
Standard 1 (FSET1) Reading	40	40	.90
Standard 2 (FSET2) Listening	35	35	.78
Standard 2 (FSET2) Reading	35	35	.76
Standard 2 (FSET2) Writing	10	10	N/A[4]
Standard 2 (FSET2) Speaking[3]	36	Total Words (N/A)	.98
		Comprehensibility 108	.96
		Grammaticality 72	.92
		Total (N/A)	.95
Standard 3 (FSET3) Listening	50	50	.85
Standard 3 (FSET3) Reading	50	50	.90
Standard 3 (FSET3) Writing	10	10	N/A[4]
Standard 3 (FSET3) Speaking[3]	36	Total Words (N/A)	.96
		Comprehensibility 123	.95
		Grammaticality 82	.86
		Total (N/A)	.95

1 Acronym designates "Final Summative Evaluation Test" for the indicated level.

2 K-R(20), unless otherwise noted.

3 For Standard 2 and 3 speaking tests, each response scored for: total number of words produced; comprehensibility (1-3 points), and grammaticality (1-2 points). Reliability coefficients are intraclass correlations for a random sample of 30 test tapes scored by all nine raters.

4 Regular reliability statistics not applicable for this kind of test.

Chapter 10
SUMMARY OF RESULTS

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We have said already that the RLAP demonstrated the improved effectiveness of radio for teaching English to primary school children, as compared to traditional instruction in Kenyan schools. Now let us explain why we said so. Behind this simple assertion lies an elaborate and rigorous evaluation of the entire RLAP effort, an evaluation carried out by independent educational researchers from the Center for Applied Linguistics in Washington, D.C. (Oxford *et al.* 1986). The scientific underpinning for the evaluation and the detailed results of that evaluation are the subject of this chapter, and are presented here not so much for the significance of any single detail but to validate the finding that the RLAP worked better than traditional teaching—the effectiveness of interactive radio instruction rests on solid scientific evidence. At the same time, the evaluation makes clear that while radio instruction greatly improved scores, scores still can be improved considerably further.

The purpose of the RLAP was to teach English to children in Standards 1-3 and to do so more effectively than traditional teaching could. Measuring to what degree the RLAP achieved its purpose involved tests in four areas (listening, speaking, reading, and writing), using two groups (experimental and control), with children in all three Standards.

The Tests

Language skills can be assessed on four bases:

- Listening—how well do children understand what is said to them?
- Speaking—how well can children express themselves orally?
- Reading—how well do children understand written language?
- Writing—how well can children express themselves in writing?

The RLAP evaluators looked at all four of these skill areas. The previous chapter on test development describes in detail how each area was tested.

The Groups

In any experiment, groups are compared to see what effect comes from some experimental treatment that only one group receives. In the RLAP, the experimental treatment was radio instruction. The experimental group was taught the English curriculum by radio, the control group was taught the English curriculum in the traditional way. Thus the tests were administered in four skill areas for two different groups.

The Children

The actual children tested were from the first three primary Standards, so each of the two groups had children from all of these Standards. Children in each Standard were tested to determine the impact of the RLAP on each of these critical school years—the three years during which students must learn English well enough to allow them to continue into Standard 4 and beyond using English as their language of instruction.

This makes a matrix of four skill areas, two groups, and three Standards. This possible 24-cell matrix had, by design, a few blanks. Writing and speaking tests were not given to Standard 1 students, the assumption being that these youngsters' skills in English expression would be too undeveloped in the first year to measure well. Those students who did take the speaking test were only a 10 percent random sample of all Standard 2 and Standard 3 students—a sampling made necessary by the time needed to listen to students' speech individually.

The result is a matrix that looks like this, where "X" indicates a test and "—" indicates no test.

Each radio/control pair tested asks for a comparison, getting back to the basic question: Did the RLAP teach English more effectively than traditional methods did—yes or no? On the basis of careful statistical analysis, we can place the answer to that question into our matrix as follows, where the answer "yes" means that at a given Standard on a given test radio instruction surpassed traditional instruction.

FIGURE 17
Tests Given by Standards, Groups, and Skills Areas

	Reading		Listening		Writing		Speaking*	
	radio	control	radio	control	radio	control	radio	control
Standard 1	X	X	X	X	—	—	—	—
							X	X
Standard 2	X	X	X	X	X	X	X	X
							X	X
							X	X
Standard 3	X	X	X	X	X	X	X	X
							X	X

* The speaking test was made up of three parts—total number of words used, the meaning and comprehensibility of the words, and the correctness of grammatical structures.

Statistical analysis determined that the gains measured for the radio group are extremely unlikely to have been brought about by chance—indeed chance could have determined these differences in fewer than one case in 10,000, a very high level of confidence. (Convention allows "statistical significance" to be claimed where chance is possible in only one case out of 20, so our confidence level greatly exceeds that convention.)

FIGURE 18
Did the RLAP Teach English More Effectively than Traditional Instruction Did?

	Reading	Listening	Writing	Speaking*
Standard 1	yes	yes	—	—
				yes
Standard 2	yes	yes	yes	yes
				yes
				yes
Standard 3	yes	yes	yes	yes
				yes

* Comprised of total words, comprehensibility, and grammar.

Analysis also was done on a subgroup of the students called the "normal-progression" group. This subgroup was made up of those students who progressed normally from one Standard to the next during the course of this project—that is, they received three years of English instruction by radio. In many developing country schools, especially rural schools, an assortment of demands and constraints conspire to keep children from making normal academic progress—the need to work, to care for siblings, to migrate; the lack of schools, teachers, and materials; the uncertain benefits of schooling for rural children. Kenya's situation is typical. Out of 3,908 students, only 850 were in this subgroup, meaning that the others (over 75%) were either repeaters, dropouts, transients, or not easily located. Analysis of the normal-progression subgroup, like the

FIGURE 19
Means, Standard Deviations, and Ranges for all Students

		Reading		Listening		Writing		Speaking*	
		radio	control	radio	control	radio	control	radio	control
Std. 1	mean	13.1	10.7	23.4	15.5				
	SD	7.6	7.6	8.3	8.9				
	range	0-38	0-39	0-40	0-39				
	no.	1544	1135	1544	1135	—	—	—	—
Std. 2	mean	14.6	13.1	15.3	11.2	2.8	2.3	76.1 34.3 15.9	67.7 29.0 14.0
	SD	5.7	5.1	5.6	4.1	2.3	2.3	32.6 15.1 7.5	37.3 13.6 6.2
	range	0-31	0-30	1-32	0-28	0-10	0-10	10-148 8-68 2-34	2-167 3-62 1-28
	no.	1356	1378	1356	1378	1356	1378	158	148
Std. 3	mean	22.9	19.1	25.7	21.6	2.7	2.1	120.2 46.4 20.7	114.1 39.1 16.5
	SD	10.2	8.4	8.1	7.2	2.3	1.9	40.8 15.3 8.2	40.6 14.8 7.8
	range	0-47	0-48	3-47	0-46	0-10	0-10	23-255 11-70 3-39	8-201 7-70 2-37
	no.	1215	1361	1215	1361	1215	1361	149	161

Speaking subscales are WT (Word Total); M (Meaning/Comprehensibility); and G (Grammar).
* The range for Word Total was determined by actual usage.

analysis of the total group, showed a strong positive effect of the radio instruction; in fact, this effect is more pronounced for the subgroup than for the total group. It is likely that the stability of the normal-progression subgroup in terms of academic progression contributed to academic achievement, and that the radio was able to contribute even more to students with this stability advantage. That is, the radio, while improving scores for all students, can improve scores for normal-progression students even more.

These students are a minority in project schools now; having a majority of repeaters, dropouts, or transients is not likely to change substantially in the near future. Radio instruction's boost to the majority, *non*-normal-progression students, is perhaps the more critical finding because it demonstrates radio's ability to make a difference among children who are buffeted by all the disadvantages associated with poor, rural schools.

Figures 19 and 20, for all students and for normal-progression students respectively, give the actual means, standard deviations, and ranges. In every case, as the Figures show, the means of the radio group are greater than the means of the control group. This difference is statistically significant, indeed highly so, in almost every case; the only nonsignificant difference, on the word-total subscale of the speaking test, still favors the radio group. We might note that the increased size of the groups tested in all but the

FIGURE 20
Means, Standard Deviations, and Ranges for Normal-Progression Students

		Reading		Listening		Writing		Speaking	
		radio	control	radio	control	radio	control	radio	control
Std. 1	mean	16.6	14.5	27.2	20.7	—	—	—	—
	SD	8.1	8.7	6.8	8.7	—	—	—	—
	range	0-37	0-39	4-39	0-39	—	—	—	—
Std. 2	mean	16.5	14.6	17.4	12.0	3.6	2.9		
	SD	6.0	5.5	5.7	4.6	2.5	2.4		
	range	2-31	3-29	2-32	0-28	0-10	0-10		
Std. 3	mean	26.2	21.2	27.7	23.0	3.4	2.5		
	SD	10.7	9.3	8.6	7.7	2.6	2.1		
	range	6-47	5-48	6-47	1-46	0-10	0-10		

Radio N = 399
Control N = 451

speaking test (which was a 10% random sample) both increases the likelihood of significance and confirms the consistent differences on the basis of more individuals. The key point is that, overall, the differences are very positive in favor of the radio group and that we can be very confident that these positive differences did not occur by chance.

The most striking difference in mean scores appears on the listening test for Standard 1, where the radio group has a 23.4 to 15.5 advantage. It seems that radio, which of course is an aural medium that emphasizes listening, was more successful in producing gains on the listening measure than on the other three measures. Gains in reading, writing, and speaking were substantial but smaller than that for listening. Gains in listening are highest both for the total group and for the normal-progression subgroup, and in each case for Standard 1. The first year of listening to radio English seems to produce the greatest gain vis-a-vis the control group.

Gains in writing were lowest. Indeed in both Standards 2 and 3, some radio students answered none of the writing items correctly—just as did some control students. Two other evaluations of the RLAP, one done by the Kenya Institute of Education and the other done for the Ministry of Education by Professor George S. Eshiwani of the Bureau of Educational Research, Kenyatta University College, noted this relative weakness in teaching writing. KIE conducted systematic observation of RLAP classrooms; their observers also found pupil response to be weakest in writing. Asked to rate the responses they observed, the KIE team placed writing responses in the "poor" category over 30 percent of the time—compared with about five percent of the time for listening and reading and 20 percent of the time for speaking (KIE 1984). In his interviews with 85 teachers, Eshiwani (1984) was told that the radio classes allowed too little time for writing practice—"If only more could be done in writing, then the project would be very good;" "that one in oral conversation—that one, it helps a great deal; but there isn't much practice in writing;" "As far as I am concerned, this method gives more practice in reading but not so much in writing. The other method gives more practice in writing." It should be noted that these teachers are commenting on what they see as the RLAP's least effective area. If teachers do give more writing practice than the RLAP does, their efforts are no more effective; in fact, writing scores of the radio students significantly surpassed the writing scores of the control group, taught in the traditional fashion.

But these comments were all given in the context of enthusiastic teacher endorsements of the RLAP; indeed, Eshiwani found that 65

percent of the teachers said the RLAP was "much better" than traditional instruction and 34 percent rated the RLAP "a little better." Only one teacher said "about the same." A critical question put by Eshiwani to the teachers asked if the RLAP should be continued, and an overwhelming 90 percent said yes—the RLAP should be continued.

An attitude survey conducted by the project team also showed strong support for the radio instruction by teachers and headmasters. Several questions required teachers to comment on their students' abilities after completing Standard 3. Ninety percent of the teachers felt students were ready to use English as a medium of instruction. Sixty-one percent felt their radio students had good or excellent ability to write, and 98 percent felt the radio students' listening ability was better than that of other students (Oxford *et al.* 1986).

Another way of measuring comparative achievement is to estimate the magnitude of differences using a criterion not directly affected by sample size—the standard deviation of the control group. To do this, we calculate a statistic we can call "effect size." This is done by comparing the means of the two groups and then expressing the difference between those means in terms of the standard deviation of the control group. That is, we take the mean of the radio group, subtract the mean of the control group, and divide the result by the standard deviation of the control group, according to the following formula:

$$\frac{\bar{X}\ \text{radio} - \bar{X}\ \text{control}}{\text{s.d. control}} = \text{effect size}$$

Effect size tells us how great intervention effects have been in terms of the standard deviation of the control group, the group that did not receive the intervention. Figure 21 displays the effect sizes by tests of the RLAP intervention.

What this means, for example, is that in Standard 3 reading, the average radio student attained a score that was above the control-group mean by .54 control-group standard deviations. Or, put another way, a student who scored at the mean in the control group would have been moved to .54 standard deviations above that mean by the radio instruction. Yet another way of saying the same thing is to substitute "group mean" for "average student": the group mean of the radio group rose above the group mean of the control group by .54 control-group standard deviations in Standard 3 reading.

FIGURE 21

Average Benefit, Expressed in Control-Group Standard Deviations, for Radio Students Compared with Control Students*

(Standard)	Reading	Listening	Writing	Speaking	Average Benefit
1	.24	.75	No writing test at this level	No speaking test at this level	.49
2	.35	1.17	.29	WT: .23 M: .39 G: .31	.46
3	.54	.61	.43	WT: .15 M: .49 G: .54	.46
THREE-YEAR AVERAGE EFFECT SIZE					.47

Speaking Subscales:

WT = Word Total

M = Meaning/Comprehensibility

G = Grammar

* Normal-progression students only for reading, listening, and writing; 10% random sample of all project students for speaking.

This Figure clearly shows that the greatest differences between the groups were in the listening tests, as witnessed by the effect sizes of 1.17, .75, and .61 control-group standard deviations. Other tests yielded smaller differences, though, consistently, radio instruction brought about positive effects as measured by effect size. Effect size is a very powerful measure of intervention impact, especially in large groups.

Effect size demonstrates the benefit that accrues from having radio instruction, as compared with traditional, non-radio instruction. Looking at the average effect size across skill areas (effect size meaning a difference in performance between radio students and control students in terms of control-group standard deviations), we see .49,.46, and .46 for each of the three Standards. An average effect size of .49 standard deviations in Standard 1 can be translated into the 69th percentile using statistical tables. If the effect size is .49, the average or median control-group student would, by definition, be at the 50th percentile, while the average radio student would be at the 69th percentile. The difference in percentiles between radio and control groups is 19 points. Another way of saying this is that the benefit of having radio instruction over traditional instruction is an improvement of 19 percentile points.

Effects of Specific Variables on Student Performance

Relationships between certain specific variables and student performance were examined. These variables were: district; radio reception; accessibility; teacher experience, education, sex, age, and certification level; and headmaster experience, education, sex, age, and certification level.

Of all these variables, we found that only *district* had a clear and important relationship to student performance. On the average, across all three project years, Kiambu was the best performing district in three tests—reading, listening, and writing. The worst performing district, quite consistently, was Kisumu, regardless of method of instruction. (We should note that all the project schools were rural—due to the rural focus of the project—which of course means that these data say nothing about any urban areas in any district. When referring to districts, we are really referring only to their rural areas, not to districts as a whole.)

What underlying variable across districts might explain such findings? No single variable explained the difference. There are a number of untested possibilities. The higher scoring district Kiambu is in close proximity to Nairobi where adults may travel to work and use English more extensively. There may be economic advantages in such a district as well which affect the schools and the school population. Lower scoring districts may be handicapped by limited or only recent access to schooling.

We did not measure certain other variables, like socioeconomic factors, that may very well have influenced student performance and created some of the district-by-district and school-by-school differences found in the results. So, while some districts scored better on these achievement tests than other districts did, this finding is only suggestive of further analysis to determine radio's effect on districts of varying profiles. In what kinds of districts did radio contribute more? In what kinds of districts did radio contribute less? It is also notable that certain variables like teacher's education level and teacher's certification level, generally thought to be related to student achievement, were not associated with differences in achievement on these measures.

Possible socioeconomic factors include the drought of 1984, which hit hard in Machakos, Kajiado, and Kisumu and may have affected students' nutrition; the tribal differences, particularly contrasting the nomadic Maasai with more sedentary groups; the generally better educational facilities on the tea estates, as in Kericho, compared with non-estate areas; and the tribal and linguistic min-

gling of children in the tea-estate schools, resulting in the use of Swahili for instruction in Standards 1 to 3. In project schools in Kilifi, on the coast of the Indian Ocean, most children spoke Swahili, with the result that the motivation to learn English may have been lower than elsewhere. Furthermore, in these project schools on the coast, radio reception was poor, and project materials had to be delivered by non-project drivers, with the result that deliveries did not always arrive with the timeliness that they arrived in other project schools.

None of these factors was studied systematically, but anecdotal information about their presence suggests possible relationships for future study.

Discussion

The data are abundantly clear in affirming consistently higher scores among the radio group. As noted, the differences in group means between radio students and control students are consistently in favor of the radio students and statistically significant in almost every case. Because of the high number of students involved, statistical significance is more likely than in a smaller sample, so a policymaker may ask how these differences compare with other educational interventions, and it is the effect-size measure that is most useful for comparisons like this. Figure 22 presents some effect sizes from several projects, including Radio Language Arts.

This comparison with other educational innovations most squarely addresses the question: How big a difference did Radio Language Arts make in Kenya? And the answer is that this project rates very well alongside other successful projects in other settings, and in terms of cost-effectiveness, appears to far surpass some of these other projects. The RLAP's net effect size was just slightly below that of its "parent" project, Radio Math in Nicaragua; it might be argued that language teaching in this Kenya setting was at least as difficult as mathematics teaching in the Nicaragua setting, and perhaps quite a bit more so. But even taking the comparisons in Figure 22 at face value, these numbers, along with the consistently positive and consistently significant advantages of radio reported in Figures 19 and 20, place the innovative Radio Language Arts Project in Kenya among the leading projects of its kind anywhere. A rule-of-thumb is that an effect size of .20 is considered a clear success.

Of special note, analysis of computer-assisted instruction (CAI) in 28 separate settings in United States elementary schools shows an average effect size of .47. The average control-group student would be at the 50th percentile, compared with the 68th percentile

FIGURE 22
Effect Sizes and Percentiles for Several Projects Involving Educational Innovation

	Effect Size	Percentile
Nicaragua Radio Math[1]	.69	76th
Thailand Radio Math[2]	.41	66th
Nicaragua textbook[3]	.36	64th
U.S. computer-assisted instruction[4]	.47	68th
Kenya Radio Language Arts	.47	68th

1 Jamesine Friend, personal communication. Listed here is the average effect size for the first three years. In the fourth, and final year, the scores were lower, an anomaly that might be ascribed to the political tumult that year that reduced days in school. Including year four, the average becomes .52 and the percentile becomes .70.

2 Friend, J., K. Galda, and B. Searle. "Transfer of Instructional Technology: Radio Math in Nicaragua and Thailand." Unpublished mimeo, no date.

3 Jamison, D., B. Searle, K. Galda, and S. Heyneman. 1981. "Implementing Elementary Mathematics Education in Nicaragua: An Experimental Study of the Impact of Textbooks and Radio on Achievement." Journal of Educational Psychology, 73:4.

4 Kulik, J., C. Kulik, and R. Bangert-Drowns. 1985. "The Effectiveness of Computer-based Education in Elementary Schools." Journal of Computers in Human Behavior, 1:59-74.

for the average CAI student. These results are no better than the radio versus control differences in our project.

We also must point out that neither the Kenyan radio group nor the control group performed as well in writing or speaking, the expressive skills in language ability, as they did in reading and listening, reflecting, no doubt, the greater difficulty involved in active mastery of a new language (speaking and writing) than in the more passive recognition of a new language (reading and listening). For most tests, there was a wide range of scores for both groups. In fact, some students in each group scored very low in these expressive areas, sometimes getting no answers correct, and other students in each group scored very high on these same tests. So the radio instruction did not make these groups into very different populations—a good deal of overlap persisted. In no case did the range of scores for the radio group and the range of scores for the control group diverge totally or even to any notable degree on the same test. Variability, which shows up in the standard deviation, was also quite similar in both groups. So, while there was signifi-

cant difference between means of the two groups, the range of scores and the variation within groups were not all that different.

Another policy question that must be considered deals with actual achievement versus possible achievement. Figure 23 displays the percentage of correct items on each test, for each group, in each Standard.

FIGURE 23
Percentage Correct for Each Test, By Groups and Standards

Level	Test	# of items	GROUP Radio All	GROUP Control All	GROUP Radio Normal Progression	GROUP Control Normal Progression
1	Reading	40	32.8	26.8	41.5	36.3
2	Reading	35	41.7	37.4	47.1	41.7
3	Reading	50	45.8	38.2	52.4	42.4
1	Listening	40	58.5	38.8	68.0	51.8
2	Listening	35	43.7	32.0	49.7	34.3
3	Listening	50	51.4	43.2	55.4	46.0
2	Writing	10	28.0	23.0	36.0	29.0
3	Writing	10	27.0	21.0	34.0	25.0
2*	Speaking: Meaning/ Comprehensibility	108	31.8	26.9	—	—
	Grammar	72	22.1	19.4	—	—
3*	Speaking: Meaning Comprehensibility	123	37.7	31.8	—	—
	Grammar	82	25.2	20.1	—	—

* The possible range for word total was determined by actual usage.

Only in listening skills did the radio group answer more than half the questions correctly on any test, and the control group never did. What we are seeing is that these tests, based directly on the official curriculum, overwhelmed all students—although radio students were consistently less overwhelmed than those in the control group. It is true that the radio improved scores compared to traditional teaching, but we are still left with a tremendous amount of room for improvement. The KIE evaluation confirmed this low overall achievement, despite the gains brought about in the radio classes. A separate study comparing urban and rural students (Oxford and Imhoof 1986) found that Nairobi children scored higher than rural children, even rural children in radio classes. When we

consider the richer English-language environment of Nairobi, this is probably not surprising.

We necessarily acknowledge this gap between current achievement and potential achievement, even in project schools. In doing so, we are not discouraged by the improvements still needed; rather, we are encouraged by the achievements already realized, in a relatively short time, among a school population with considerable disadvantages. Despite those disadvantages—the complex of constraints stemming from rural isolation—the radio instruction brought about consistent, unequivocal gains in achievement. AID specifically mandated the RLAP to work with the rural poor, precisely because the children of the rural poor usually achieve so little in school.

In addition to these achievements, the RLAP won overwhelming favor among teachers and headmasters, as reported in attitude studies done among these groups both by the RLAP and by Prof. Eshiwani. Teachers and headmasters gave highly favorable ratings to radio instruction and felt that radio students had an advantage over other students in many areas of learning. Well over 90 percent of the teachers and headmasters wanted the radio instruction to continue.

While the achievements of the radio group are notable, the RLAP's generation of so much enthusiasm among rural teachers and headmasters may be more telling in the long run. If rural students are to continue to improve, as they must, their teachers must be lively and hopeful and convinced that the rural environment need not hold these children back forever. The RLAP has demonstrated that rural children can be brought forward, contrary to the beliefs of those who may have seen no hope for such disadvantaged schools. Breaking through these beliefs, as much as any particular test score differences, may be the RLAP's most lasting contribution to Kenya's schools.

REFERENCES

Eshiwani, George S. 1984. "Report of the External Summative Evaluation of the Radio Language Arts Project in Kenya." Available from the Academy for Educational Development, Washington, D.C.

Kenya Institute of Education. 1984. "An Evaluation Report." Available from the Academy for Educational Development, Washington, D.C.

Oxford, Rebecca L., *et al.* 1986. "Final Report: Evaluation of the Kenya Radio Language Arts Project." Washington, D.C.: Center for Applied Linguistics and Academy for Educational Development.

Oxford, Rebecca L., and Maurice Imhoof. 1985. "Nairobi, Cassette, and Observation Students of the Kenya Radio Language Arts Project: A Special Evaluation Report." Washington, D.C.: Academy for Educational Development.

Chapter 11
STRATEGIES FOR AND COSTS OF DISSEMINATING INTERACTIVE RADIO INSTRUCTION

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INTRODUCTION

Radio students learned more English than students receiving conventional instruction according to the evaluation results of the Radio Language Arts Project. Teachers and headmasters who participated in the project strongly support use of the radio lessons. These factors, together with the low cost of radio, constitute a strong argument for widespread dissemination of the lessons.

This chapter suggests two plans for nationwide dissemination of the RLAP program. The plans differ only in their assumptions about the amount of time required for full dissemination. The first assumes it will take nine years, the second that it will take six years.

In many respects, Kenya offers ideal conditions for wide-scale implementation of a new instructional radio course. The nation has a long history of involvement in educational radio. Teachers are familiar with the use of radio in the classroom, many schools already have receivers, broadcast and printing capacities are well developed, and technical expertise is available. Given this strong resource base, the barriers to nationwide implementation (not all schools have receivers and not all are in range of the current transmitters) are relatively minor.

The need to place additional radio receivers in the schools and to build additional transmitters suggests a three-stage expansion strategy. In the first stage, service will be provided to all schools that currently have receivers. In the second stage, new radio receivers will be distributed to all schools within the range of the current transmitters. And, in the third stage, the transmitting facilities will be extended to the entire nation, and radio receivers will be distributed to the schools in outlying areas. In the nine-year plan, Stage 1

will take three years, Stage 2 two years, and Stage 3 four years. In the six-year plan, Stage 1 will take two years, Stage 2 one year, and Stage 3 three years.

The bulk of this chapter is devoted to questions of cost; the various components of the cost of implementation are analyzed, and an estimate of the cost per student presented.

PROJECT DEVELOPMENT

The RLAP staff—from the Kenya Institute of Education and the Academy for Educational Development—produced 585 half-hour English language lessons, 195 lessons each for Standards 1, 2, and 3. These lessons are now on tape and available for rebroadcast without additional production cost. The staff also developed Teacher's Notes for Standard 1 and Standards 2 and 3 of 180 and 260 printed pages, respectively, and worksheets for pupils. The Teacher's Notes include an outline of the lesson and suggestions for the teacher. Student worksheets are bound into reusable booklets. The Teacher's Notes and student booklet will require recurrent expenditures. The Standard 1 workbook is 19 printed pages, and the Standard 2 and 3 booklets 48 pages each. Students provide their own exercise books for writing practice.

The RLAP educators tested the lessons and worksheets in 31 rural schools in seven districts chosen to represent the variety of mother tongues spoken in Kenya. Radios, batteries, and radio maintenance were supplied by the project, as were Teacher's Notes and supplementary materials. The project also provided a one-day orientation session for participating teachers and headmasters. KIE donated the studio space, recording facilities, and air time to the project, and made the time of teacher tutors available for evaluation activities.

In sum, the developmental period was characterized by substantial Kenyan and AID investments of time and money in the preparation of lessons and print materials and in evaluation activities.

DISSEMINATION COSTS

The major costs associated with the introduction of a new radio curriculum are realized, of course, in its developmental period. With respect to dissemination decisions, these represent "sunk costs;" which is to say they are irrelevant in forecasting future cost. Dissemination costs include both one-time investment costs, such as the purchase of additional receivers, and continuing costs, such as print materials production and distribution. The latter recurrent

costs are, for the most part, replacement costs since the RLAP classrooms will not require the language textbooks currently used. Many of the recurrent costs related to the RLAP would become add-ons only if schools were given the option of using either the radio lessons or the current language program.

A host of factors influence the costs of expanding radio-based instruction, in general, and the RLAP in Kenya, in particular. These include existing transmission and reception capabilities, as well as capacities for teacher training, distribution of printed materials, and management. To the extent that these capabilities are well developed already, the cost of dissemination will be lower.

Transmission

Questions about transmission include the availability of broadcast time, the range of the transmitter, and the quality of the transmission. (Transmission quality is affected not only by the type and power of the transmitter but by the adequacy of maintenance.)

In Kenya one of the chief constraints to immediate wide-scale dissemination is the scarcity of broadcast time. While many countries with national radio systems have insufficient programming, particularly during the daytime hours, this is not the case in Kenya KIE alone has a five-hour schedule of instructional support programs. The staged design of the Radio Language Arts lessons requires an added one-half-hour each year with full implementation requiring one and one-half hours. The estimated value of the air time KIE "purchases" from the Voice of Kenya is $120 per hour.

The already crowded KIE broadcast schedule leaves two options. Either the RLAP must be substituted for current programs or a new radio channel created. The estimate is that a new channel with the same range as the present one, roughly 84 percent of the schools, would call for either 20 FM 50w-100w transmitters or 9 AM 20kw-100kw transmitters. (Shortwave transmission, which is of course less expensive than either FM or AM, is considered inappropriate for radio instruction because of the fragility of its signal.)

In addition to the decision to create a new channel, a decision must be made on whether the benefits outweigh the costs of transmitting to all the schools in Kenya. At the present time the schools in the Siaya, Kakamega, Busia, Mandera, and Kilifi districts may have poor reception. (See Appendix at end of this chapter.) Summary information on the number of schools and classrooms within the current reception range is presented in Figure 24.

Depending on the number and type of transmitters purchased, new transmission sites may have to be constructed. To the extent that the physical infrastructure for the new channel can use the existing system, costs will be limited to new antennas, additional electrical power, and rental of studio-transmitter links. New sites also would require the construction and electrification of facilities and the building of access roads. Costs for FM and AM transmitters including antennas, studio links, etc., but with no site development, are $12,000 and $5,000, respectively.[1]

Unless air time on the new channel is fully subscribed, its initial cost will be far higher than the cost of rental from the Voice of Kenya. Presumably, however, a new KIE channel would carry all educational broadcasting, including the RLAP, and thus would be used at least five hours a day for 24 weeks during the school year (to broadcast current KIE education programs) and an additional one-and-a-half hours a day for the RLAP for 39 weeks. Ideally, KIE could sell the remaining air time until it can fully use the new channel itself.

FIGURE 24
The Number of Schools and Classrooms in Good and Poor Reception Areas

	Schools	Classrooms*		
		Standard 1	Standard 2	Standard 3
Good Reception	10,061	18,591	14,883	13,826
Poor Reception	1,905	3,659	2,884	2,729
Total	11,966	22,250	17,767	16,555

* The number of classrooms was obtained by dividing the total number of students in each Standard by the average number of students in a classroom (40). On the average, there are two streams or classrooms per Standard.

NOTE: Poor reception includes those schools with low quality reception, as well as those completely outside the range of the transmitters.

Source: Ministry of Education 1983 statistics; information provided by personnel at KIE.

Reception

The second major constraint to rapid full-scale dissemination is the number of receivers currently in the schools. While the goal of the government is to provide each school with a radio, and while the government and the World Bank have worked together to place over 12,000 radios in schools, the number of receivers which remain in operation is not known. Even if all these radios are in place and

working, there is justifiable concern that the government's goal of one radio per school falls short of the real needs of radio instruction in general, and of the RLAP, in particular. This is true for several reasons. First, the average number of streams per Standard (classes per grade) is two. Thus, at the very minimum, one radio with a detachable speaker which can be placed in a separate classroom is necessary. Second, if a second channel is created and educational broadcasting is divided between the two channels, the dedication of the radio receiver to the RLAP would foreclose its use by other teachers in the school. Third, receiver failure would mean that students would be deprived of the radio broadcast for at least several weeks because no extra receivers would be available and because radios would have to be sent to KIE in Nairobi for repair. Finally, although the theft of radios does not appear to be a major problem, theft too represents a serious threat to uninterrupted instruction.

Cost of reception is dependent not only on the number of receivers needed but on the type of power available for these receivers. Although precise statistics have not been compiled on the number of schools with electricity, typically only the city schools have electricity. This pattern will not change dramatically in the next five years. The data in this chapter's Appendix indicates that city schools represent only 2.6 percent of all schools and 3.1 percent of schools in the broadcast range of the current transmission system. The average monthly electric bill for a city school is $9.38. Use of a radio for the RLAP would increase this bill by a fraction. The remaining 96.9% of the schools are dependent on batteries as a source of electrical power. While this is a relatively more expensive source of power per kilowatt hour, it is justifiable given the initial costs of electrification. To bring electricity into a school in areas where electricity is already available is $7,500 (cost of the line and the transformer) unless electrification is part of a government program, in which case charges may be lower. The cost of a set of the five or six batteries required by most school receivers is approximately $.94 cents. Each of the RLAP classrooms was supplied with two sets of batteries a month because they were used in radio-cassette players and to receive other school broadcasts. Since only radio reception is necessary for the RLAP dissemination, three sets of batteries per year per classroom would be sufficient, so the total cost per year would be $2.81.

Distribution

Reliance on batteries, however, raises the issue of the adequacy of the current school distribution system, an issue also relevant to

print materials. Nzioka, in a 1984 study of educational broadcasting in Kenya, found that while most schools received broadcast schedules, "the majority of schools do not receive the support materials" (Nzioka 1984). To what extent this distribution problem is limited to radio curricula or is indicative of a more widespread phenomenon is not known. At the very least, these findings suggest the need to upgrade distribution mechanisms as a precondition for wide dissemination of the RLAP.

Printed Materials

The actual printing of materials does not seem to be a problem. The Jomo Kenyatta Foundation prints most school texts, and KIE also has a small printing facility. Student booklets are estimated to cost between $.11 and $.21, depending on the number of pages and the total quantities ordered. Teachers' manuals are more costly ($.47 to $.80) because of their length. Of course, the higher initial cost of the Teacher's Notes will be offset by a longer period of use, a probable five or six years compared to two or three for the students' materials.

Teacher Training

KIE currently broadcasts instructions to teachers on the use of its school programs. Nzioka (1984) found, however, that teachers rarely heard these broadcasts because the broadcasts were aired outside of school hours and many teachers did not have radios at home. The RLAP project team also determined that the project teachers preferred face-to-face orientation to lengthy instructions broadcast into the classroom as part of the lessons.

The typical Ministry of Education, Science, and Technology strategy is to send trainers to the seven provincial capitals to provide in-service programs to the Provincial Inspectors (7), District and Assistant Primary Inspectors (195), and Assistant Education Officers and Teacher Advisory Centre Tutors (530). The estimated cost of a one-day in-service program, assuming two KIE trainers spend two nights and one day in each capital and one-day orientation sessions for 732 people (travel and lunch), would be approximately $4,375. Over half of this amount would be spent on travel. While the Ministry does not always subsidize the cost of travel to in-service workshops, the savings from non-reimbursement of travel expenses need to be measured against the costs which would result from poor attendance. Representation from all districts is crucial since these supervisory people are teachers who provide appropriate orientation to the classroom teachers. Since in-service activities

are regular responsibilities of the inspectors, education officers, and tutors, this kind of training at the district level would not necessarily increase the government's recurrent expenditure.

Program Management

Because of KIE's experience with school broadcasting, the marginal cost of the addition of the RLAP to other radio instruction will be much less in Kenya than it would be in countries with little experience in radio and few trained individuals on staff. While the scope of work during the developmental period required a team consisting of eight professionals, an administrative assistant, a studio engineer, a distribution coordinator, one secretary, two typists, and a driver, a much smaller core group would suffice for dissemination purposes. This team might consist of a program coordinator, one professional educational broadcaster, one office assistant, and one typist. Annual salaries and housing allowances would cost approximately $49,706 per year.

The unit costs of the resources which may be required for dissemination of the RLAP lessons are summarized in Figure 25. Estimated prices are listed in both Kenyan shillings and U.S. dollars. Where appropriate, an estimate of the lifetime of the resource is also provided.[2]

STRATEGIES FOR DISSEMINATION

The constraints posed by the need for investment in a new radio channel, the acquisition and distribution of an adequate supply of radios, batteries, and print materials, and the development and refinement of large-scale distribution and teacher training systems call for a gradual approach to dissemination.

Under such a stepwise plan, the RLAP services would be provided first to those schools which already have an adequate number of receivers and are within range of the current transmitters. The second stage would extend service to all the schools in good reception areas which did not have an adequate number of receivers in stage one. During the third stage, the program would reach all the schools that had previously been unable to receive clear radio signals. This assumes, of course, that new transmitters had been put in place. Completion of the third stage would therefore mean that all the schools in Kenya had access to the RLAP program.

Just as geographical extension of the program is accomplished stepwise, it is also necessary to stagger the introduction of the RLAP lessons. Since the lessons were designed so that the sets of

FIGURE 25
Resource Price List

	Cost		
	Shillings	Dollars	Lifetime
1. Radio Receivers			
Cost of radios	560.00	35.00	5 years
Cost of an average repair	200.00	12.50	
2. Power			
Average school monthly electric bill	150.00	9.38	
Cost of hookup (minimum)	120,000.00	7,500.00	
Batteries per year per class 3 sets (5 or 6 per set) @ Sh 15.00 per set	45.00	2.81	1 year
3. Print			
Teacher's Notes			6 years
Std 1 (130 pages)			
12,000 copies	7.58	.47	
4,000 copies	10.08	.63	
Std 2, 3 (260 pages)			
12,000 copies	9.68	.61	
4,000 copies	12.87	.80	
Student Worksheets			4 years
Std 1 (19 pages)			
600,000 copies	1.71	.11	
200,000 copies	2.05	.13	
Std 2, 3 (48 pages each)			
600,000 copies	2.82	.18	
200,000 copies	3.39	.21	
4. Transmission			
FM transmitters, 50-150w	192,000.00	12,000.00	12 years
AM transmitters, 20-100kw	80,000.00	5,000.00	12 years
Air time per hour	1,900.00	119.00	
5. Administration			
Salaries and Allowances			
Program Coordinator	121,100.00	7,568.75	
One Professional	72,080.00	4,505.00	
One Assistant	53,880.00	3,367.50	
One Typist	21,840.00	1,365.00	

Exchange Rate: U.S. $1 = Kenyan Sh. 16

skills introduced in one year form the basis for work in the succeeding year, it is essential that students begin the lessons in Standard 1 rather than enter the program midstream. Consequently, in the first year of dissemination only Standard 1 lessons would be broadcast. Standard 2 and 3 lessons would be added in years two and three.

Alternative dissemination schedules are provided in Figures 26 and 27. These two plans are purely illustrative of the possibilities for expanding program access while at the same time investing in communications, teacher training, and materials distribution infrastructures. They differ primarily in their assumptions about class size, 40 pupils per stream (class), and the dropout rates from Standards 1 to 2 and 2 to 3. The decline in the number of beginning classrooms across Standards reflects these dropout rates. No adjustments have been made for population growth. Figures 28 and 29 outline the teacher training and print material requirements of each plan for each year.

Figures 30 and 31 show the cost per student under differing assumptions about the number of students to be reached and the number of receivers and student workbooks to be distributed. Figure 30 assumes that all students, whether they are currently in areas with good, poor, or no reception, will be included in the project, that each student will be supplied with one set of worksheets, and

FIGURE 26
Number of Classrooms Receiving Radio Language Arts Programs: Nine-Year Plan

		Classrooms					
		Standard 1		Standard 2		Standard 3	
		New	Total	New	Total	New	Total
Stage 1	Year 1	500	500				
	Year 2	2,500	3,000	399	399		
	Year 3	9,000	12,000	1,996	2,395	372	372
Stage 2	Year 4	2,591	14,591	7,186	9,581	1,860	2,232
	Year 5	4,000	18,591	2,069	11,650	6,696	8,928
Stage 3	Year 6	1,000	19,591	3,194	14,844	1,928	10,856
	Year 7	2,659	22,250	799	15,643	2,976	13,832
	Year 8		22,250	2,124	17,767	745	14,577
	Year 9		22,250		17,767	1,978	16,555

Assumptions:

1. There are, on average, 40 students per stream, or classroom, and two streams per Standard.
2. 12,000 classrooms already have receivers. Even with two channels, the RLAP programs for different Standards would not be aired at the same time so receivers could be shared among Standards.
3. Every classroom will have a radio receiver (12,000 now in schools; 44,572 to be added for full implementation).

that each classroom will have its own radio receiver. Figure 31 assumes that only those students currently in good reception areas will have access to the RLAP lessons, worksheets will be supplied to every two students, and radio receivers will be shared among Standards. Both tables assume that there are 12,000 receivers already available in schools. These two tables also assume that every classroom will be supplied with three sets of batteries per year and that, on the average, there are only two streams per Standard in each school. It should be noted that the difference in the costs presented in Figures 30 and 31 is underestimated since the cost of the new transmitters is not included in Figure 30.

FIGURE 27
Number of Classrooms Receiving Radio Language Arts Programs: Six-Year Plan

		Classrooms					
		Standard 1		Standard 2		Standard 3	
		New	Total	New	Total	New	Total
Stage 1	Year 1	500	500				
	Year 2	11,500	12,000	399	399		
Stage 2	Year 3	6,591	18,591	9,183	9,582	372	372
Stage 3	Year 4	3,659	22,250	5,263	14,845	8,557	8,929
	Year 5		22,250	2,922	17,767	4,904	13,833
	Year 6		22,250		17,767	2,722	16,555

Assumptions:

1. There are, on average, 40 students per stream or classroom and two streams per Standard.
2. 12,000 classrooms already have receivers. Even with two channels, the RLAP programs for different Standards would not be aired at the same time so receivers could be shared among Standards.
3. Progression rates from 1 to 2 and 2 to 3 are .7985 and .9318, respectively.

FIGURE 28
Resources Required for the Nine-Year Plan

	Classroom		Individual		
	Teachers to Train, Guides	Teacher Guide Replacement	Student Workbooks One per Student	Student Work-books, One per Two Students	Workbook Replacement
Year 1	500		20,000	10,000	
Year 2	2,899		115,960	57,980	
Year 3	11,368	578	454,720	227,360	33,990
Year 4	11,637	12,510	465,480	232,740	147,670
Year 5	12,765	4,489	510,600	255,300	264,040
Year 6	6,122	6,659	244,880	122,440	391,690
Year 7	6,434	7,699	257,360	128,680	452,910
Year 8	2,869	8,793	114,760	57,380	517,250
Year 9	1,978	9,281	79,120	39,560	545,940
TOTAL	56,572	40,009	2,262,880	1,131,440	2,353,490

* Replacement rates of .17 and .25 were calculated for teacher and student materials, respectively.

FIGURE 29
Resources Required for the Six-Year Plan

	Classroom		Individual		
	Teachers to Train, Guides	Teacher Guide Replacement	Student Workbooks One per Student	Student Workbooks, One per Two Students	Workbook Replacement
Year 1	500		20,000		10,000
Year 2	11,899	475,960	237,980		
Year 3	16,146	2,108	645,840	322,980	123,990
Year 4	17,479	4,853	699,160	349,580	285,450
Year 5	7,826	7,824	313,040	156,520	460,240
Year 6	2,722	9,155	108,880	54,440	538,500
TOTAL	56,572	23,940	2,262,880	1,131,440	1,408,180

* Replacement rates of .17 and .25 were calculated for teacher and student materials, respectively.

FIGURE 30
Cost per Student per Year at Full Implementation in Kenya (in U.S. dollars)

Student Costs		Per Student Cost
Textbooks*		.06
Classroom Costs		
Teacher training*	.03	
Teacher texts*	.15	
Radio receiver*	7.27	
Radio maintenance	2.25	
Batteries	2.81	
Total	12.51/40	.31
Transmission Costs		
Air Time	35,100.00/N of students	.02
Program Costs		
Personnel	16,805.00/N of students	.01
		.40

* These costs have been "annualized" at 10% over their respective lifetimes to reflect a combination of interest and depreciation on the undepreciated portion of the original capital.

Assumptions:

1. An existing channel is extended to reach the entire population but at no cost to the project.
2. Reusable workbooks are provided to every student.
3. Every classroom will have a radio receiver (12,000 now in schools; 44,572 to be added for full implementation).
4. Each classroom uses three sets of batteries per year.
5. There are 40 students in each classroom.

While it would be useful to demonstrate the effects of the alternate assumptions about transmission on a per student cost, that is, the effect of expanding present transmission or establishing a new channel, adequate information is not available to do this. Such information would include the type of transmitter desired, how much transmission site development is necessary and what that development will cost, and what proportion of air time is likely to be subscribed in the next few years.

The unknowns with respect to transmission, as well as the absence of a government dissemination strategy, make it difficult to

FIGURE 31
Cost per Student per Year of Implementation to Schools and Students in Good Reception Areas in Kenya (in U.S. dollars)

		Per Student Cost
Student Costs		
Textbooks*		.03
Classroom Costs		
Teacher training*	.03	
Teacher texts*	.15	
Radio receiver*	1.29	
Radio maintenance	2.25	
Batteries	2.81	
Total	6.53/40	.16
Transmission Costs		
Air time	35,100.00/N of students	.02
Program Costs		
Personnel	16,805.00/N of students	.01
		.22

* These costs have been "annualized" at 10% over their respective lifetimes to reflect a combination of interest and depreciation on the undepreciated portion of the original capital.

Assumptions:

1. An existing channel is extended to reach the entire population but at no cost to the project.
2. Reusable workbooks are provided to every student.
3. Every classroom will have a radio receiver (12,000 now in schools; 44,572 to be added for full implementation).
4. Each classroom uses three sets of batteries per year.
5. There are 40 students in each classroom.

estimate the marginal cost of adopting the RLAP nationwide. If the RLAP totally replaces the current English language program, the marginal cost would equal the cost of the RLAP less the cost of the current program. As summarized in Figures 30 and 31, the difference would be defined by those costs strictly associated with radio instruction—namely, receivers, receiver maintenance, power, and air time. The RLAP texts and central office personnel would simply replace those of the current non-radio program. Depending on assumptions, the marginal cost for adopting the RLAP would vary between $.22 and $.40 per pupil. Most of these costs are attributable to the purchase, maintenance, and powering of receivers. Full im-

plementation in all Standard 1 through 3 classrooms, with a radio in each classroom, would require the purchase of an additional 44,572 receivers. Even with this extraordinary purchase, the per pupil costs remain low as shown in Figure 30. Of course, to the extent that the receivers are considered *necessary* for other KIE programs, then their cost also might be shared. This spreading of radio costs over all programs, "required" or not, would reduce—all else being equal—the marginal cost of the RLAP to a few cents per pupil.

The sensitivity of costs to alternate assumptions suggests the need for both feasibility and cost studies related to the transmission issues, as well as government definition of at least the parameters of one or more implementation plans. In addition to these studies, the likelihood that dissemination plans based on different amounts of resources (Figures 30 and 31) will have different educational consequences, suggests it might be wise to test several approaches in the first year of dissemination. This would permit identification of the educational consequences of such treatments as students sharing workbooks and Standards sharing receivers.

CONCLUSIONS

The data presented in this chapter indicate that the RLAP can be implemented at a relatively low long-run recurrent cost to the Kenyan government. This is due primarily to the relatively low cost of radio education and to the presence of well-developed infrastructures in Kenya for broadcasting and printing.

Since many schools at present are outside of transmission range, they do not have access to school broadcasts. It can be argued that these schools are precisely those in most need of additional resources. Radio, in general, and interactive instructional radio programming (such as the Radio Language Arts lessons) in particular, offer a unique opportunity to provide much needed resources to even the most remote schools at a relatively low cost. Thus, the one-time investment in extending transmission may be fully justified on the basis of both equity and efficiency.

NOTES

1 Estimates were provided by the Educational Communication Center, SUNY-Albany.

2 The information on costs was obtained in interviews with personnel from KIE, the RLAP, AED Washington, and the Educational Communication Center, SUNY-Albany.

REFERENCE

Nzioka, G.L.M. 1984. "Educational Broadcasting in Kenya." *The Educator*, Vol. 1, No. 1: 19-21.

APPENDIX
Numbers of Schools and Standard 1, 2, and 3 Enrollments 1983

Province/ District	No. of Schools	Std 1 No. of Students	Std 2 No. of Students	Std 3 No. of Students
CENTRAL				
Kiambu	303	31,727	28,159	27,591
Murang'a	347	39,035	34,281	33,014
Nyeri	319	26,465	24,319	24,018
Nyandarua	161	13,059	11,543	11,363
Kirinyaga	163	15,335	13,496	13,547
TOTAL	1,293	125,621	111,798	109,533
COAST				
Kwale	201	13,637	11,569	9,425
Kilifi*	256	21,492	16,691	14,449
Lamu	39	2,117	1,728	1,654
Tana River	78	4,667	2,994	2,302
Taita-Taveta	134	8,007	7,446	7,370
TOTAL	708	49,920	40,428	35,200
EASTERN				
Machakos	1,081	64,514	55,510	51,831
Kitui	537	24,946	24,470	22,690
Embu	189	13,998	12,280	11,756
Meru	706	47,137	35,719	32,598
Isiolo	27	1,749	1,474	1,258
Marsabit	33	1,925	1,771	1,421
TOTAL	2,573	154,269	131,224	121,554
RIFT VALLEY				
Trans Nzoia	152	18,297	14,959	13,966
Uasin Gishu	224	16,456	13,390	13,925
Nandi	319	21,076	16,307	14,995
Keiyo				
Marakwet	205	14,192	7,307	7,878
West Pokot	188	8,270	6,871	6,024
Nakuru	263	25,294	22,640	21,815
Kajiado	121	6,225	5,233	5,019
Narok	138	9,562	6,889	6,222
Laikipia	144	7,514	6,399	6,271
Kericho	481	40,938	33,176	29,910
Baringo	324	16,310	10,343	10,178
Samburu	54	2,735	2,399	1,945
Turkana	59	8,678	4,406	2,444
TOTAL	2,672	195,547	150,886	140,492

Province/ District	No. of Schools	Std 1 No. of Students	Std 2 No. of Students	Std 3 No. of Students
NYANZA				
Siaya*	525	36,111	27,070	25,847
Kisumu	454	32,730	21,246	20,471
Kisii	842	61,794	44,612	39,190
South Nyanza	989	66,621	43,707	37,700
TOTAL	2,810	197,256	136,635	123,208
WESTERN				
Kakamega*	820	64,945	55,566	53,832
Bungoma	428	39,800	30,325	26,771
Busia*	284	22,361	15,051	14,174
TOTAL	1,532	127,106	100,942	94,777
NORTH EASTERN				
Garissa	22	1,331	1,074	961
Wajir	23	1,254	904	796
Mandera*	20	1,435	993	838
TOTAL	65	4,020	2,971	2,595
MUNICIPAL				
Nairobi	141	17,484	17,155	16,992
Mombasa	66	7,805	7,917	7,750
Nakuru	35	3,705	3,560	3,364
Thika	15	1,150	1,149	1,035
Kisumu	34	3,712	3,825	3,764
Kitale	12	865	713	674
Eldoret	10	1,552	1,458	1,260
TOTAL	313	36,273	35,777	34,839
GRAND TOTAL	11,966	890,012	710,661	662,198*

*Districts with poor reception

Source: Ministry of Education, "Primary School Statistics 1983," undated.

PART III
SUMMARY

Overall Summary of the Radio Language Arts Project

Chapter 12
SUMMARY

Maurice Imhoof

> "At the beginning, I thought I was doing useless work, for the pupils had not seen the radio itself. They didn't know to speak English. But now we find it being very useful to us teachers and to the children too. I see that there is a great difference between the pupils using the radio and the ones who have not used it."
> —Kibiko School Teacher, Kenya

CAN WE TEACH ENGLISH BY RADIO?

According to teachers in Kenya, we can. Primary school teachers and independent Kenyan evaluators all remark on the English fluency of students receiving radio instruction in the Radio Language Arts Project. They compare the radio students favorably with children two or three grades ahead in conventional classes. Teachers involved in the project are enthusiastic supporters of the radio methodology and more than 90 percent want it to continue in their schools.

WHAT IS THIS NEW RADIO METHODOLOGY?

Called *interactive radio instruction*, it uses the low-cost technology of radio as a tool for delivery of carefully designed instruction. The major feature of this instructional system is the high frequency of active student participation in the lessons. Once every few seconds, the young learners are required to respond to the radio by speaking, reading, writing, singing, chanting, or performing physical actions appropriate to the radio cues. The methodology then is an effective instructional design, characterized by frequent student participation, combined with radio as the delivery medium.

HOW DOES INTERACTIVE RADIO INSTRUCTION DIFFER FROM OTHER EDUCATIONAL RADIO?

Interactive radio instruction carries the major burden of instruction. It not only delivers the instruction through the radio medium,

it also shapes the instruction through the instructional design system. In general, other educational radio supports regular classroom instruction in which the teacher and textbooks are the major components.

IS INTERACTIVE RADIO INSTRUCTION *NEW* TO THE RLAP?

No, the RLAP is one of several projects testing the effectiveness of radio to deliver cost-efficient, quality instruction to learners. It was developed in a number of carefully controlled and researched projects over the past decade, in response to the limited educational opportunities of many rural children in developing countries. These projects, recognizing the widespread availability of radio, have created a breakthrough in our ability to reach more children with better instruction at lower per student cost. Developed and supported by the U.S. Agency for International Development, projects include the Radio Mathematics Project and the Radio Assisted Community Basic Education Project, as well as the Radio Language Arts Project in Kenya.

IS INTERACTIVE RADIO INSTRUCTION FOR TEACHING ENGLISH DIFFERENT FROM RADIO FOR TEACHING MATHEMATICS?

The content certainly influences the instructional design and the radio methodology. Language practice provides a natural, dynamic context for interaction between speakers. Teaching math skills or scientific information or methodology requires different kinds of practice and, therefore, different radio instruction. But radio also constrains language practice. Certain open-ended questions and conversations are difficult to control or correct by radio. Each subject seems to have its own strengths and constraints although the underlying principles of interactive radio instruction are the same.

DOES RADIO REPLACE TEACHERS?

Radio was the major medium of instruction, but teachers had an important role during the broadcasts, in pre- and post-broadcast activities, and in teacher-led complementary lessons. The radio lessons were designed to *assist* teachers in the classroom, enhancing their effectiveness in teaching a difficult and important skill. Teachers and headmasters welcomed this support. Although the pro-

grams were designed to assist underqualified teachers, all teachers felt the programs helped the children to learn more English.

WHY CHOOSE ENGLISH LANGUAGE INSTRUCTION?

In Kenya and many other countries, success in school depends in large measure on the ability to use the English language as a medium of instruction. The primary significance of the RLAP and other projects that make up the interactive radio experience lies in the emphasis on applications of radio to teaching basic skills needed for school success. The RLAP systematically evaluated the effectiveness of interactive radio in teaching English as a second language to young children for whom English becomes the medium of instruction at the fourth-grade level and documented the techniques used to achieve these results, building further evidence that the interactive methodology is successful.

CAN THE ENGLISH LESSONS BE USED IN OTHER COUNTRIES?

The lessons can be *adapted* for use elsewhere. The lessons are based on the Kenyan English curriculum for primary grades, but the curriculum is very similar to many beginning English as a second language curricula. Cultural and geographical references can easily be replaced with different vocabulary. The RLAP itself adapted the Kenyan textbook-based curriculum for use on the radio. The process for adapting the curriculum, and the lessons produced based on the curriculum, provide the model for extensions to other countries which face similar educational problems and use English as an educational tool.

DID THE LESSONS PRODUCED IN KENYA ADVANCE THE INTERACTIVE RADIO METHODOLOGY?

We believe they did. New techniques for encouraging student participation were required to teach language. One important technique was the use of children in the classroom to provide active audiovisual aids to learning. These children often were asked to perform activities for the rest of the class to watch. For example, a child was asked by the radio to walk around a chair. While the child walked, the class was asked questions, directed to comment, or in other ways required to observe what the child was doing to clarify difficult linguistic concepts. Other techniques were used to achieve individual student participation. The radio, assisted by the class-

room teacher, called on individual children to answer questions and give comments.

HOW WERE LESSONS DEVELOPED?

A several-step development process was followed in which team members, sometimes assisted by consultants:

- Collected baseline data on schools and languages
- Selected project schools
- Carried out a sociolinguistic survey on language use in school communities
- Designed the evaluation research
- Adapted the Kenyan English curriculum to radio
- Tried out sample radio lessons in schools
- Developed the format for radio lessons, pupil worksheets, and teacher's notes
- Developed the production process and schedule
- Designed the formative and summative evaluation process and instruments
- Oriented project teachers and headmasters.

After this developmental phase, the regular production cycle of writing, producing, and broadcasting began on a daily basis. Formative evaluation based on classroom observation, also on a daily basis, and pupil testing helped writers to revise and correct problems in the lessons. Summative evaluation measured the program's effectiveness at the end of each year and over the total three-year period.

WHAT EDUCATIONAL PRINCIPLES GUIDED LESSON DEVELOPMENT?

One of the strengths of interactive radio instruction was the instructional design principles on which it was based. Several of these were applications of approaches validated by the Radio Mathematics Project, the first of the interactive radio experiments:

- Systematic instructional development
- Distributed learning
- Active learning
- Immediate reinforcement
- Rigorous formative evaluation.

Other principles, specifically related to the use of radio, included:

- Intensive use of radio
- The teacher/radio partnership
- Cost control

HOW DID WE KNOW ENGLISH INSTRUCTION WAS EFFECTIVE?

One method was through formative evaluation carried out during lesson development. Observers evaluated each instructional segment by observing children in the classroom. Observers also administered weekly tests to children in the formative evaluation radio classrooms. Less than a 70 percent achievement rate required the project staff to examine the methodology and often rewrite upcoming segments or make other corrections.

HOW WELL DID THE PROJECT SUCCEED IN TEACHING ENGLISH?

The major method of judging success was comparing achievement scores of students receiving instruction by radio with those receiving conventional instruction. Radio students achieved higher scores in all language skills—listening, reading, speaking, and writing—than other students. Scores at the end of each year and cumulative scores for all three years favored the radio children. Scores were even higher for those students who received instruction by radio for the entire three years.

WERE THERE OTHER MEASURES OF SUCCESS?

Tests do not tell everything. Responses from teachers and headmasters were even more enthusiastic. They commented especially on the confidence with which radio children used English.

WERE THE ACHIEVEMENT GAINS GOOD ENOUGH?

This is a question for education planners and policy makers. Neither the children in conventional nor in radio classes are mastering the entire curriculum. Although radio students are doing better, there are other questions regarding the curriculum and opportunities for learning in the rural schools that need to be addressed.

WERE THERE SPECIAL PROBLEMS RELATED TO ACHIEVEMENT GAINS?

There was considerably more student mobility than anticipated. Movement into and out of the experimental classrooms was very high. The total number of students who remained in the experimental classes throughout the three years was only about 30 percent. Presence of irregular students no doubt affected the achievement results of radio students as it could well have of conventional

students. Repeater and dropout problems are larger educational issues for Kenyan educators.

ISN'T DEVELOPING RADIO PROGRAMS COSTLY?

Implementing interactive radio instruction for teaching English in Kenya would cost approximately $.40 a pupil a year. At this cost, all children in the first three grades could receive English instruction by radio. Naturally, costs will vary from country to country depending on the school broadcasting system in place, but the recurrent costs for radio instruction are low. Additional efficiencies, such as teaching other subjects by radio, can reduce the costs even further. Although the cost of developing any instructional system is high, once developed, interactive radio instruction remains cost efficient.

WHAT WERE THE NON-MEASURABLE BENEFITS OF THE PROJECT TO ENGLISH TEACHING?

This book has been mainly about the tangible outcomes of an educational intervention that used interactive radio instruction. It has described various systems and the processes that developed those systems, and it has reported measurable results in achievement and attitudes. These systems and results are only the surface of much deeper processes that remain essentially out of the range of our evaluation tools. We do not know, for example, what long-range effect on students or teachers the project may have.

We have observed that the students in the radio classroom are active and animated as they learn by radio. We can speculate that the use of interactive radio instruction has opened up the possibility of more creative and relevant teaching and a greater partnership between teachers and learners.

We have seen and heard the enthusiasm of teachers and headmasters for radio instruction and have measured their overwhelming positive attitudes toward the radio lessons. We can speculate that, whatever the effect of the radio lessons themselves, the attention given to improving the quality of instruction and the demonstrated achievement results will continue to affect teachers beyond the life of the project.

English is a critical school skill for Kenyan children. Their full participation in school, and in the society at large, depends on their successful mastery of English. We have demonstrated to children, and perhaps also to their parents, that it is a skill that rural children can master to the level that the schools require.

We can speculate that the radio lessons have brought the use of English naturally into the classrooms, and that the radio lessons have opened the door for rural children to participate in the broader Kenyan environment through improved educational opportunities.

AFTERWORD

An "Afterword" offers an opportunity to look to the challenges ahead. In its broadest sense, the challenge is to provide quality education to children worldwide; in a narrower sense, to reach rural school children who could learn English through interactive radio. Choosing a middle path, I will address the challenge of what remains to be done to raise student achievement.

Clearly, the Radio Language Arts Project has made great strides in improving student performance in English. Student achievment gains were very impressive—the final overall effect size of 0.46 for Standard 3 is substantial. (Effect sizes provide a rough, though standardized, calibration of how successful an intervention has been. See Chapter 10, Summary of Results.) Some of the reported effect sizes, those over 1, as for the listening skills for Standard 2, are phenomenal. (Effect sizes of 0.2 are considered successful for educational interventions in the United States.) But, even with these impressive gains and the advantages offered to the rural students by radio instruction, the radio students were outperformed by the urban students.

The extent of the "rural/urban gap" was demonstrated in an informal comparison test that the project carried out in Nairobi. At the very end of the project, a small sample of Standard 1, 2, and 3 students who had not had radio instruction was given the same English language achievement tests that the project's radio and control students had taken earlier. The results of that test could be analyzed to yield an informative, albeit crude, measure of this "rural/urban gap."

Table 1 below displays the differences in student performance means between the rural *control* group and the urban group. The rural *control* group provided performance scores with none of the effects of the radio intervention. Since the urban group had not received any radio instruction, the groups were comparable in that neither received any special interventions and that both represented the output of the educational system "as is."

TABLE 1
Mean Differences Between Urban and Rural Control

	Urban	Rural (control)	Difference (Urban-Rural)
Standard 1	(n = 259)	(n = 451)	
Listening	37.4	20.7	16.7
Reading	32.8	14.5	18.3
Standard 2	(n = 249)	(n = 451)	
Listening	27.7	12.0	15.7
Reading	27.4	14.6	12.8
Writing	6.5	2.9	3.6
Standard 3	(n = 266)	(n = 451)	
Listening	42.3	23.0	19.3
Reading	40.7	21.2	19.5
Writing	6.3	2.5	3.8

The disparity is evident, even with this preliminary measure. Given the scores of the rural students, the differences in the urban and rural means appear sizable. But the term "sizable" offers little perspective for seeing its magnitude. With full appreciation for the maxim, "Figures don't lie, but liars figure," I propose a measure for the "rural/urban gap."

To quantify the magnitude of difference between the rural and urban student performance, I suggest expanding the use of effect sizes (1) to measure performance differences between urban and rual cohorts, and (2) to quantify targets of performance improvement for rural students. Effect size measures the effectiveness of an educational intervention in bringing about performance gains; here it provides a measure of "the effect size gap"—how much rural students must gain to perform comparably to their urban brethren.

A look at the mathematics involved in the calculation of effect size and effect size gap may make the potential usefulness clearer. The substantive difference between the two is the substitution of the mathematical terms. Effect sizes are calculated by using the difference in the means of the control and treatment groups, the effect size gap is calculated by using the differences in the means of the rural and urban cohorts.

In essence, the urban mean (substituted for the treatment group mean) becomes a target for what a planner would have rural students achieve. For the purpose of measuring the rural/urban gap,

using the urban mean is appropriate. In fact, any relevant number can be used as a target score, for example, a desired performance score on an achievement test, although ceiling effects may have to be taken into account.

The formula for determining effect size is:

$$\text{effect size} = \frac{[\text{mean (treatment)}]-[\text{mean (control)}]}{\text{standard deviation (control)}}$$

Similarly, the formula for determining "effect size gap" is:

$$\text{"effect size gap"} = \frac{[\text{mean (urban)}]-[\text{mean (rural)}]}{\text{standard deviation (rural)}}$$

Effect sizes (and effect size gaps) are expressed in decimals. Remember that an effect size of "1" means that the average performance of members of the *treatment* group is, on the whole, one standard deviation superior to the performance of the control group. It is as if the whole normal curve shifted forward by one standard deviation. Sometimes percentiles are useful to demonstrate exactly how far one standard deviation is. An effect size of "1" means that an educational intervention enables the students who, unassisted, would be in the 50th percentile (average performance) to score in what would be the 83rd percentile for that group.

From this vantage point, one can see the potential applications. Since effect size gap is measured by the same standard as effect size (both use the standard deviation of the rural, i.e. rural control, in the denominator), one can use the two to gain insights not only to how wide the rural/urban gap is, but in what needs to be done to bridge it. An effect size gap tells educational planners how much rural students must gain to perform comparably with urban students; an effect size tells planners how much rural students could be expected to gain using a particular intervention. Planners can benefit from both pieces of information—how far the rural students have to go and how far any one intervention can take them.

Now let's look at Table 2. The first column reports the differences in the means of the urban and rural students (from Table 1). The second column contains the standard deviations of the rural control group. Finally, the "rural/urban gap" is measured in terms of effect sizes.

TABLE 2
Effect Size Measurement of the Rural/Urban Gap

	Mean Differences (Urban-Rural)	S.D. (Rural)	Effect Size Gap
Standard 1			
Listening	16.7	8.7	1.9
Reading	18.3	8.7	2.1
Standard 2			
Listening	15.7	4.6	3.4
Reading	12.8	5.5	2.3
Writing	3.6	2.4	1.5
Standard 3			
Listening	19.3	7.7	2.5
Reading	19.5	9.3	2.1
Writing	3.8	2.1	1.8

The differences in terms of effect sizes—what achievements have to be made on the part of the rural students in order to compete with the urban—are substantial. An effect size of 2 is tantamount to moving an average rural student from the 50th percentile to the 98th percentile of that rural cohort.

No planner would attribute the effect size gap entirely to the quantity and quality of instruction; the socioeconomic-cultural advantages of urban living have a profound effect on educational opportunity. So targets for educational interventions would have to be adjusted downward to provide for these advantages.

Moreover, any rural/ruban gap measure is likely to be quite wide in English compared to other subjects. In terms of learning English, urban students not only benefit from the general advantages of urban living, but also from more out of school opportunities to learn English. In Kenya, for example, much television programming is done in English, and urban students are more likely to have access to TV. Furthermore, English is in common use in Nairobi.

Still, considerable strides must be made in education in rural areas.

Educational planners in various countries may begin presently determining the effect size gap for each subject area across every grade level. The figures used in this illustration were simply a by-product of testing the effects of interactive radio instruction in Kenya. Test results which could be used to determine the rural/urban effect size gap are readily available in any country which has nationwide standardized testing, such as school leaving exams.

When planners begin focusing on which intervention to choose to reduce the rural/urban gap, until the advent of one miraculous, self-contained educational "black box" intervention, *combinations* of interventions will be the best interim solution. Combinations of interventions could be highly complementary, such as radio and tape recorders, so that students could practice on their own or make up missed lessons. Other combinations may not be complementary at all.

Using the effect size gap measure, choices for educational interventions are not simply constrained by the questions: What's the cost? and, How many students would be reached?

Rather, more questions can be asked: How much more will the students learn (the predicted effect size gain)? How much will the rural/urban gap shrink?

Equity and quality issues take on new nuances because it is possible to look at the cost-effectiveness of interventions to bring about effect size gains. Are limited budgets better spent raising the performance of all rural students marginally, or the performance of a few measurably? The choices become starker because decision-makers have more predictive information, but the choices are never easy.

My discussion here has been quite preliminary. No doubt, transformation of a standard measure (effect size) to measure standards, to set achievement targets, will be controversial. The implications of mathematical, statistical, and educational assumptions made here (many of them implicit) will have to be examined elsewhere. My purpose was to advance, tentatively, a notion of measuring the rural/urban gap, and provide that gap measure along with intervention effect size measures as useful pieces of information for educational planners.

I have used this opportunity for a last word, an "Afterword," not to wax proud about the accomplishments of the Radio Language Arts Project, but rather to set forth the terms of the challenge of bridging the rural/urban gap. The Radio Language Arts Project has achieved an important success; the improvements in students' performance in rural Kenya are most encouraging. The project has demonstrated conclusively that interactive radio does make a difference in rural schools. AID commends the project's accomplishments. But it is wiser to end, not by toasting one's accomplishments, but by looking to the challenges ahead.

Julianne Gilmore
USAID Project Officer
Kenya Radio Language Arts

APPENDIX

TEACHER'S NOTES
STANDARD TWO—LESSON 102

Content:

New:
Oral: short, shorter, tall , taller
Reading: Worksheet 25
Writing: big, bigger

Revision:
Oral: somebody, nobody, light, dark
Reading: Story on the blackboard

New words:
Oral: breakfast, dark, day, every, floor, happy, heavy, lamp, lift, light, lit, middle, night, remember, somebody, sweep, than, woke, young
Reading: Worksheet 25, sentences on the blackboard

You will need:
nothing

The children will need:
workbooks, pencils, and exercise books

Before the broadcast:
1. Select two *tall* children, Rosa and Chege, who are exactly the same height, and a very short girl to be Mumbi. Also select another boy to be Juma.
2. Explain the meaning of the verb "light/lit" and the word "lamp" to the children. (as in "He lit the lamp.")
3. Distribute workbooks and have children open them to worksheet 25.
4. Make sure the children have pencils and exercise books.

RADIO: I'm tall.
PUPILS: I'm taller than you.
RADIO: I'm taller than you.
PUPILS: I'm taller than you.
RADIO: I'm old.
PUPILS: I'm older than you.

Songs:
1. The Sleepy Song.
2. It's Too _____ .
3. The Tall, Taller, Tallest Song.

Activities:
1. Clap and Count
2. Morning Activities Poem

Objectives:
1. Compare size, height, and length.
2. Read *Read With Us* pages 40-43.
3. Complete sentences 1-6 on page 40 of *Read With Us*.

Class Organization:
Whole class, groups, and individuals

Materials Needed:
Teacher: 3 strings of different lengths
Pupils: 1. pencils and exercise books
2. copies of *Read With Us*

Preparation:
1. Distribute copies of *Read With Us*.
2. Identify three children who can be described as "tall, taller, tallest."
3. Draw three circles on the blackboard. The circles should be different sizes so that they can be described as "big, bigger, biggest."

Introduction:
Tell the pupils that they will talk about different sizes today. They will also read pages 40-43 of their *Read With Us* and do a writing exercise.

Development:
1. Ask the three children to come to the front and stand in the order, "tall, taller, tallest."
2. Draw the pupils' attention to the difference in the heights. Show them the tall child, the taller child, and the tallest one. Do this several times and have the children repeat after you. You can use the children's names.
3. Have the children tell you which child is the shortest and which one is the tallest.
4. Show the three pieces of string to the children and draw the pupils' attention to the differences in length. Show them the long piece of string, the longer, and the longest and describe them thus with the children saying after you.
5. Select two strings. Ask the children to tell you which of the strings is longer. Then hold out all three strings and ask which is the longest.
6. Using similar moves, teach "big, bigger, and biggest," referring to the circles on the blackboard.
7. Tell the pupils to turn to page 40 of *Read With Us*. Tell them to look at the pictures on page 40. Read the words describing the three boxes and chicken aloud and have the children read after you. Draw their attention to the differences in size.
8. Read the six sentences on page 40 with the children and then tell them to read the same sentences without you.
9. Read about the boxes with the children and then have them read the same sentences without you.

10. Read about the chicken with the children and then have the children read without you.
11. Ask the boys to read page 42 aloud while the girls read it silently.
12. Tell the girls to read page 42 aloud while the boys read it silently.
13. Have the boys read page 43 aloud while the girls follow and read it silently.
14. Have the girls read page 43 aloud while the boys read it silently.
15. Tell the pupils to write the sentences at the bottom of page 40 of *Read With Us* in their exercise books, completing them by filling in the missing words. Tell them the missing words are on the same page.

RADIO LANGUAGE ARTS PROJECT
ENGLISH IN ACTION
LESSON PLAN

STANDARD TWO
COMPLEMENTARY LESSON B

Objective:
Do exercises A, B, and C on pages 43 and 44 of *Read With Us.*

Class Organization:
Whole class and individuals

Materials Needed:
Teacher: *Read With Us*
Pupils: copies of *Read With Us*

The Lesson

Introduction:
Tell the pupils that they will do exercises A, B, and C on pages 44 and 45 of *Read With Us.*

Development:
1. Tell the pupils to look at the pictures and the word about each picture in exercise A. Tell them to select the correct letter or letters given under the exercise and write out the words in full. They need not draw the pictures.
2. Tell the children to write out the sentences in exercise B in full. The words to be used in completing the exercise are given after sentence 9.
3. Tell the children to study the pictures in exercise C on page 45. Tell them to write out sentences 1-8, completing them using the words given after sentence 8.
4. Collect the exercise books for marking. Additional Note: Make sure that all the children complete one exercise before starting the next one. If some children cannot complete the three exercises during the lesson, have them do so during their free time.

Songs.

The Go To School Song

I go to school everyday!
He, she, and they went yesterday!
We'll go tomorrow, to learn and play!
We all go to school!

The Sometimes/Never Song

Sometimes I sing, sometimes I talk.
Sometimes I laugh, sometimes I cry.
Sometimes I run, sometimes I walk.
But I never, never fly!

The Riding On His Bicycle Song

He's riding on his bicycle.
He's riding on the grass.
He isn't on the bicycle.
No, he is on the grass.

The Too High Song

It's too high; I can't reach it.
It's too high; I can't reach it.
It's too high; I can't reach it.
It's too high for me!

The Months Song

January, February
March, April, May, June.
July, August,
September, October,
November, and December.

It's Too Heavy

It's too heavy; I can't lift it.
It's too heavy; I can't lift it.
It's too heavy; I can't lift it.
It's too heavy for me.

Songs:

Please Fill My Cup

Please fill my cup.
Now my cup is full.
I have a cupful.
A cupful of tea!

His Friend Is Tall

His friend is tall.
Her friend is taller.
My friend is the tallest,
The tallest friend of all.

His Book Is Thick:

His book is thick.
Her book is thicker.
My book is thickest,
The thickest book of all.

I'm Brushing My Teeth

I'm brushing my teeth.
I'm brushing my teeth.
I brush them everyday.
I'm brushing my teeth.
I'm brushing my teeth.
I brushed them yesterday.

English in Action
Standard Two

RADIO LANGUAGE ARTS PROJECT

Lesson 102
Script Time: 28:53

Pages	Block	Seg	Type	SOW Code	Compentency/Description	Seg. No	Seg. Time	Running Time
1	A B	— —	E —	— —	Standard Opening Good Morning		1:05	1:05
2	C	SL 1	—	—	Continuity		:15	1:20
3,4,5,6	—	2	M	A 13 A 1-2	Somebody, nobody, light	3 + 4/5		
7,8,9	—	3	M	A/13 B 1	dark		4:30	5:50
10,11,12	—	4	M	—	Drill: lights, lit		1:15	7:05
13	D	1	—	—	Continuity		:10	7:15
14,15	—	2	E	—	Clap once, twice		1:00	8:15
16	E	R 1	—	—	Continuity		:15	8:30
17-20	—	2	M	A/13 C 1	Story on blackboard	2/5	3:40	12:10
21	—	3	M/I	—	"Morning Words"		1:00	13:10
22-27	—	4	I	A 19 C 1	Worksheet 25	2/5	3:40	16:50
28	F	1	—	—	Continuity		:10	17:00
29	—	2	E	—	It's too heavy		1:00	18:00
30	G	SL 1	—	—	Continuity		:15	18:15
31-35	—	2	I	A/19/A 1	short/shorter, tall/taller	2/5		
36-39	—	3	I	A/19/B 1	"His friend is tall."		5:00	23:15
40,41,42	—	4	I	—	Drill: short, tall, old—er		1:15	24:30
43	H	—	W 1	—	Continuity		:10	24:40
44,45,46	—	2	I/M	A/19/D 1	big/bigger, small/smaller	2/5	3:00	27:40
					happy, happier			
47	J	—	E	—	Standard Close		:50	28:30

CAST:

(X) Safiri (X) Musician
(X) Tina ( ) _____
(X) Rono ( ) _____
(X) Sara ( ) _____

NEW VOCABULARY: sleepy PRODUCTION TIME: 28:56

Oral: somebody, nobody, light, lit, lamp, dark, middle, day, night, every, wake, woke, sweep, floor, breakfast, breakfast, porridge, remember, lift, heavy, than, young, happy

Reading: light, lit, lamp, dark

Sentence on b.b. 25

Worksheets: 25

Content review: _____
Congruence review: _____
Production review: _____
Approved: _____

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Hein/Brooke
Lesson: 102 Block: A
Segment: 1 Skill:
Script page: 1 of: 47

Segment page: 1 of: 1

1. THEME MUSIC UP 10, THEN UNDER 15
2. SAFIRI: This is ENGLISH IN ACTION,
   Standard Two, Lesson 102.
3. TINA: Good morning, Safiri.
4. SAFIRI: Good morning, Tina.
5. THEME MUSIC UP AND OUT
6. TINA/SAFIRI: Good morning, children.
7. PPR 3
8. MUSIC INTRO TO "GOOD MORNING" SONG
9. TINA: Children, sing with us!
10. TINA/SAFIRI: (SINGING)
    Good Morning, Good Morning, how are you?
    Good Morning, Good Morning, how do you do?
    Good Morning, Good Morning, how are you?
    Good Morning, Good Morning, how do you do?
11. MUSIC SONG OUTRO
12. TINA/SAFIRI: Good morning!

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 1 Skill: Cont.
Script page: 2 of: 47

Segment page: 1 of: 1

1. DRAMA THEME 3, UNDER AND HOLD
2. SAFIRI: Children, today I'm going to tell you a story about Sara and Rono.
3. TINA: But first let's practice the words "somebody" and "nobody."
4. DRAMA THEME TO END

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page: 3 of: 47

Segment page: 1 of: 12

1. RONO: Juma, come to the front.

2. FX TRAVEL MUSIC 5

3. SARA: Juma, stand in the corner at the front of the room.

4. PPR 3

5. RONO: Sara, there's somebody in the corner, isn't there?

6. SARA: Yes.
7. RONO: Who is it?

8. SARA: It's Juma.

9. RONO: Children, say, "There's somebody in the corner."

10. PPR 5

11. RONO: There's somebody in the corner. Again.

12. PPR 4

BEFORE THE BROADCAST

Select Juma.
Write the following on the blackboard
with a box around it:

light
dark
light, lit
lamp

During the broadcast be ready to point to the words in the box as appropriate. Also be ready to give the children a quick mother tongue translation of "light/lit" and "lamp" (as in, "He lit the lamp.") During this lesson, Safiri will tell a very short story.

Then the children will be asked questions about the story, and will be expected to answer without further prompting from the radio.

The questions (and appropriate answers) are as follows:

—What did Sara say?
—She said, "Rono, wake up." or
—She said, "There's somebody in the room."
—Then what did Rono do?
—He lit the lamp.
—What was in the room?
—A cat.

RADIO LANGUAGE
ARTS PROJECT
English in
Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page. 4 of: 47

Segment page: 2 of: 12

1. SARA: Now, Juma, come out of the corner. Stand in front of the room, in the middle.
2. RONO: Teacher, please help Juma.
3. PPR 2
4. RONO: Now there's nobody in the corner.
5. SARA: Children, say, "There's nobody in the corner."
6. PPR 5

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page: 5 of: 47

Segment page: 3 of: 12

1. SARA: There's nobody in the corner. Again
2. PPR 4
3. RONO: Good, Juma. Sit down.
4. FX TRAVEL MUSIC 5
5. SARA: Now, children, look at the words in the box on the blackboard.
6. PPR 2
7. RONO: Look at the word "light."
8. PPR 2
9. SARA: Children, say "light."
10. PPR 2
11. SARA: Light. Again.
12. PPR 1
13. RONO: Sara, is it light during the day?
14. SARA: Yes, it is.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page: 6 of: 47

Segment page: 4 of: 12

1. RONO: Is it light now?
2. SARA: Yes, Rono. It's daytime now.
3. RONO: Children, say, "It's light during the day."
4. PPR 4
5. RONO: It's light during the day. Again.
6. PPR 3
7. SARA: Children, look at the second word in the box . . . the word "dark."
8. PPR 2
9. RONO: Children, say, "Dark."
10. PPR 2
11. RONO: Dark. Again.
12. PPR 2

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page: 7 of: 47

Segment page: 5 of: 12

1. GUITAR: STRUM C MAJOR CHORD
2. TINA: Safiri, is it dark now?
3. SAFIRI: No, Tina. It isn't dark now.
   It's dark at night.
4. RONO: Children, say, "It's dark at night."
5. PPR 4
6. RONO: It's dark at night. Again.
7. PPR 3
8. TINA: Yes . . . it's dark at night
   . . . and I'm sleepy. A Little Dreamily-Then A Little Yawn

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&? Skill: S/L-M
Script page: 8 of: 47

Segment page: 6 of: 12

1. XYLOPHONE INTRO: "SLEEPY SONG"
2. TINA: (SINGING):
   At night it is dark and I'm sleepy,
   There is darkness all around.
   At night it is dark and I'm sleepy
   And the rain falls softly down.
3. XYLOPHONE: "SLEEPY SONG" REFRAIN UNDER LINE 6
4. SAFIRI: Children, sing with Tina.
5. TINA: (SINGING):
   At night it is dark and I'm sleepy,
   There is darkness all around.
   At night it is dark and I'm sleepy
   And the rain falls softly down.
6. XYLOPHONE: REFRAIN AROUND AGAIN
7. TINA: (SINGING):
   At night it is dark and I'm sleepy,
   There is darkness all around.
   At night it is dark ad I'm sleepy
   And the rain falls softly down.
8. XYLOPHONE OUTRO

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page: 9 of: 47

Segment page: 7 of: 12

1. RONO: Now , children, look at the words "light" and "lit" in the box, and look at the word "lamp."
2. SARA: Teacher, please point at these words and explain them to the children in mother tongue.
3. FX DRUM AND RING MUSIC 8
4. RONO: Thank you, teacher.
5. SARA: Children, let's drill.
6. RONO: Children, say, "He lights the lamp."
7. PPR 3
8. RONO: He lights the lamp.
9. PPR 3

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two
Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page: 10 of: 47

Segment page: 8 of: 12

1. RONO: He lit the lamp.
2. PPR 3
3. RONO: He lit the lamp.
4. PPR 3
5. RONO: He lights the lamp every night.
6. PPR 4
7. RONO: He lights the lamp every night.
8. PPR 4
9. RONO: He lit the lamp last night.
10. PPR 4
11. RONO: He lit the lamp last night.
12. PPR 4
13. RONO: He lights the lamp every night.
14. PPR 4

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page: 11 of: 47

Segment page: 9 of: 12

1. RONO: He lit the lamp last night.
2. PPR 4
3. RONO: He lights the lamp every night.
4. PPR 4
5. RONO: He lit the lamp last night.
6. PPR 4
7. RONO: He lights the lamp every night.
8. PPR 4
9. RONO: He lit the lamp last night.
10. PPR 4
11. SARA: Good drill, children.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page: 12 of: 47

Segment page: 10 of: 12

1. DRAMA THEME 3, UNDER AND HOLD
2. SAFIRI: Children, I'm going to tell you a story. Listen carefully.
3. DRAMA THEME TO END
4. SAFIRI: Last night Sara and Rono were asleep. It was dark. Sara woke up. She said . . .
5. SARA: Rono! Wake up! There's somebody in the room! (TENSE, EXCITED WHISPER — SHE THINKS THERE'S AN INTRUDER IN HER HOUSE)
6. SAFIRI: Rono woke up. He lit the lamp.
7. FX MATCH STRIKING
8. RONO: No Sara. There's nobody in the room.
9. SARA: Then what is it? (STILL WORRIED)
10. FX CAT MEOW
11. RONO:)
SARA:) It's a cat!! (LAUGHINGLY, RELIEVED AS THEY DISCOVER TOGETHER WHAT'S IN THE ROOM)

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: 3/L-M
Script page: 13 of: 47

Segment page: 11 of: 12

1. TINA: Now children . . . let's talk about the story.
2. TINA: Last night Sara woke up. Safiri, what did Sara say?
3. SAFIRI: She said, "Rono, wake up."
4. TINA: And then she said, "There's somebody in the room."
5. SAFIRI: Children, say, "She said, 'Rono, wake up.' "
6. PPR 4
7. SAFIRI: She said, "Rono, wake up." Again.
8. PPR 3
9. TINA: That's right, children.
10. SAFIRI: Rono woke up. Tina, then what did he do?

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: C
Segment: 2&3 Skill: S/L-M
Script page: 14 of: 47

Segment page: 12 of: 12

1. TINA: He lit the lamp.
2. SAFIRI: Children, say, "He lit the lamp."
3. PPR 3
4. SAFIRI: That's right! He lit the lamp.
5. TINA: Children . . . what was in the room?
6. PPR 4
7. TINA: That's right! A cat.
8. SAFIRI: Children, what was in the room?
9. PPR 2
10. TINA: That's right! There was a cat in the room!
11. SAFIRI: Good work children.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: D
Segment: 1 Skill: Cont.
Script page: 15 of: 47

Segment page: 1 of: 1

1. MUSICAL BRIDGE NUMBER ONE
2. SARA: Let's play the "Clap and Count" game!

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: D
Segment: 2 Skill: E
Script page: 16 of: 47

Segment page: 1 of: 2

1. SAFIRI: Children, stand up.
2. FX STAND UP WHISTLE
3. SAFIRI: Children, clap and count with Rono and Sara.
4. PPR 2
5. SARA: Clap once and count, children.
6. FX ONE CLAP AND COUNT
7. RONO: Clap twice and count.
8. FX TWO CLAPS AND COUNT
9. SARA: Now clap three times.
10. FX THREE CLAPS AND COUNT
11. RONO: Clap four times.
12. FX FOUR CLAPS AND COUNT

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: D
Segment: 2 Skill: E
Script page: 17 of: 47

Segment page: 2 of: 2

1. SARA: Clap five times.
2. FX FIVE CLAPS AND COUNT
3. RONO: Clap once.
4. FX ONE CLAP AND COUNT
5. SARA: Clap three times.
6. FX THREE CLAPS AND COUNT
7. RONO: Clap twice.
8. FX TWO CLAPS AND COUNT
9. SAFIRI: Now stop: (Pause) sit down, children.
10. FX SIT DOWN WHISTLE

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: E
Segment: 1 Skill: Cont.
Script page: 18 of: 47

Segment page: 1 of: 1

1. MUSICAL BRIDGE NO. TWO
2. TINA: Let's practice reading.
3. SAFIRI: What do you want to read, Tina?
4. TINA: There's a story on the blackboard.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: E
Segment: 2-3 Skill: R-M
Script page: 19 of: 47

Segment page: 1 of: 5

1.	SAFIRI:	Look at the story on the blackboard, children.
2.	PPR 2	
3.	SAFIRI:	Children, look at sentence one on the blackboard.
4.	PPR 2	
5.	SAFIRI:	Read it aloud.
6.	PPR 7	
7.	TINA:	"I wake up at six o'clock every morning." Again.
8.	PPR 5	
9.	TINA:	Again.
10.	PPR 5	

Before
On the blackboard.
1. I wake up at six o'clock every morning.
2. I get out of bed.
3. I wash my hands and face
4. I put on my clothes.
5. I make breakfast.
6. Then I sweep the floor.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: E
Segment: 2-3 Skill: R-M
Script page: 20 of: 47

Segment page: 2 of: 5

1. SAFIRI: Read sentence two, children. 2. PPR 5 3. TINA: "I get out of bed." Again. 4. PPR 3 5. SAFIRI: Now read sentences one and two again. 6. MUSIC: KAYAMBA 13 7. TINA: "I wake up at six o'clock every morning. I get out of bed." Again. 8. PPR 9 9. SAFIRI: Very good. Now read sentence three. 10. PPR 6	Before On the blackboard. 1. I wake up at six o'clock every morning. During: 1. Help the children read the sentences when asked to. 2. Touch the sentences when the children read.

RADIO LANGUAGE ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: E
Segment: 2-3 Skill: R-M
Script page: 21 of: 47

Segment page: 3 of: 5

1. TINA: "I wash my hands and face." Again.
2. PPR 4
3. SAFIRI: Read sentence four, children.
4. PPR 6
5. TINA: "I put on my clothes." Again.
6. PPR 4
7. SAFIRI: Good. Now read sentences three and four again.
8. MUSIC: KAYAMBA 13
9. TINA: "I wash my hands and face. I put on my clothes." Again.
10. PPR 9

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: E
Segment: 2-3 Skill: R-M
Script page: 22 of: 47

Segment page: 4 of: 5

1. TINA: Again.
2. PPR 9
3. SAFIRI: Now read sentence five.
4. PPR 5
5. TINA: "I make breakfast." Again.
6. PPR 3
7. SAFIRI: Good. Now read the last sentence.
8. PPR 5
9. TINA: "Then I sweep the floor." Again.
10. PPR 3
11. SAFIRI: Read sentences five and six again.
12. PPR 9

RADIO LANGUAGE ARTS PROJECT
English in Action
Standard Two

Writer: Ojiando
Lesson: 102 Block: E
Segment: 2-3 Skill: R-M
Script page: 23 of: 47

Segment page: 5 of: 5

1.	TINA:	"I make breakfast. Then I sweep the floor." Again.	
2.	PPR 9		
3.	SAFIRI:	That was good reading, children. Now say the morning poem with Tina.	Teacher: Please assist the children to do the actions with the poem.
4.	TINA:	I wake up in the morning. I wash my face. I put on my clothes. I drink a cup of porridge. And then I run to school.	
5.	SAFIRI:	Again, children.	
6.	TINA:	I wake up in the morning. I wash my face. I put on my clothes. I drink a cup of porridge. And then I run to school.	
7.	SAFIRI:	That was very good, children.	

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Sedlak
Lesson: 102 Block: E
Segment: 4 Skill: R-I
Script page: 24 of: 47

Segment page: 1 of: 5

1. MUSICAL BRIDGE NO. THREE
2 TINA: Children, put worksheet 25 in front of you.
3. PPR 3

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Sedlak
Lesson: 102 Block: E
Segment: 4 Skill: R-I
Script page: 25 of: 47

Segment page: 2 of: 5

1. SAFARI: Now, children, look at box O.
2. PPR 2
3. SAFARI: Touch the shopkeeper.
4. PPR 2
5. SAFARI: Is the shopkeeper young or old?
6. PPR 2
7. TINA: Young. Again.
8. PPR 2
9. SAFARI: Read sentence 9 aloud.
10. PPR 7
11. TINA: The shopkeeper is young. Again.
12. PPR 4
13. SAFARI: Now touch the carpenter.
14. PPR 2

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Sedlak
Lesson: 102 Block: E
Segment: 4 Skill: R-I
Script page: 26 of: 47

Segment page: 3 of: 5

1. SAFIRI: Is the carpenter young or old, children?
2. PPR 2
3. TINA: Old. Again.
4. PPR 2
5. SAFIRI: Now read sentence 10 aloud.
6. PPR 6
7. TINA: The carpenter is old. Again.
8. PPR 4
9. SAFIRI: Read sentence 11 aloud.
10. PPR 7
11. TINA: The shopkeeper is younger than the carpenter. Again.
12. PPR 4
13. SAFIRI: Children, is the shopkeeper younger than the carpenter?

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Sedlak
Lesson: 102 Block: E
Segment: 4 Skill: R-I
Script page: 27 of: 47

Segment page: 4 of: 5

1. PPR 3
2. TINA: Yes, he is. Again.
3. PPR 2
4. SAFIRI: Read sentence 12 aloud.
5. PPR 7
6. TINA: The carpenter is older than the shopkeeper. Again.
7. PPR 4
8. SAFIRI: Children, is the shopkeeper older than the carpenter?
9. PPR 3
10. TINA: No, he isn't. Again.
11. PPR 2
12. SAFIRI: Now look at box P. Touch the tree.
13. PPR 2
14. SAFIRI: Read sentence 13 aloud.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Sedlak
Lesson: 102 Block: E
Segment: 4 Skill: R-I
Script page: 28 of: 47

Segment page: 5 of: 5

1. PPR 6
2. TINA: The tree is tall. Again.
3. PPR 4
4. SAFIRI: Read sentence 14 aloud.
5. PPR 6
6. TINA: The grass is short. Again.
7. PPR 4
8. SAFIRI: Children, is the tree tall or short?
9. PPR 2
10. TINA: Tall. Again.
11. PPR 1
12. SAFIRI: Is the grass tall or short?
13. PPR 2
14. TINA: Short. Again.
15. PPR 1
16. SAFIRI: Very good. Let's read more about the tree and the grass tomorrow.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: F
Segment: 1 Skill: Cont.
Script page: 29 of: 47

Segment page: 1 of: 1

1. MUSICAL BRIDGE NO. FOUR
2. SARA: Rono, please lift this box for me.
3. RONO: Uhhff . . . . (STRAINING TO LIFT IT)
I can't, Sara. It's too heavy!

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: F
Segment: 2 Skill: E
Script page: 30 of: 47

Segment page: 1 of: 1

1. GUITAR OR CASIOTONE INTRO: "TOO HIGH (HEAVY)" SONG
2. RONO (SINGING): It's too heavy, I can't lift it.
   It's too heavy, I can't lift it.
   It's too heavy, I can't lift it.
   It's too heavy for me.
3. GUITAR OR CASIOTONE OUTRO
4. SARA: Let's all sing with Rono!
5. GUITAR OR CASIOTONE INTRO
6. Whole Cast (Singing): It's too heavy, I can't lift it.
   It's too heavy, I can't lift it.
   It's too heavy, I can't lift it.
   It's too heavy for me.
7. GUITAR OR CASIOTONE REFRAIN, UNDER AND HOLD
8. RONO: Let's sing it once more!
9. Whole Cast (Singing): It's too heavy, I can't lift it.
   It's too heavy, I can't lift it.
   It's too heavy, I can't lift it
   It's too heavy for me.
10. GUITAR OR CASIOTONE OUTRO

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: G
Segment: 1 Skill: Cont.
Script page: 31 of: 47

Segment page: 1 of: 1

1. DRAMA THEME 3, UNDER AND HOLD
2. TINA: What are Sara and Rono doing?
3. SAFIRI: They're working in their shop.
4. DRAMA THEME TO END

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: G
Segment: 2-3 Skill: S/L-I
Script page: 32 of: 47

Segment page: 1 of: 9

1. SARA: Look, Rono.
I can touch the top shelf!

2. RONO: You're tall, Sara!

3. SAFIRI: Children, is Sara tall?

4. PPR 3

5. RONO: "Yes, she is." Again.

6. PPR 2

7. SARA: Rono, try to touch the top shelf. (teasing)

8. RONO: I can't Sara. I'm too short. (STRETCHING TO REACH)

9. SAFIRI: Children, is Rono short or tall?

10. PPR 3

Before:
Select:
1. Two tall children, Rosa and Chege, of exactly the same height.
2. Mumbi who is much shorter than Rosa and Chege.

During:
Help the children identify the sizes during the segment.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: G
Segment: 2-3 Skill: S/L-I
Script page: 33 of: 47

Segment page: 2 of: 9

1.	SARA:	"He's short." Again.	Muitungu: Alert the teacher to select children who are not self-conscious about their sizes.
2.	PPR 2		
3.	SARA:	I'm taller than you, Rono.	
4.	RONO:	Yes, Sara, you are taller than me.	
5.	SAFIRI:	Rosa and Mumbi, come to the front.	
6.	MUSIC:	TRAVEL MUSIC 6	
7.	SAFIRI:	Mumbi, stand beside Rosa.	
8.	PPR 2		
9.	SAFIRI:	Children, look at Rosa and Mumbi.	
10.	PPR 2		
11.	SARA:	Rono, is Rosa tall or short?	

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer Ojuando

Lesson: 102 Block: G
Segment: 2-3 Skill: S/L-I
Script page: 34 of: 47

Segment page: 3 of: 9

1. RONO: She's tall.
2. SAFIRI: Children, is Rosa tall or short?
3. PPR 3
4. RONO: "She's tall." Again.
5. PPR 2
6. SAFIRI: Children, is Mumbi tall or short.
7. PPR 3
8. SARA: "She's short." Again.
9. PPR 2
10. SARA: Rono, is Rosa taller than Mumbi?
11. RONO: Yes, she is.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: G
Segment: 2-3 Skill: S/L-I
Script page: 35 of: 47

Segment page: 4 of: 9

1. SARA: Children, say, "Rosa is taller than Mumbi."
2. PPR 4
3. SARA: Again
4. PPR 4
5. SARA: Again
6. PPR 4
7. SAFIRI: Children, is Rosa taller than Mumbi?
8. PPR 3
9. RONO: "Yes, she is." Again.
10. PPR 2
11. SAFIRI: Is Mumbi short, children?
12. PPR 3

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: G
Segment: 2-3 Skill: S/L-I
Script page: 36 of: 47

Segment page: 5 of: 9

1. RONO: "Yes, she is." Again.
2. PPR 2
3. SARA: Rono, is Mumbi shorter or taller than Rosa?
4. RONO: She's shorter than Rosa.
5. SARA: Children, say, "Mumbi is shorter than Rosa."
6. PPR 4
7. SARA: Again
8. PPR 4
9. SARA: Again.
10. PPR 4

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: G
Segment: 2-3 Skill: S/L-I
Script page: 37 of: 47

Segment page: 6 of: 9

1. SAFIRI: Good. Now, Chege, come to the front.
2. MUSIC: TRAVEL MUSIC 4
3. SAFIRI: Chege, stand beside Mumbi.
4. PPR 2
5. SAFIRI: Children, look at Chege.
6. PPR 2
7. SAFIRI: Is Chege tall or short?
8. PPR 3
9. SARA: "He's tall." Again.
10. PPR 2

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: G
Segment: 2-3 Skill: S/L-I
Script page: 38 of: 47

Segment page: 7 of: 9

1. SAFIRI: Is Chege taller or shorter than Mumbi, children?
2. PPR 4
3. SARA: "He's taller than Mumbi." Again.
4. PPR 3
5. SARA: Again.
6. PPR 3
7. RONO: Children now say, "Chege is as tall as Rosa."
8. PPR 4
9. RONO: Again.
10. PPR 4

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: G
Segment: 2-3 Skill: S/L-I
Script page: 39 of: 47

Segment page: 8 of: 9

1. SAFIRI: That was very good, children.
Rosa, Mumbi, and Chege, go back to your desks.

2. MUSIC: TRAVEL MUSIC 4

3. SAFIRI: Now, children, listen to our new song.

4. MUSIC: Intro To Tall, Taller, Tallest Song

5. SAFIRI: (Singing)
His friend is tall.
Her friend is taller.

6. RONO: (Singing)
My friend is tallest.
The tallest friend of all.

7. MUSIC: GUITAR BRIDGE

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: G
Segment: 2-3 Skill: S/L-I
Script page: 40 of: 47

Segment page: 9 of: 9

1. SAFIRI: Chilaren, sing.
His friend is tall.
Her friend is taller.

2. RONO: (Singing)
My friend is tallest,
The tallest friend of all.

3. MUSIC: GUITAR BRIDGE

4. SAFIRI: Again.
His friend is tall.
Her friend is taller.

5. RONO: My friend is tallest,
The tallest friend of all.

8. MUSIC: GUITAR OUTRO TO SONG

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: G
Segment: 4 Skill: S/L-I
Script page: 41 of: 47

Segment page: 1 of: 3

1. TINA: Children, listen.
2. SAFIRI: I'm tall.
3. TINA: I'm taller than you.
4. SAFIRI: I'm old.
5. TINA: I'm older than you.
6. SAFIRI: I'm short.
7. TINA: I'm shorter than you.
8. SAFIRI: I'm sleepy.
9. TINA: I'm sleepier than you.
10. SAFIRI: Now children . . . you do it. I'm tall.
11. PPR 3
12. TINA: I'm taller than you.
13. PPR 3

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Ojuando
Lesson: 102 Block: G
Segment: 4 Skill: S/L-I
Script page: 42 of: 47

Segment page: 2 of: 3

1. SAFIRI: I'm old.
2. PPR 3
3. TINA: I'm older than you.
4. PPR 3
5. SAFIRI: I'm short.
6. PPR 3
7. TINA: I'm shorter than you.
8. PPR 3
9. SAFIRI: I'm young.
10. PPR 3
11. TINA: I'm younger than you.
12. PPR 3
13. SAFIRI: I'm sleepy.
14. PPR 3

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: G
Segment: 4 Skill: S/L-1
Script page: 43 of: 47

Segment page: 3 of: 3

1. TINA: I'm sleepier than you.
2. PPR 3
3. SAFIRI: I'm happy.
4. PPR 3
5. TINA: I'm happier than you.
6. PPR 3
7. SAFIRI: Good drill, children.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: H
Segment: 1 Skill: Cont.
Script page: 44 of: 47

Segment page: 1 of: 1

1. MUSICAL BRIDGE NO. ONE
2. TINA: Children, it's time to write.
3. SAFIRI: Today let's write some new words from Worksheet 25.

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: H
Segment: 2 Skill: W
Script page: 45 of: 47

Segment page: 1 of: 2

1. FX WRITING MUSIC 2, UNDER AND HOLD
2. TINA: Children, take your exercise books and pick up your pencils.
3. PPR 3
4. SAFIRI: Now look at Worksheet 25 again.
5. PPR 2
6. TINA: Look at Box M.
7. SAFIRI: Look at sentence 1.
8. PPR 2
9. TINA: Sentence 1 . . . "The bucket is big."
10. SAFIRI: Write the word "big." Write the word "big."
11. FX WRITING MUSIC UP 8, UNDER AND HOLD
12. TINA: Children, now look at sentence 3.
13. SAFIRI: Look at sentence 3 . . . "The bucket is bigger than the comb."

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Edgerton
Lesson: 102 Block: H
Segment: 2 Skill: W
Script page: 46 of: 47

Segment page: 2 of: 2

1. TINA: Children, look at the word "bigger."
2. SAFIRI: Write the word "bigger."
3. FX WRITING MUSIC UP 14, UNDER AND HOLD
4. TINA: Good, children. Put down your pencils.
5. FX FADE WRITING MUSIC

RADIO LANGUAGE
ARTS PROJECT
English in Action
Standard Two

Writer: Hein/Brooke
Lesson: 102 Block: 1
Segment: 1 Skill: __
Script page: 47 of: 47

Segment page: 1 of: 1

1. MUSIC: INTRO TO GOODBYE SONG
2. TINA: Children, it's time for us to go.
3. MUSIC: REPEAT INTRO
4. SARA/RONO
   TINA/SAFIRI: (SINGING)
   Goodbye, Goodbye, it's time for us to go.
   Goodbye, Goodbye, it's time for us to go.
5. MUSIC: SONG INTRO
6. SARA/RONO
   TINA/SAFIRI: Goodbye!
7. FX THEME MUSIC UP AND UNDER TO LINE 10
8. SAFIRI: English in Action, Lession 102, Standard Two, was produced by the Radio Language Arts Project at the Kenya Institute of Education.
9. FX THEME MUSIC UP AND OUT

RADIO INSTRUCTION MATERIALS AVAILABLE

Samples of the complete instructional program:

- Scripts
- Audio Tapes
- Teacher's Notes
- Student Worksheets

Available for a handling charge from:

Academy for Educational Development
Clearinghouse on Development Communication
1255 23rd Street, N.W.
Washington, D.C. 20037 U.S.A.

FILM/VIDEO AVAILABLE

RADIO: THE INTERACTIVE TEACHER

This film shows how the Radio Language Arts Project in Kenya effectively used interactive radio instruction to teach English in rural primary schools. The 20-minute color film demonstrates the process used in developing the radio lessons and shows third-grade students participating actively during the broadcasts. Evaluation results based on student achievement testing are reported. Interviews with teachers also document the effectiveness of the project. A short, printed guide summarizes highlights of the film.

Format: 16mm film; 3/4" U-Matic NTSC; 1/2" VHS and Beta NTSC; 3/4" PAL

Languages: English, Spanish, French

The film, produced by the Academy for Educational Development in 1985 for the U.S. Agency for International Development, is available for loan or purchase from:

Academy for Educational Development
Clearinghouse on Development Communication
1255 23rd Street, N.W.
Washington, D.C. 20037 U.S.A.

SELECTED PROJECT DOCUMENTS

"Reading by Radio: A Position Paper on the Use of Radio in Teaching Reading Skills for Educational Development," Maurice Imhoof, March 1981.

"Writing the Instructional Radio Script," Esta de Fossard, April 1982.

"Revised Implementation Plan," October 1982.

"Selecting Project Schools," Field Notes #1, Maurice Imhoof, November 1982.

"Sequencing Reading Skills for Teaching English by Radio," Field Notes #2, Maurice Imhoof, December 1982.

"The School Classroom and the Radio Classroom," Field Notes #3, Esta de Fossard, September 1983.

"Important Considerations in Planning a Radio Project," Field Notes #4, Maurice Imhoof, November 1983.

"English by Radio: Implications for Non-Formal Language Education," Maurice Imhoof, Philip Christensen, and Kurt Hein. Published as Occasional Paper #12, by the Non-Formal Education Information Center, Institute for International Studies in Education, Michigan State University, East Lansing, Michigan 48824, December 1983.

"Teaching English by Radio," Maurice Imhoof, February 1984.

"A Look at Methodology," David Edgerton and Philip A.S. Sedlak, August 1984.

"Radio and the Educational Needs of Africa," Alex T. Quarmyne. The keynote address presented at the conference on "New Directions for Education by Radio," in Nairobi, Kenya, September 24-28, 1984.

"Interactive Radio in the Classroom: Ten Years of Proven Success," Clifford H. Block, Philip R. Christensen, Maurice Imhoof, and William A. Smith, September 1984.

"Nairobi, Cassette, and Observation Students of the Kenya Radio Language Arts Project: A Special Evaluation Report," Rebecca L. Oxford and Maurice Imhoof, October 1985.

"Final Report—Evaluation of the Kenya Radio Language Arts Project," Rebecca L. Oxford, John L.D. Clark, John C. Hermansen, Philip R. Christensen, and Maurice Imhoof, June 1986.

These documents and a list of all other documents produced under the project are available from:

Academy for Educational Development
Clearinghouse on Development Communication
1255 23rd Street, N.W.
Washington, D.C. 20037 U.S.A.

Several articles about interactive radio instruction, including activities in the Radio Language Arts Project, have appeared in *Development Communication Report* and are available from the Clearinghouse.

INDEX

Academy for Educational Development (AED) contract with Agency for International Development, 12-15
Achievement
  differences for urban non-radio and rural radio students, by linguistic competency, 257-261
  gains, 215-227, 253
Activity
  action cues, 132-133
  frequency of physical activity, 62
  pupil-participant system, 144-146
  songs and games, 133-136
Actors, 62, 160
Adaptation for other foreign countries, viii, 18, 251
Agency for International Development
  funder for Academy for Educational Development Radio Language Arts Project, 12-15
  support of instructional radio research and development, vii-ix, 4, 7-8, 19
Anecdotal notes, information gathering strategies, 179
Annual broadcast schedule of English in Action, 21-22, 35
Assessment instruments
  baseline data collection questionnaires, 184-197
  summative evaluation test development, 199-214
Attention span of children
  advantage of distributed learning, 53
  segmented lesson format, 65
  visual cues, risk of distraction by lack of, 59
Attitudes of teachers and headmasters, 220-221, 229, 249
Audience for English in Action, incidental, 163
Average benefit for radio students compared with control students, 222

Baseline data collection, 176-180
  school selection procedures, 177-179
  sociolinguistic survey, 176-177
  questionnaire samples, 184-197
Batteries cost per RLAP classroom, 233, 236, 241-242
Benefit for radio students compared with control students, 222
Blackboard
  teacher role, 24
  use in sample instructional script, 116-117
  use of visual aids, 27-28
  use to minimize print materials 72-73
Block, Clifford H.
  radio as delivery system for innovation, 7
Books
  as support for radio-based instruction, 25-27
  costs of students' and teachers' books, 27, 72, 234, 236, 239-242
  Progressive Peak series of primers, 27
  students' exercise books use for formative evaluation, 102
British usage in grammar and vocabulary, 62
Broadcast lesson plans, 26
Broadcast lessons vs. cassettes as delivery system, 23, 48
Broadcast reception quality compensation by actor speech clarity, 62
  Kenya districts with poor reception, 231, 244-245
Broadcasting schedule, 21-22, 35, 163
Broadcast scripts, samples of complete Standard 2 script, 271-317
  continuity devices, 127-132
  drama theme, 126-129
  listening/speaking block, 115-119
  pause for pupil response, 136-140
  pupil participant system, 144-146
  songs and games, 133-136
Broadcast scripts, writing of, 115-148
  production process, 36-47
Broadcast time
  availability in Kenya, 231-232
  cost of purchase from Voice of Kenya, 231, 236, 241-242

Cassettes, advantages and disadvantages as delivery system, 23, 48
Center for Applied Linguistics
  baseline data collection, 176-179
  summative evaluation test development, 32, 182, 184
Certificate of Primary Education

Examination scores as school selection criterion, 178
Chance effect, 217, 219-220
Characters, 124-126
actors' use of standard Kenyan English, 62
as teachers, 58
creation of two-way communication, 59
Checklists and recordkeeping
conflict charts, 154
production process, 36-47
songs and games, 155
vocabulary records, 154-155
Christensen, Philip R.
role of teacher in RLAP vs. Radio Mathematics Project, 24, 48
Classroom
aids, 27-28
number of, for RLAP nationwide implementation, 237-238
settings as entertaining alternatives, 58
Collection of baseline data, 176-180
sociolinguistic survey, 176-177
school selection procedures, 177-179
Competencies
allocation of time, 52
curriculum adaptation for interactive radio instruction, 78-97
definition of, 81, 97
Complementary teacher-led lessons, 23-24
duration, 70, 75-76
lesson plan, facsimile for typical Standard 2 lesson, 266-269
lesson plans, 26
use of English, 68
Computer-assisted instruction in U.S., comparison of effect size, 224-225
Confidence level, 217, 219-220
Conflicting feedback from teacher and radio, 75
Contamination, avoidance by lapped-year research design, 180-181
Content as set by Ministry of Education, 20, 50, 77-79
Continuity devices, 126-132
cautionary note for scriptwriters, 129-130
Control design, 21, 180-182
Conventional educational radio vs. interactive radio instruction, 56-59
Correct items on tests, percentages for control and radio groups, by grade level for all and normal-progression students, 218-219
Correspondence, information-gathering strategies, 179
Costs
control of, 74
of batteries per RLAP classroom, 233, 236, 241-242
of broadcast time from Voice of Kenya, 231, 236, 241-242
of cassette-based instructional delivery system, 23, 48
of field observations, 106
of project management at nationwide implementation, 235, 236, 241-242
of radio receivers and average repair, 236, 241-242
of student worksheets, 27, 72, 234, 236, 239-242
of teacher books, 27, 234, 236, 239-242
of teacher in-service training, 24-25, 234-235, 239-242
of transmission for nationwide implementation, 232, 236, 241-242
Criteria
for selecting observation schools, 178
for selecting project site, 13
Critical and noncritical language, 95-96
Cues
musical, 126-132
verbal, 132-133
visual, 27-28, 59
Cultural appropriateness, script review process, 150-151
Cultural-sociolinguistic survey for baseline data, 176-177
Curriculum
adaptation to interactive radio instruction, 77-98
adoption of Kenya Syllabus for Primary Schools: English, 19-20, 50, 77-79
design factors, 86-96
English curriculum analysis prior to system design, 30
implementation, 50
pace of coverage, 51
sociolinguistic constraints, 91-95
Cyclical review, 53-55

Data, baseline
school selection procedures, 177-179
sociolinguistic survey, 176-177
Design using Kenya Ministry of Education curriculum, 19-20, 50, 77-98
Design of instruction, 28-31, 49-73
language-related factors, 91-95
Design of research, 175-184
baseline data collection, 176-180
summative evaluation, 180-183
Developing countries educational problems, 8
Dissemination costs and strategies for implementation on nationwide basis, 230-243

Distributed learning, advantages vs. topical learning, 52-53
Distributed practice vs. mass practice, 52
Distribution of print materials as part of production process, 36-47
problems in Kenya instructional broadcasting, 233-234
Drama themes, 58
use in sample instructional script, 118-119
Drills, 141-146
in sample instructional script, 117-118
songs as repetition drills set to music, 134

Educational Media Services, 11-12
Effect measurement conflict with treatment development in R&D, 183
Effect size, 221-225
comparison with other educational innovations, 224-225
definition of, 221
differences for urban non-radio and rural radio students, by linguistic competency, 258-260
Effectiveness of project, summary, 217, 249-255
Electric power, cost for radio reception, 233, 236
English
as medium of instruction in Standards 4 through 8, 10
as subject in Standards 1 through 3, 9-10
syllabus of Kenya Ministry of Education, 19-20, 77-79
English in Action broadcast schedule, 21-22
English model
standard model of good Kenyan English, 62-63, 93-94, 151
teacher skills, 62-63
Eshiwani, George S.
evaluation of project, 220-221
Evaluation phase, 32-33
Evaluation, formative, 99-113
as part of production process, 36-47
definition of, 175
effect on script writing, 121
feedforward flexibility in lesson planning, 52
sample instrument, 109-113
Evaluation, summative, 180-182
definition of, 175
design summary for one classroom, 182
problems and issues, 182-183
results, 215-227
school selection procedures, 177-179
Experimental groups, 216-217

Facilities
offices and equipment, 35-36
studio production, 36, 158
Feedback, 63-65
formative evaluation, 99-113
Feedforward revision system, 99, 104-105
Format and timing of year two and three scripts, 122-123
Formative evaluation, 99-113
as part of production process, 36-47
effect on script writing, 121
feedforward flexibility of lesson planning, 52
sample instrument, 109-113
Frequent pupil response, 59-61
Friend, Jamesine
costs of student worksheets, 72, 76
critical and noncritical language, 95-96
radio characteristics affecting curriculum design, 97
Radio Mathematics Project effectiveness, 4, 18

Games and songs, 133-136
recordkeeping, 155
Groups, experimental, 216-217

Hawthorn effect minimization, 175
Headmaster orientation as information-gathering strategy, 179-180
Hours of instruction of English in Action, 21-22
Housing allowances and salaries for project management at
nationwide implementation, 235
Human resources, 33-34
requirements for nationwide implementation, 235

Imhoof, Maurice
cassettes, advantages and disadvantages as delivery system, 23, 48
site selection criteria, 13
Immediate reinforcement, 63-65
Implementation of RLAP on nationwide basis, strategies and costs, 229-243
In-service training of teachers, 24-25
costs of, 234-235, 239-242
Individualized instruction
disadvantage of radio medium, 66, 68
teacher responsibilities, 69-70
Influence of teacher in situations of conflicting feedback, 75
Information-gathering strategies, research design, 175-184
Initial design phase, 28-31
Instructional design, 51-52, 124
Instructional organization
distributed learning, 53

topical organization, 52
Instructional pace, 65-66
distributed learning approach, 53
observation as means of determining appropriate pace, 101
Instructional sequence
establishment by Scheme of Work, 51
radio interactive instruction advantages over textbooks, 59
Interactive radio instruction
definition of, 249
difference from conventional educational radio, 6, 249-250
frequent pupil response, 59-61, 119-120
summary characteristics of, 50
Intervention by teacher, 69-71
mother tongue intervention in broadcasts, 67, 90, 97
Intonation and pronunciation
standard Kenyan English as model, 62
post-production review for accurate conveyance of meaning, 162

Kemmerer, Frances
costs of student worksheets, 72, 76
Kenya
broadcasting control and centralization, 163
educational context, 9
English curriculum analysis, 30
English in curriculum and as medium of instruction, 9-10
primary school year, 21
RLAP nationwide implementation, costs and strategies, 229-243
schools and enrollment in Standards 1 through 3, by province/district, 244-245
site selection criteria, 13
Kenya Institute of Education, 10-11, 20
facilities for project, 35-36
Progressive Peak series of primers and teachers' books, 19
radio instruction activities, 11-12, 229, 231, 234
Kenya Syllabus for Primary Schools: English
adaptation of curriculum for interactive radio instruction, 77-98
objectives for Standards 1 through 7, 77-78

Language, definition of, 87
Language skill areas
coverage in radio lessons, 21
curriculum adaptation to interactive radio instruction, 81-83
Lapped-year research design, 180-182
Lesson development, 84-86
Lesson frequency and duration
RLAP vs. Schools Broadcasts, 6, 65
Lesson planning
as part of production process, 36-47
basis for script writing, 120-123
determination of time allocated to competencies, 52
flexibility needed to respond to formative evaluation results, 52
Lesson plans for teachers, broadcast and complementary sessions, 25, 265-269
Lessons developed for RLAP, number of, 230
Limitations of radio medium, 86-90
compensatory instructional modes, 68-75
Limitations of testing strategy, 104
Linguistic environment
effect on curriculum content and design, 91-95
effect on formative evaluation, 106
research design, 176-178
rural areas vs. urban areas, 93-94
Listening tests
description and sample questions for Standard 1, 200-201
description and sample questions for Standard 2, 202-206
description and sample questions for Standard 3, 210-211
effect size, by grade level, 222
number of questions, maximum possible score, and reliability, by grade level, 214
score means, standard deviations, and ranges for control and radio groups, by grade level for all and normal-progression students, 218-219
score percent correct for control and radio groups, by grade level for all and normal-progression students, 218-219

Maintenance segment, sample excerpt, 64
Mass practice vs. distributed practice, 52
Means, standard deviations, and ranges of test scores for control and radio groups, by linguistic skill and grade level for all students, 218
for normal-progression sub-group, 219
Methods and principles of instruction, summary, 50
Methods for production tracking, 36-47
Monitoring student and teacher outcomes, 99-101
Music
continuity devices, 126-131
musical cues, 58, 131-132

National Committee on Educational Objectives and Policies, Kenya, 9
Nicaragua Radio Mathematics and textbook effect size, comparisons with RLAP, 224-225
Notes for teachers
as support for radio-based instruction, 25-27
costs of, 72, 234, 236, 239-242
facsimile notes for typical Standard 2 lesson, 265
number of pages produced, 230
Notional categories in Scheme of Work, 82, 96
Nzioka, G. L. M.
study of educational broadcasting in Kenya, 234

Observation
as technique to monitor student and teacher outcomes, 100-101
cost control considerations, 106
Office equipment and facilities, 35-36
One-way communication
as encourager of passivity, 59
radio medium influence on curriculum design, 87
Operational phase, 31-32
Orientation
as information-gathering strategy, 179-180
costs of in-service training, 234-235, 239-242
Outcomes, monitoring of, 99-101
Oxford, Rebecca L.
cassettes, advantages and disadvantages as delivery system, 23, 48

Pace of instruction, 65-66
distributed learning approach, 53
observation as means of determining appropriate pace, 101
Participation of students
frequent pupil response, 59-61
pupil-participant system, 144-146
Passivity, disadvantages of one-way communication, 59
Pauses for student response, 136-144
observation as means for determining length of, 101
timing of, 136-138
Percent correct for tests of control and radio groups, by grade level for all and normal-progression students, 218-219
Physical activity
action cues, 132-133
frequency of, 62
Post-production, 161-162
Pre-production, 157-158
Print materials
as support for radio lessons, 25-27, 71-72
costs of, 234, 236, 239-242
distribution problem, 233-234
role of teachers, 24
Production facilities, 36
studio production, 158-161
Production process, 36-47
Production schedule, 149
Professional field staff and major responsibilities, 34
Progressive Peak series of primers, 71
as realization of Kenya Syllabus for Primary Schools: English
linguistic content, 78
Pronunciation and intonation
post-production review for accurate conveyance of meaning, 162
standard Kenyan English as model, 62
Props
use as visual aid, 27-29
use to minimize print materials, 73-74
Pupil-participant system, 144-146

Questionnaires, samples for baseline data
adults, 192-197
students, 188-192
teachers, 184-188
Questions on tests
description and examples for Standard 1, 200-202
description and examples for Standard 2, 202-210
description and examples for Standard 3, 210-212
number, maximum possible score, and reliability, by grade level, 214

Radio characters, 124-126
actors' use of standard Kenyan English, 62
as teachers, 58
creation of two-way communication, 59
Radio education activities in Kenya, 11-12, 231, 234
Radio infrastructure for RLAP nationwide implementation, 231-232
Radio medium
curriculum design factors, 86-91
limitations of, compensatory instructional modes, 68-74
primary pedagogic burden, 21, 69
reasons for selection as innovative delivery system, 7
Radio Mathematics Project
adaptation of model for English language, 6, 20, 28, 49

critical and noncritical language, 95-96
curriculum organization, 82-83
effect size comparison with RLAP, 224-225
effectiveness of, 4, 17
formative evaluation model, 99
limited use of student worksheets, 76
role of teacher, 24, 48, 30, 64
testing strategy adoption by RLAP, 104
Radio receivers, constraint to RLAP nationwide implementation, 232-233
Ranges, means, and standard deviations of test scores for control and radio groups, by linguistic skill and grade level for all students, 218
for normal-progression sub-group, 219
Reading exercises
immediate reinforcement, 64
timing of, 139-141
Reading tests
description and sample questions for Standard 1, 200-201
description and sample questions for Standard 2, 206-207
description and sample questions for Standard 3, 211-212
effect size, by grade level, 222
number of questions, maximum possible score, and reliability, by grade level, 214
score means, standard deviations, and ranges for control and radio groups, by grade level for all and normal-progression students, 218-219
score percent correct for control and radio groups, by grade level for all and normal-progression students, 218-129
Receivers, constraint to RLAP nationwide implementation, 232-233
Recordkeeping and checklists
conflict charts, 154
production process, 36-47
songs and games, 155
vocabulary, 83, 154-155
Rehearsal and recording sessions, 159-160
Reinforcement
for alternative correct responses, 69
immediate, 63-65
writing exercises, responsibility of teacher, 64
Reliability of tests, 214
Repetition
cues, 133
drills in sample instructional script, 117-118
pattern drills, 141-143
songs as repetition drills set to music, 134
Research design, 175-184
baseline data collection, 176-180
summative evaluation, 180-183
Research conflict with treatment development in R&D, 183
Response
frequency and intervals, 60-63
pauses for student response, 136-144
Results of summative evaluation, 215-227
Rural areas
achievement differences for urban non-radio and rural radio students, by linguistic competency, 257-261
linguistic environment, 62, 93-94
radio as alternative instructional delivery system, 4
research design, 175-178

Salaries and housing allowances for project management at nationwide implementation, 235
Sample questionnaires for baseline data
adults, 192-197
students, 188-192
teachers, 184-188
Sample scripts
complete Standard 2 script, 271-317
continuity devices, 127-132
drama theme, 126-129
listening speaking block, 115-119
pause for pupil response, 136-140
pupil-participant system, 144-146
songs and games, 133-136
Sample test questions
Standard 1, 200-202
Standard 2, 202-210
Standard 3, 210-212
Sampling procedures
baseline data collection, 176-180
Scheme of Work
basis for script writing, 120-122, 151
cyclical review, 53
development, 79-84
feedforward revisions incorporation, 99, 104-105
instructional design document to guide lesson preparation, 30
instructional sequence, 51
production process, 36-47
prioritized sequence of instruction, 51, 66
sample frame, 80
Scheduling
production process, 36-47
production schedule, 149

School selection procedures, 177-179
Schools Broadcasts
duration of lessons, 65, 75
Educational Media Services, 11-12
Schools in Kenya, number and Standard 1-3 enrollments by province/district, 244-245
Scores on Certificate of Primary Education Examination as school selection criterion, 178
Score means, standard deviations, and ranges for control and radio groups, by linguistic skill and grade level for all students, 218
for normal-progression sub-group, 219
Score percent correct for control and radio groups, by grade level for all and normal-progression students, 218-219
Scoring procedures for speaking tests, 209
Script review process, 150-153
Script writing, 114-148
format and timing of year two and three scripts, 122-123
production process, 36-47
Scripts, samples of complete Standard 2 script, 271-317
continuity devices, 127-132
drama theme, 126-129
listening/speaking block, 115-119
pause for pupil response, 136-140
pupil-participant system, 144-146
songs and games, 133-136
Searle, Barbara
Radio Mathematics Project effectiveness, 4, 18
Segments
format and timing in year two and three scripts, 122-123
initial teaching segments, 54
maintenance segments, 54
Sentence patterns
Kenya Syllabus for Primary Schools: English, 78-79
Sequence of instruction
establishment of priorities by Scheme of Work, 51, 66
radio medium advantages over textbooks, 59
Settings, 124-126
entertaining alternatives to classrooms, 58
Sociolinguistic constraints on curriculum, 91-95
Songs and games, 133-136
frequency, 62, 133
recordkeeping, 155
use in sample scripts, 117, 133-136
Sound effects, 87-88, 152-153
pre-production, 157-158
Speaking/listening cues, 132-133
Speaking tests
description and sample questions for Standard 2, 207-209
description and sample questions for Standard 3, 212
effect size, by grade level, 222
number of questions, maximum possible score, and reliability, by grade level, 214
score means, standard deviations, and ranges for control and radio groups, by grade level for all and normal-progression students, 218-219
score percent correct for control and radio groups, by grade level for all and normal-progression students, 218-219
scoring procedures, 209
Standard deviations, means, and ranges of test scores for control and radio groups, by linguistic skill and grade level for all students, 218
for normal-progression sub-group, 219
Staffing, 15-17, 33-35
actors, 160
musician, 160
producer/director, 157
recording engineer, 157
requirements for nationwide implementation, 235
scriptwriters, 120
Statistical significance, 217, 219-220
Structures in Scheme of Work, 81-82
Student participation
frequent pupil response, 59-61
pupil-participant system, 28, 144-146
Student population
as school selection criterion, 178
Kenya schools and enrollment in Standards 1-3, by province/district, 244-245
total and normal-progression in experimental group, 218
Student worksheets
costs of, 27, 72, 234, 236, 239-242
design and use as support for radio-based instruction, 26-27, 72
limited use in Radio Mathematics Project, 76
number of pages produced, 230
use for formative evaluation, 102
Summative evaluation, 180-183
definition of, 175
design summary for one classroom, 182
problems and issues, 182-183

results, 215-227
school selection procedures, 177-179
Suppes, Patrick
Radio Mathematics Project effectiveness, 4, 18
Systematic instructional design, 51-52

Tapes, advantages and disadvantages as delivery system, 23, 48
Teacher books
costs of, 27, 234, 236, 239-242
writing of, as part of production process, 36-47
Teacher influence in situations of conflicting feedback, 75
Teacher orientation, 24-25
as information-gathering strategy, 179-180
distributed learning vs. topical organization, 53
Teacher responsibilities, 23-25, 69-71
mother tongue intervention in broadcasts, 67, 90, 97
reinforcement for writing exercises, 64
Teacher skills, 10, 23
as school selection criterion, 178
radio reinforcement, non-reliance on English skills, 63
standard model of good Kenyan English, 62-63
Teacher's notes
as support radio-based instruction, 25-27, 71
costs of compiled books, 27, 234, 236, 239-242
facsimile notes for typical Standard 2 lesson, 265
number of pages produced, 230
writing of, as part of production process, 36-47
Teaching segments
additional cycles, 54
initial, 54
Test score means, standard deviations, and ranges for control and radio groups, by linguistic skill and grade level for all students, 218
for normal-progression sub-group, 219
Test score percent correct for control and radio groups, by grade level for all and normal-progression students, 218-219
Tests
data analysis, 103
development, 199-214
sample evaluation, 111-113
weaknesses of testing strategy, 104-105
weekly tests, 102-103
Time-on-task
as complement to model of good English, 63
format and timing of year two and three scripts, 122-123
maximization, 67-68
Timing
of choral reading segments, 138-141
of pauses for student response, 136-138
of writing responses, 141
Topical organization, disadvantages of, 52
Topics in Scheme of Work, definition, 81
Treatment development, conflict with effect measurement in R&D, 183
Transmission infrastructure for RTAP nationwide implementation, 231-232
Transmission quality
compensation by actor speech clarity, 62
Kenya districts with poor reception, 231, 244-245
Treatment effectiveness, summary, 217
Training of teachers, 24-25, 234-235
Transition devices, 126-132
cautionary note for scriptwriters, 129-130
Two-way communication
response to radio characters, 59

Unidirectional communication
as encourager of passivity, 59
radio medium influence on curriculum design, 87
Universal free primary education in Kenya, 9
Urban areas
achievement differences for urban non-radio and rural radio students, by linguistic competency, 257-261
electricity, average monthly bill for city schools, 233
linguistic environment, 62-63, 93-94
schools, number and Standard 1-3 enrollments, by municipality, 245

Variables control in research design, 181
Verbal cues, 132-133
Visual cues
risk of distraction by lack of, 59
use of classroom aids, 27-28
Vocabulary
in Scheme of Work, 82
Kenya Syllabus for Primary Schools: English vocabulary sets, 78
recordkeeping, 83, 154
Voice of Kenya, 12, 22, 141
broadcast time, cost and availability of, 231, 236, 241-242

production facilities, 36, 158
Worksheets for students
costs of, 27, 72, 234, 236, 239-242
design and use as support for radio-based instruction, 26-27, 72
limited use in Radio Mathematics Project, 76
number of pages produced, 230
use for formative evaluation, 102
Writing exercises
effective reinforcement for, teacher responsibilities, 64
time allocation in radio broadcasts, 70-71
timing of pauses for, 141
Writing broadcast scripts, 115-148
format and timing of year two and three scripts, 122-123
production process, 36-47
Writing tests
effect size, by grade level, 222
number of questions, maximum possible score, and reliability, by grade level, 214
sample questions for Standard 3, 212
score means, standard deviations, and ranges for control and radio groups, by grade level for all and normal-progression students, 218-219
score percent correct for control and radio groups, by grade level for all and normal-progression students, 218-219