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ABSTRACT

This case study looks at the way in which the fundamental principles and practices of a well-established model of interactive radio instruction (IRI) were examined in light of the way that South Africa now wishes to teach language and mathematics. At stake was IRI's capacity to reinvent itself and still find a useful role for radio in the context of a much greater role for the teacher and employing a problem-solving, pupil-centered learning methodology. This case study documents the process of changing an instructional design. It includes theoretical concerns; issues around the role of the pupil, the teacher, and media in a multichannel setting; new obligations, such as teacher training, as well as student learning; and the challenge to reevaluate many of the existing assumptions about the role of radio in the classroom. The sections include: "Good Reasons for Second Thoughts"; "Rethinking the Role of the Teacher"; "Designing the New Approach"; "Learning Outcomes and Acceptance"; "Original" and "New" Models: What's the Difference?"; "How Well Do the New Models Work?"; and "Reflection on this Model of Change." (Contains 21 references.) (MAS)

CHANGING TIMES IN SOUTH AFRICA:

REMODELING INTERACTIVE LEARNING

LearnTech Case Study Series No. 8

by Stuart Leigh

June 1995

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Foreword

After Nelson Mandela's release in 1990, and prior to the first democratic elections in April of 1994, LearnTech was privileged to assist South Africans with their program of educational innovation and reform. South Africa was asking fundamental questions about the goals and practice of education. Because of a history of entrenched inequities, education planners focused on twin needs: 1) for rapid reform on a massive scale, and 2) for high quality solutions based on the best contemporary education theory and practice. It was in this context that LearnTech was asked to provide technical services to the Open Learning Systems Education Trust (OLSET), a South African NGO interested in applying various learning technologies, including Interactive Radio Instruction (IRI), to improve basic education in English and mathematics among the most disadvantaged communities.

This case study looks at the way in which a well-established model of IRI had to examine its fundamental principles and practices in light of the way that South Africa (and many other countries) now wish to teach language and mathematics. At stake was IRI's capacity to reinvent itself and still find a useful role for radio in the context of a much greater role for the teacher and employing a problem-solving, pupil-centered learning methodology. Since radio is inherently not a communicative, two-way medium, this was a major challenge.

So this case study documents the process of changing an instructional design. It includes theoretical concerns; issues around the role of the pupil, the teacher and media in a multichannel setting; new obligations, such as teacher training, as well as student learning; and the challenge to re-evaluate many of the existing assumptions about the role of radio in the classroom.

The project's story is, above all, one of developing local capacity, responding to local control, and accepting local evaluation. LearnTech's Resident Advisor, Stuart Leigh, acknowledges the many colleagues and critics with whom he worked to devise and test the many changes. I would like to acknowledge his role in creatively accepting the initial challenge to change as an opportunity to remodel IRI, and doggedly pursuing that goal. He now tells the story with the same honesty that he brought to living it.

Mike Laflin

Acknowledgements

This case study is written from an insider's perspective. I was the Resident Technical Advisor to the South Africa Radio Learning Project from its inception through December 1994. Over 3 years of intensive work, many people have shaped my understanding of the project and of South Africa. At the risk of omitting someone, acknowledgement first is due the management and staff of the Open Learning Systems Education Trust (OLSET): Meshak Chaza, Ruth Dube, Manie Eagar, Penny Goddard, Kathy Graham, Farhana Akhalwaya, Savera Kalideen, Al Karaki, Jenny Kenyon, Lennox Klaas, Victor Kubjane, Pat Mahlambi, Rob Marsh, John Molefe, David Moloto, Nomfundo Mpondo, Lindi Mtimkulu, Themba Mtshali, Gordon Naidoo (Project Manager), Joe Ndlovu, Golden Neswiswi, Stephanie Parker, Pule Phalatse, Fatima Phiri, Lebo Ramofoko, Zubeida Shaik, Lindi Tshabalala, Nombulelo Tyawa, and Sbongile Zwane.

Mention should be made of the many artists, actors and musicians who helped create the materials, including Sophia Condaris, Mark de Lange, Don Mlangeni, Don Laka, John Lata, Olga Moletsane, Maggie Williams, Tu Nokwe, the Voices of Joy, and many others. I would also like to acknowledge the contribution made by South African consultants. First the evaluators who have helped us clarify our work: Charles Potter, Angela Arnott, Mandia Mentis, John Mansfield, Letta Mashishi, Adele Gordon, Cyril Julie, Sbongile Nene, Ishbel Hingle, and Viv Linington. The work is stronger for their contributions. Thanks also to curriculum and training advisors who, like our evaluators, helped guide us. An incomplete list includes: Esther Ramani, Albert Weideman, David Langhan, Paul Musker, Vic Rodseth, Vanessa Francis, Fatima Dada, Teboho Moja, Marlene Rousseau, Mervyn Ogle, Nick James, Colleen Goldstein, Pam Rodwell, Steve Rhodes, Lynn Rossouw, and Martha Mogkoko. And for cultural guidance and creative assistance, Welcome Msomi.

Deserving of special note are hundreds of South African teachers, principals, and tens of thousands of students and parents who have received our work with enthusiasm and let us know that what we are doing has meaning.

A number of consultants deserve acknowledgement: Maurice Imhoof for assisting the redesign of EIA; Jim Cobbe for a very useful economics study; Esta de Fossard-Nelson and Andrea Bosch for an inspiring writing workshop; Alexander Romiszowski for helping to put the maths program design on a sound footing; and most notably, Rebecca Kalin, scriptwriting advisor, for helping OLSET to find more than one style and to keep the materials flowing for many months on end.

Finally, I would like to thank those who made it possible for me to work and learn in South Africa during this critical and uplifting period. First, at the USAID mission in Pretoria Dave Evans, Cherie Rassas, and Jennifer Bisgard; at USAID in Washington Jim Hoxeng. The staff and management of the Education Development Center's LearnTech Project have provided excellent field support to the project. My special thanks are due to the former and current LearnTech directors - Tom Tilson, who first asked me to represent LearnTech in South Africa; and Mike Laflin, who has provided a great deal of thoughtful guidance during the many ensuing phases of the work.

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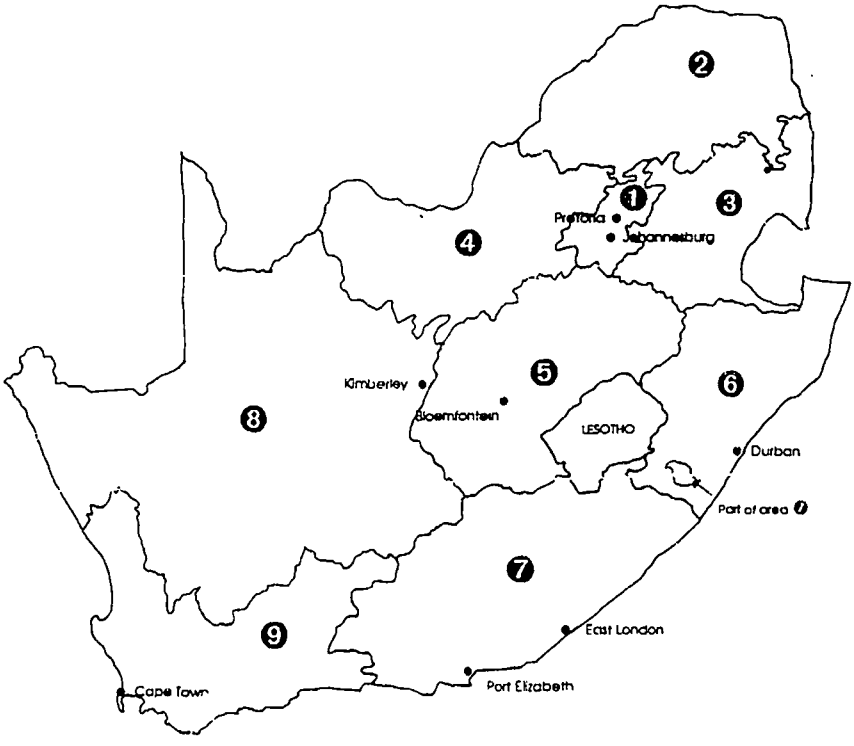


First Thoughts

When we began in March 1992, we thought of the South Africa Radio Learning Project[1] as a fairly straightforward adaptation of programs to teach English as a Second Language by radio. More than 500 half-hour interactive radio programs for the first three grades of primary school English had been developed in Kenya between 1980 and 1985. From 1987 to 1990 the same scripts were closely adapted for use in Lesotho where they are now part of the official primary English curriculum. Both series were called *English in Action* (EIA). Shorter adaptations and pilot projects had also been done (40 lessons in Swaziland in 1989-90 and 100 lessons in Honduras in 1987 and in Belize in 1991-1992). Given the substantial investments of money, time and expertise in course development, and the generally positive evaluations of learning outcomes, these materials seemed to offer South Africa a well-tested system to refine and adapt.

The testing of IRI in South Africa followed a phased approach. It began with a very short pre-pilot to test whether the basic concept was acceptable to users (teachers, students, principals, other concerned educators) and funders. From March to June 1992, 15 audiocassette-based lessons were tested with integrated print and a single day of preparatory teacher training. Twenty four pre-pilot classrooms participated in 12 township and farm schools in and around Soweto and Bloemfontein.[2]

Teachers' and principals comments were generally highly positive:

> *"I liked the program very much. It was very useful to me as well as the pupils. I found the method of teaching English by radio excellent because the pupils were very interested and they learned English very quickly and easy..."*
> Teacher, Bainsvlei farm school

> *"Pupils have gained a lot and their vocabulary has increased within 15 days' time."*
> Teacher, Waterbron farm school

> *"The pupils have gained a lot by way of answering questions and learning the songs. They are more advanced than they would otherwise have been."*
> Principal, Lesedi school[3]

However, the opinions of four highly regarded South African English as Second Language (ESL) experts were more mixed:

> *"An impressive view, revealing successful learning, interactive methodology and positive attitudes among pupils and teachers. A strong sense of potential along with some unease that weaknesses might become entrenched and opportunities missed to solve problems".*[4]

> *"Serious thought should be given to ways of reducing dependence on the radio for the total content of the lesson. For example, as the lessons are structured at the moment a huge amount of teacher potential, together with opportunities for radio-led teacher development, are being wasted".*[5]

Right from this very early stage, the project solicited and integrated the opinions of teachers, principals, other stakeholders in the community and other NGOs working in ESL, some of whose products would eventually compete with those of the Radio Learning Project. Genuine consultation and constant local evaluation was the only way the work would develop credibility and acceptance. But this practice would also deeply affect the ongoing development of the project.

It was clear that we should revise the design of the interactive radio system inherited from earlier projects. But how? In what ways?

'The pupils are more advanced than they would otherwise have been'.

Good Reasons for Second Thoughts

There were two main issue areas that prescribed a new approach to IRI in South Africa:

- first, curriculum reform and materials development were taking place in an environment of heated debate around methodology and education theory;
- second, we saw the need to take greater responsibility for the professional development of teachers than the earlier IRI model, which focused primarily on learning among students, permitted.

Affecting both of these were the political dimensions of education in South Africa in the 1990s.

The Politics of South African Education

No project could avoid participating in the education policy debates, which were taking place in many centers. Some were trying to affect the "national government in waiting", as some called the ANC at the time, while others were thinking more provincially. Anyone with ready answers was challenged. Projects either had an established community of supporters or, if a project were relatively new, had to demonstrate the process of consultation by which their ideas were validated. Evidence of having actively and democratically grappled with key issues was expected. Important issues for the SARLP activity included the absence of an agreed national curriculum for English language or mathematics, and no clear language policy for education. Possibly the key issue for IRI was the nearly universal rejection of authoritarian teacher-centered methods and the requirement to design an acceptable media-assisted approach to learner-centered practice.

During the course of the project it became clear that while many South African educators were open to the project, other significant players had serious doubts. Some doubts were based on readings (and some misreadings) of the literature about IRI. Some had concerns about the effects the introduction of *English in Action* had had on competing projects in neighboring Lesotho. Some had heard that it had "failed" in Kenya. (In fact, while it was not institutionalized by Kenya's Ministry of Education, radio students

there had significantly outperformed comparison students.) Some could imagine only a limited range of types of interactivity in the programs. And many had very reasonable doubts about the capacity of radio to promote the more responsive, truly learner-centered approach to education South Africa now requires.

The SARLP had to convince its critics that IRI could be useful in any classroom.

The project also took place in the context of South African broadcasting history. Schools broadcasting in South Africa had been tried, but was regarded as ineffective, lacking relevance for many in its audience, and, as an emanation of the South African Broadcasting Corporation (SABC) it represented discredited racially-based education. So, the SARLP had to convince its critics that interactive radio could have a useful place in any classroom. To further complicate matters, some saw the project as being largely the product of external (i.e. United States) forces and not sufficiently home-grown. Finally, there were significant competitive concerns from other ESL publishers."

Somehow the project would have to try to address all these concerns.

International Trends in Educational Psychology

Apart from the specifics of the South African situation, international currents in educational theory and practice also called for a re-examination of early IRI designs and a broadening of the definition of IRI. (LearnTech Case Study No. 1 has dealt with this subject in depth.)

In brief, cognitive learning theories and constructivist theories of knowledge have led educators to reassess earlier behavioral and associationist learning theories.[7] While the first generation of IRI developers were aware of cognitive and constructivist theories, the fact is that the first IRI programs (math) had "a strong stimulus-response character".[8] Indeed, initial discussions of IRI math (1974-79) and the Kenyan ESL programs (1980-85) emphasized these theoretical underpinnings (e.g., frequent pupil response, distributed learning, immediate reinforcement).[9]

Such concepts and terminology have also been used to support transmission models of teaching, now largely out of favor, in which children are presented with knowledge which they must "get". However, South Africans are not particularly interested in merely "getting" messages; they are interested in the creativity of learners being engaged in shaping their knowledge.[8]

South Africans are interested in the creativity of learners shaping their own knowledge.

Constructivism and Language Teaching

Typically in the past, methods of second language teaching had little to do with the ways language is naturally learned. In recent years, attempts have been made to look at the ways children acquire their first language and structure methods of second language teaching to more closely resemble them.[11]

ESL practitioners in South Africa and elsewhere have based many useful and effective innovations in classroom practice upon natural language acquisition theory. Such approaches rely on creating conditions for real communication in the classroom. This is seen to be "an effective means of language teaching. It create(s) in a school setting the field conditions of language learning through communication".[12] Many language teachers are now using practices from more than one method in the "communicative classroom", guided by such principles as:

- Children bring to the learning situation a wealth of knowledge which must be respected and drawn upon as material for the lesson.
- Lessons should foster meaningful language experiences and real communication between children and teachers, and children and other children.
- Classrooms should employ a wide range of culturally relevant and stimulating activities to promote active participatory learning.

Such principles demand much of an instructional radio series produced at a central location possibly thousands of miles from the classroom, months or years earlier. How could the radio draw on the individual knowledge of children and support real communication based in the felt need of individuals to communicate with meaning and urgency?

Constructivism and Mathematics

In 1992-3, the term "constructivism" was not generally used by ESL workers when discussing language teaching methodology. Rather, they talked about "communicative language teaching", "natural acquisition" (and to some degree "whole language"). Constructivism as a term and as an explicit theoretical position was much more

developed, however, in South Africa's primary mathematics (or "maths") community.

While the project attended solely to developing and implementing *English in Action* until April 1993, the intention from the outset had been to adapt existing interactive radio mathematics materials for South Africa. These had been developed over 20 years and had been shown to be very effective in Bolivia and in many other countries. At the time of proposing the project, adaptation had seemed a sound approach. However, by early 1993, project experience with primary ESL instruction and initial research in the mathematics community suggested that adaptation might not be possible. Perhaps in no other sector of the education community was there so much agreement on the need for and the general shape of a radical home-grown reform of existing approaches to primary education.

How could the radio draw on individual knowledge and support real communication?

Maths education NGO's were addressing issues like the following:

> *"In 1991 of 290,318 pupils who wrote DET school leaving exams, 392 passed maths at the higher grade with a C symbol or better. In classrooms across the country, in both townships and rural areas, maths and science are viewed as foreign constructs and as integral part of the structure of oppression".*[13]

Many traced some of the blame for this to teacher education based on "fundamental pedagogics", promoting teacher centered formalistic drilling and on inappropriate materials. Teachers felt unable to expand beyond the confines of the formal syllabus and rigid schemes of work and most children were failing to develop firm concepts of quantity and number.

To develop a stronger "number sense", constructivist principles are being applied to classroom practice in some South African schools, especially at the junior primary level[14], informed by such beliefs as:

- There are many equally acceptable ways to solve a problem and teachers must cultivate acceptance of multiple strategies in problem solving.
- Children need to work with well designed manipulable materials to develop solid "number sense".
- Children should be allowed to work at their own pace and some will need more time to solve problems than others.

The SARLP clearly wished to be a part of South Africa's future and to participate in the reform agenda. So, in June 1993 it organized a conference of leading mathematics educators to explore the possibility of using radio for primary maths instruction and presented existing IRI radio math project experience. The attendees took issue with the emphasis on choral response and saw no evidence of multiple strategies or investigative approaches being used in earlier IRI mathematics models. Clearly, to win their support we needed a new IRI mathermatics design.

Language and Mathematics Teaching: A Common Thread

Whether guided by constructivism or communicative language teaching theories, both language and mathematics educators have much in common. They share a history of authoritarian education

The project reassessed the role of the teacher in IRI classrooms.

at all levels and they are united in a common reform agenda, demanding respect for the individual child and better conditions for learning. In maths the focus is on cultivating multiple strategies, employing investigative and discovery approaches, and using manipulables in a well-resourced classroom. In ESL the focus is on eliciting children's existing knowledge, creating conditions for meaningful and natural communication, employing a wide range of activities, and situating language in the culture of the community. And, of course, both maths and ESL communities are promoting children working in small groups and pairs, and teachers working as effective facilitators of learnir.g.

Rethinking the Role of the Teacher

While IRI projects have focused primarily on materials development and distribution, there has always been some teacher training built into IRI projects. In Lesotho, for example, in addition to face to face meetings, a series of 20 radio programs was produced which attended to general issues in English teaching and dealt with how teachers could best work with radios, the radio programs and radio lesson materials. Training often centered around logistical issues such as reading teacher's notes in advance, having materials ready, dealing with radio reception, circulating through the room to check students' responses to the radio teachers, etc.. While these are important issues, to South African language educators, such a focused range of teacher development concerns was seen as too limited.

While the project was not initially conceived as a teacher training project, it was clear that it needed to promote communicative teaching methods. For new pedagogy to take root, the project would need a substantial teacher development component.

But what role should radio take in this? Anything that resembled teacher training for centrally managed "Bantu education" would quickly be rejected. So too would any project perceived as using radio to "teacher-proof" the classroom. South African IRI programs would have to contribute to teachers' professional development while doing the long-standing job of earlier IRI efforts, namely, assuring that children were learning. In view of this climate, the project reassessed the role of the teacher in IRI classrooms.

The original impetus behind the development of IRI was to guarantee student learning where teachers were often unable to teach important concepts in mathematics effectively. It was also seen as an aid to overburdened teachers.

> *"...as we saw it, the key ingredient in the eventual success of the project would be whether the radio broadcasts reached their intended audience, the children. The teachers, as our only means of access to this audience had to perceive the value of the radio lessons both as a means of improving the educational opportunities of their young charges and also as a teaching assistant who could reduce their own workload."*[15]

Teachers should be treated as a community of professionals.

In Kenya's *English in Action* project the role of teacher as "partner" with the radio was further developed in an attempt to assure student learning while creating a locally appropriate role for teachers within and around the radio programs.

> *"... the classroom teacher ... 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".*[16]

The radio lessons were designed to lay a solid foundation that the teacher could build on to whatever degree she could. Still, it was seen that

> *"...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".*[17]

In South Africa this feature was problematic. Though one could point to the fact that IRI was an instructional system which included time after the audio lesson when teachers were supposed to take over entirely, experience had shown that some teachers might not do a complementary follow-up lesson or only do a very brief one. Also, the amount of time available for English instruction varied at different grade levels and in different schools. For whatever reason, should there be little or no complementary follow-up, the IRI teacher's role in teaching the subject might be smaller than progressive teacher educators would wish. And even with a complementary lesson, the teacher's role during the audio-assisted lesson would need to be an important one.

To try to address such issues the project established a few key principles:

- teachers should be treated as a community of professionals;
- the programs should be able to operate in the context of a wide range of skills among teachers;
- a multichannel system of teacher support should be offered (including face-to-face training and peer group meetings, and audio, video, and print media) as an optimal model of teacher support, though teachers might be unable to take part in the full range offered;
- the radio programs should in themselves promote new and more effective learner centered approaches;

- because the regular classroom audio programs for children also offer extensive, certain, and extremely valuable contact time with teachers, this time should be used for inservice teacher development;
- regular radio-assisted practice by teachers of a wide range of effective teaching methods could increase their fluency and confidence with an expanded repertoire of practical skills;
- programs which rely on teachers' creativity within the radio lesson increase the risk of ineffective lessons, but they also imply the possibility of stronger, more relevant teaching and learning than earlier IRI approaches;
- various amounts of additional teacher training could be offered.

Why Pupils' Classroom Time Became Teacher Training Time

Radio-based teacher training has generally taken place outside school hours, often at times teachers find obstacles to listening. It is difficult to motivate teachers to give time to inservice training without offering them tangible rewards, such as accreditation leading to a salary increment. It is difficult to guarantee that teachers will listen to broadcasts outside of working hours. There are myriad personal reasons not to. And even with cassettes, which offer greater flexibility to the user than radio does, incentives are often required.

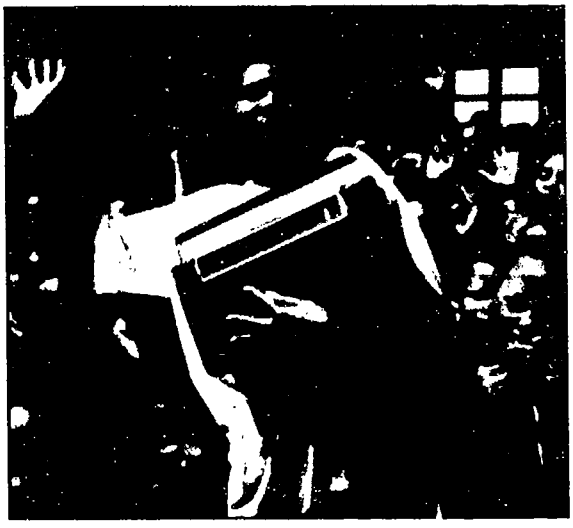
The only time that one can be certain of engaging teachers is while they are at work. Because the South African version of *English in Action* (like its predecessor in Kenya) was conceived systematically as a daily program to carry the core curriculum, it offered daily contact with teachers. The project seized this opportunity.

Designing the New Approach

When USAID agreed to fund further development of the IRI methodology in South Africa, LearnTech and OLSET were faced with some radical design choices in a period of manifest political change and uncertainty. Where little else was certain the need for re-creating enthusiasm for learning was evident.

Music, Motivation and the "Culture of Learning"

Resistance to the government had often taken the form of student boycotts and standoffs between teachers and administrators. The poor physical conditions in African schools and the scarcity of teaching materials was compounded by attacks on teaching facilities and materials, and many educators described with distress a pervasive absence of a "culture of learning". The revised design therefore maintained the pre-pilot's theme song and the general approach to music which were explicitly motivational. The project was committed to fostering enthusiasm for education. Building on a hymn commonly sung by choirs in many parts of the country, a theme song was composed with lyrics fusing the series title "English In Action" with the simple but purposive phrase "I want to learn".



The project wanted to foster enthusiasm for education.

It was a hit. Virtually universally, the theme song has been noted as a powerful positive element. Children typically start the lesson by dancing or clapping to the penny whistle, accordion, and traditionally based rhythm. And throughout the series an eclectic blend of popular and traditional music and original songs is employed both educationally and to maintain a sense of fun and pleasure in the learning experience.

Supporting Communicative Language Learning in Various Settings

The central issue for the revision design was how to create programs to optimize student learning and help teachers adjust to communicative language teaching. And this would have to occur in classrooms with very different language characteristics. As revision began in September 1992, the new language-in-education policy was still very unclear. Under the old policy, English was taught from Grade 2 but the home language was the medium of instruction until Grade 5 when children were expected to switch to English. Yet many children simply did not have the language skills to do this effectively. The impact of this deficit on learning in English in upper primary and secondary school and on drop out and repetition rates can hardly be overestimated.[18]

Most advisors to the project (some of whom were helping the ANC develop the new language-in-education policy) agreed on the principle of free choice at the school level.[19] In fact, many schools were already teaching English as a subject in Grade 1, in response to parental demand, and some schools were even attempting to use English as the medium of instruction from Grade 1. They called this going "straight for English".

Policy advisors described and defended various language strategies, including a bilingual medium approach from Grade 1 throughout schooling. Perhaps the greatest consensus, however, was built around the "gradual transition" model. In this approach, with each successive year, additional more complex subjects are taught in a language other than the home language. In this context a good deal of attention is being given to helping teachers with "codeswitching" and language "scaffolding" strategies to help students in classrooms where more than one language must be used.[20]

Since free choice created a wide variety of school policies and practices, the SARLP would need to be designed flexibly to function in many language settings. In any event, its value and appeal would rest on its ability to foster excellent teaching of English as a subject. It would need to make space for use of local home languages, local resources, and local teachers' skills. And by using the descriptive terms "Level 1" and "Level 2" rather than "Grade 1" and "Grade 2", various year-long series could naturally find their most appropriate grade levels in different communities.

The Program Design

In October 1992, after further consultation with local ESL practitioners, a design for the new programs was reached. The existing *English in Action* scripts already called for substantial use of mother tongue, and the format of short segments and short dramatic vignettes, "sound stories" and songs seemed appropriate. The table below shows typical examples of an original EIA 1 program (Lesotho), the South African EIA 1 (Level one) model and a South African EIA 2 (Level two) model.

English in Action Formats

EIA 1 Original	EIA 1 South Africa	EIA 2 South Africa
Opening	Opening	Opening
Good Morning Song	Good Morning Song	Good Morning Song
Structured Practice	Teacher Led Activity	Story 1
Song		Teacher Led Activity
Sound Story	Structured Practice	
Physical Activity	Song	Song
Structured Practice	Sound Story	Story 2
Song	Physical Activity	Teacher Led Activity
Structured Practice	Structured Practice	
Physical Activity	Song	Structured Practice
Song	Structured Practice	Song
Structured Practice	Song	Story 3
Song	Teacher Led Activity	Teacher Led Activity
Structured Practice		
Goodbye Song	Goodbye Song	Goodbye Song

Program duration 29:30

The outlines of lessons above are illustrative only. The only constants in the original EIA sequence were the opening, and the Good Morning and Goodbye Songs. The constants in the South African EIA 1 are the opening, Good Morning, Goodbye, and the two teacher led activities. The format for EIA 2 is more fixed. There is always a story in three parts followed by three teacher led activities. The structured practice segments can be of many types. In EIA 1 they are often modeling and repetition, though other forms are used. In EIA 2 they are often more comprehension based and related to the story.

The new EIA 1 programs drop about 1/3 of the original segments (especially modeling and repetition, other structured practice drills and repeat performances of songs) and substitute for them 8-10

minutes of what are called Teacher Led Activities (TLAs). These take the form of a readiness activity of 3-4 minutes in duration near the beginning of the program, and one follow-up activity of similar duration just before the end. These segments provide the teacher with suggestions for activities that call upon children to bring forth their own knowledge, work in small groups or pairs or chains, utilize language based in the local classroom environment, use physical actions to concretize related language, or engage children in various language learning games. TLAs also show teachers how to orchestrate effective pair and group work. Here is an example of a Teacher-Led Activity from lesson 34:

> *Play the "telephone game". Ask 2 children to stand at their desks. Have one child "call' the other on an imaginary telephone. The children should say "Ring! Ring!" They should then talk to each other using any English sentences they like. Be sure they begin with "hello" and end with "goodbye". Involve as many pairs of children as you can. (About 4 minutes)*

Over the course of the 130 programs in the EIA 1 series, teachers are exposed to 260 new ideas for activities they can create for their students. This approach is the single most important innovation in South Africa's Level 1 ESL radio programs.

Teacher Resource Kit

The other major innovation in EIA 1 was the creation of a new first term (ten week) program of school readiness and preparation for formal daily English lessons. Most students who enter primary school have not had the benefit of early childhood educare (preschool), and many educators believe that children should acquire basic classroom skills before formal second language lessons begin. Called the English In Action Teacher Resource Kit, it offers a print-based teacher's guide with a large number of classroom activities and a single cassette with songs and stories in English.

The Teacher Resource Kit aims to develop skills in 5 broad categories: self and social awareness; language; thinking; environmental awareness; and coordination and physical awareness. Activities are organized around the themes of self, body, family, school, community, environment, shapes, sizes, colors, storytelling, and rhythm. The Kit is to be used in any sequence teachers choose. After working with the Kit from mid-January, teachers begin the second term in mid-April with the daily audio-assisted EIA 1 lessons.

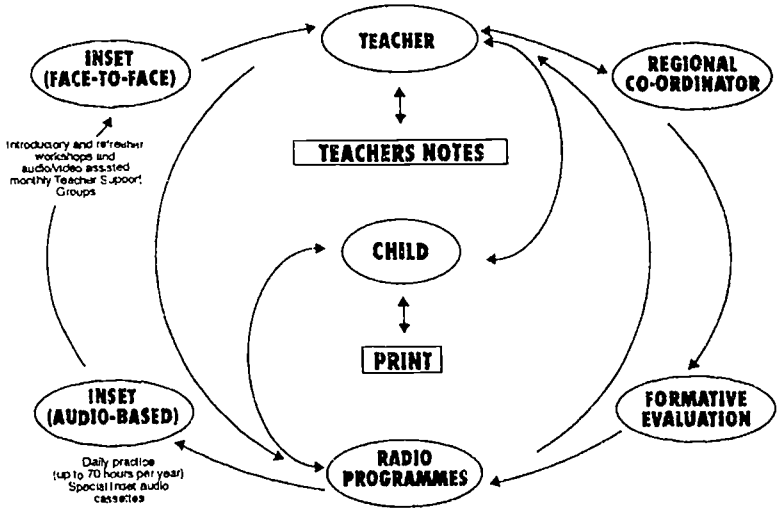
Teacher Training and Ongoing Support

While daily engagement with the programs provided significant inservice support and a structure for practicing new ideas, other means of assisting teachers were also developed. To help teachers teach English without the audio programs, the teacher's guide also provided ideas for follow-up lessons to be done during additional English teaching time each day. This offered an opportunity for practicing activities like those in the audio programs' TLAs.

The project used a multichannel learning design because there are many possible channels to student and teacher learning. By integrating several channels, greater learning would result. [21]

So, an instructional system was conceived setting the child at the center supported by the teacher, audio and print, with the teacher also supported by additional inservice training, by daily audio and print materials, by inservice audio and print, by video at workshops and by peer support groups.

RADIO LEARNING PROJECT INSTRUCTIONAL SYSTEM



All teachers received initial training for two days prior to using the materials. Five video modules introduced teachers to the basics of using the audio-based instructional system and facilitating the communicative classroom. Once teachers began using the materials, they were invited to join Teacher Support Groups (TSGs)

organized in small clusters of schools. These met after school once a month. Here, teachers were offered an opportunity to lead, observe, and critique demonstration lessons. The project's regional coordinators also provided instruction in key areas (such as lesson planning/preparation, teaching reading, handling errors in the communicative classroom, assessment, testing, etc.). Audio cassettes also dealt with some of these issues. Such a system of school-based support was intended to address motivational and social factors in teacher performance as well as academic, technical and skills issues.

Evaluation and Testing

Studies of learning outcomes, costs and cost effectiveness have dominated the analyses of earlier IRI projects. While the SARLP attended to these issues,[22] the project chose to employ an evaluation design that included both independent (external) and participatory internal evaluation processes. The instruments and processes of evaluation included:

- Pre-tests and post-tests: listening comprehension (EIA 1)
- Pre-tests and post-tests: listening comprehension, reading, speaking (EIA 2)
- Focus groups
- Case studies
- Qualitative interim assessments of the project (EIA 1 and 2) based on staff interviews, staff self assessments, field observations, questionnaires to users, video

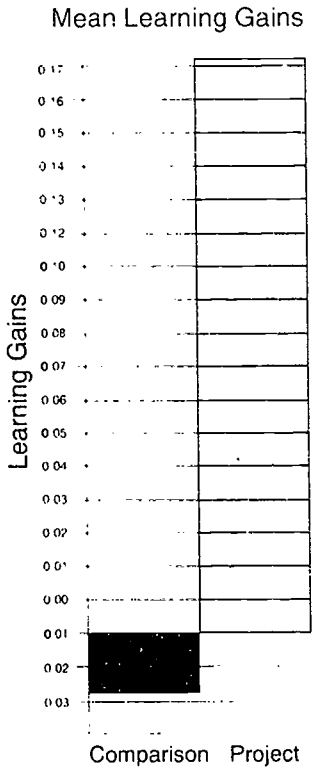
Because the project was in a formative period and staff were almost all very new to such work, a participatory evaluation design was used to stimulate communication and personnel development within the project. Project staff were asked to assist the evaluation in various ways, such as conducting field observations, collecting case study data, administering tests, and coordinating community focus group meetings. And as with the teacher support groups, these evaluation processes were designed to involve teachers and principals in ongoing discussion and reflection. In this way the evaluation would not only assess but also promote the development of teachers (through reflection on practice), the schools-based community (including parents), and project workers.

Learning Outcomes and Acceptance

Evaluation Results of EIA 1

A few of the key findings of the summative evaluation of EIA 1 include the following indicators of its effectiveness:

> *"The results suggest that the English in Action programme was more effective than a cross section of comparative English classes in improving receptive vocabulary of Grade 1 English among second language speakers (20% greater learning gains).*

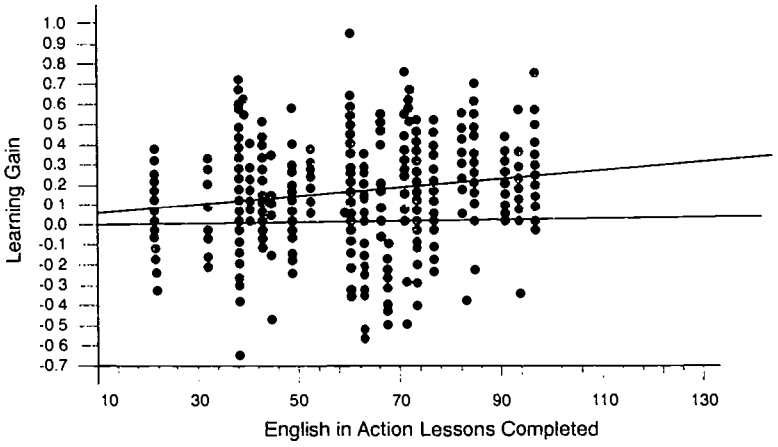


> *"The results clearly indicate that a primary goal of the English in Action intervention was met - the development of listening skills.*

> *"The project showed an increasing amount of improvement in post-test scores depending on the number of lessons of the English in Action programme to which they were exposed.*

Pupils who received less than 33 lesson improved by 6.7%; pupils who received between 34 and 66 lessons improved by 13%; and pupils who received more than 66 lessons improved by 24%".[23]

Project Pupil Learning Gains vs. Lesson Number



The greatest learning gain differentials (21%) were shown by pupils in farm schools in rural settings where school resources, support and training have historically been weakest. In addition to these positive statistical findings, there was strong acceptance from the user communities. The external evaluator's focus group report states:

"There is overwhelming support for OLSET on the ground - professionals, the bureaucracy and parents (some of whom are professionals) are all agreed on the value of the project's programme of English in Action Radio Learning.

"... the project is succeeding to bring key groups around the core element of the programme - delivering of a service to make learning English and teaching a foreign language pleasurable.

"OLSET's programmes' ability to build vocabulary across the curriculum is noted in all encounters with teachers.

"There is overwhelming demand that the project's programme should go to scale".[24]

Designing Level 2

While such strong acceptance for EIA 1 indicated that Level 2 programs designed along very similar lines would likely be welcome, it was not possible to follow the same design for level 2. A pure constructivist design was not what the project had set out to achieve with EIA 1. Rather it was advancing a design drawing on many approaches which promoted communicative methods. However, new writing staff joined the project as the work on EIA 1 was ending and they were especially sensitive to continuing critical comments from various experts who were only now becoming aware of the project and questioned its design or who continued to have reservations about the parts of each EIA 1 program that still bore a resemblance to the original *English in Action* design.

EIA 2 emphasizes reading and writing.

One evaluator's most significant criticisms concerned the long range viability of the project based on the weakness he perceived in curriculum development expertise among staff, noting that OLSET was not yet an active player in certain key debates about curriculum reform. OLSET was advised that it would have difficulty convincing some significant players to adopt *English in Action* without additional development work being demonstrated. OLSET was advised to integrate further local critiques in the design of the next year's series (EIA 2) and revise certain aspects of EIA 1.[25]

Among the problems with EIA 1 that critics cited:

- Some of the teacher led activities were not communicative enough; that some produced "signification" but were absent of "communicative value" based on a need to communicate meaningfully.[26]

- The original "distributed learning" design principle produced a disjointed quality with too much variety in content; and a more thematic approach might be useful.

- There were too many choral modeling and repetition drills.

- Related to the preceding two points, there was not enough meaningful context for the language featured in the programs. Inclusion of a story in each (or most) of the programs, rather than only occasionally, could provide more context.

- To further reduce "rote" in the radio methodology, the project might consider including an additional (third) extended teacher-led activity in each lesson.

With respect to the last point, not only did critics accept the central innovation in the EIA 1 revision- the two teacher led activities, as a way to improve communicative teaching, they suggested inclusion of a third one.

Given the range of concerns, however, the project abandoned the original EIA 2 scripts, and based its new EIA 2 series on an entirely new story of three children on an search for the owner of a lost bird. Each lesson consists of three two-minute story segments, each followed by a TLA. After the first and second TLAs, there are songs and immediately after the second TLA there is a structured practice segment. The TLAs retain the same function as in EIA 1, highlighting language from the story segments and structuring meaningful language learning activities. The final activities rotate through a cycle which promotes reading, drawing, role playing, and writing. EIA 2 places more emphasis on the teaching of reading and writing than EIA 1.

There are 130 lessons in the EIA 2 series. The first 30 lessons provide a gradual transition from EIA 1, introducing the characters and the idea of serialized stories and reading simple comic book "frames". As with EIA 1 there is a pupil workbook and teachers'

guide and posters, but there is also a color comic reader which traces highlights from the 100 lesson long story which begins at lesson 31.

Evaluation and Testing of EIA 2

As with EIA 1 in 1993, a multi-level approach to evaluation was used for EIA 2 in 1994. Paper and pencil tests examined a wider range of receptive language skills (listening comprehension, but also pre-reading and reading). A separate project to test speaking skills in EIA 2 and comparison classrooms was undertaken. And as in the previous year, in 1994 focus groups, case studies, and a second qualitative interim project assessment were carried out.

Evaluation Results of EIA 2

In 1994 teachers began using the Level 2 programs in mid-May rather than at the beginning of the school year in January, as the design calls for. Thus, by the time of post-testing in October, they were able to complete on average only about one third of the 130 EIA 2 lessons. In spite of this partial exposure, significantly positive test results were reported by independent evaluators.

- ❖ EIA 2 pupils' learning gains were on average 5% greater than comparison school pupils on a combined test of listening and reading skills despite receiving only one third of the EIA 2 lessons.

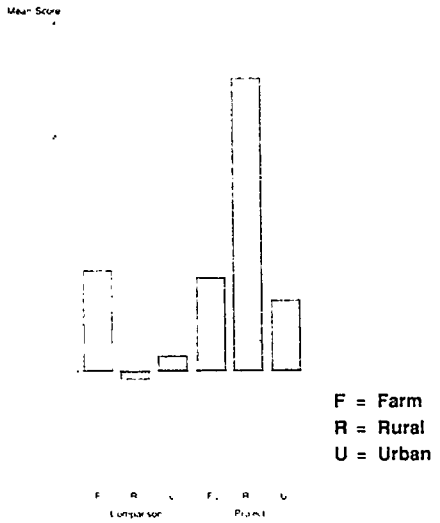
The great majority of EIA 2 pupils tested were the same ones who, as EIA 1 pupils in 1993, demonstrated 20% higher performance than comparison pupils. Thus 1994 scores showed EIA 2 pupils starting from significantly elevated levels relative to comparison pupils. The 5% greater gain attributable to EIA 2 indicates that with only partial exposure EIA 2 pupils widened their margin of English language competence through continued participation in the program.

- ❖ Learning gains attributable to EIA 2 were strongest in rural schools.[5]

Where urban project pupils beginning with average scores of 75.6% improved by 6%, rural pupils beginning at 59.4% improved by 24.9%, reaching similar performance levels. One of the purposes of the project was to address issues of equity and access. It appears that this purpose was met. Those beginning with the least

advantages derived the greatest benefits. Encouraging as these results were, they raised certain questions. Because by design EIA 2 is less prescriptive and more reliant on teacher's skills and actions than EIA 1, there may be more variation in pupil/class performance. It will be useful to conduct further tests in future years when students have the benefit of a complete year of exposure to all 130 lessons.

Mean Learning Gains



Support for the reading/listening test findings came from a separate test of speaking skills developed and conducted in 1994.

> *"Findings showed that language gains in terms of fluency were much the same at both pilot and control schools in the urban areas. These suggested that the English In Action programme was only one of a number of factors influencing fluency gains in these areas. However, language gains calculated in terms of the variety of grammatical structures used were greater at pilot schools than at control schools.*
>
> *"In the rural areas children at pilot schools showed much greater gains, both in terms of fluency and variety of grammatical structures used, than those at control schools. This suggested that the programme was making a significant contribution to the learning of English in environments where there were perhaps not as many opportunities to hear and interact in English as there were in the urban areas."*[28]

Finally, case studies and focus groups demonstrated that acceptance of EIA at Level 2 from teachers and principals remained high.

While many schools were disappointed that OLSET would not be developing a third year of ESL programs in 1995, they understood that the imperative for this period would be revising the programs in the light of feedback to date and extending the delivery system from a cassette-only system to one that included radio-based delivery as well.

The New Mathematics Programs

At the same time as it developed *English in Action*, the project had to develop a new model for radio math. Following its exploratory radio mathematics conference of June 1993, OLSET sought local partners in developing programs. Three groups from the conference expressed interest in collaborating with OLSET. In 1993 two distinct program types were developed and exploration of a third begun.

One was meant to sensitize general audiences to the acceptability of multiple methods of problem solving. Because the collaborating group was interested in "general" audiences and had serious reservations about using audio for students in classrooms, OLSET could commit only minimal resources to it. Still an interesting program was created and distributed.[29]

The second was a series of three programs for Grade 6 and 7 children living in townships near Capetown. This series, called "MathsTime", was based on crime-buster dramas meant to excite and enhance imagery useful in understanding fractions. They aimed to appeal to a 1993 teenage audience and made extensive use of rap music. Worksheets carried some of the instructional burden.[30] An evaluation was completed.

Following the 1993 explorations, development was begun on another math series. From the outset OLSET had been seeking ways to work at the lowest possible grade levels. At this point other collaborators proposed that OLSET work with existing booklets and manipulable materials that they had developed for Grades 3 and 4. And a more systematic and extended process of development of new radio maths programs was begun.[31]

Four positive design features had suggested themselves from the two earlier maths pre-pilots.

- ❖ Drama can exemplify the usefulness of maths in the real world, a key concern.
- ❖ Participatory musical instructional segments are attractive to students.
- ❖ Problems of varying difficulty can be solved during pauses (with gentle music "beds") of varying length.
- ❖ Posing a final problem at the very end of a program and quickly and gently closing can 1) effectively shape an activity, and 2) leave classrooms working on a problem with unlimited time to explore solutions.

The new programs would also explore the use of audio to foster new types of interactions between teachers and students and between students and other students. The programs could approve of students using diverse approaches to the same problem and help them move comfortably to an understanding of number. And as with *English in Action*, regular participation of teachers in such programs could provide effective inservice training and practice of new teaching methods. By listening in on classrooms in which model teachers cultivate multiple strategies and learn from students' inventive approaches, teachers' would be gently encouraged to try new, less rigid methods.

A pre-pilot test of one new program design was done in April 1994. Following evaluation, a 20 minute six segmented format was reached (see below).[12] While the earlier evaluation had made the project cautious about using English as the language of instruction, OLSET's new maths project partners felt that with adequate attention to language in the scripts, programs could be in English as early as Grade 4, and possibly at Grade 3. Teachers would need to assist pupils through "language scaffolding" strategies, translating, interpreting, and elaborating where pupils couldn't cope.

The program relied on a kit of manipulable materials. Each pair of students received a kit containing a set of 1000, 100, 10, 1's number cards; many counters (cardboard circles, though corn kernels could have worked as well); a "100-square" card counting board, a spinner, and a set of colored number strips modeled on cuisinaire rods.

"Many Times" Radio Maths Format

	Segment	Purposes	Procedures/Style
1	Opening	Gain attention, state objectives	Song- generic objectives, glimpse drama and issues to come through "actuality billboard".
2	Math Gymnastics	Recall, practice of prior learning	Often used apparatus. Multiple quick responses cued by radio. "Listen and do", less "listen and say." (15-60 second pauses)
3	In-Depth Exploring	Develop new concepts	Children explore apparatus at length. Activity may derive from brief dramatized problem. Worksheet used to show problem succinctly and graphically, possibly with very light use of printed text. (45-120 sec. pauses)
4	Transfer/ Practice	Reinforce today's work, tie to prior work to expose "sameness."	Modeling, quick problems with simple multiple strategies demonstrated. Listening to characters on radio conversing and/or describing multiple approaches. Sometimes radio also models errors. Show elegance of some solution types. (45-120 sec. pauses)
5	Music	Build "number bonds" via operations drill	Rhythmic songs with regular rests during which answers to simple calculation problems (e.g., random multiplication by 7) are done and voiced in patterned response form.
6	Real Problem/ Goodbye	Develop new concepts, close	Dramatic presentation of post-broadcast final problem. Restatement, clarification by narrator. Graphic representation in print with numbers written on worksheet to state main elements of problem. For individual or pair work. Free use of apparatus.

Program duration 19:45

Evaluation Results of "Many Times"

A 30 lesson six week pilot test was conducted using audio cassettes in 20 schools in four regions. Among the findings of the independent evaluators were the following:

> *"Audio lessons can introduce new 'voices' into the classroom that can contest and supplement traditional pedagogies, giving teachers and pupils opportunities to reflect on their own and others' practices. Different teaching practices and learning processes are thereby introduced.*

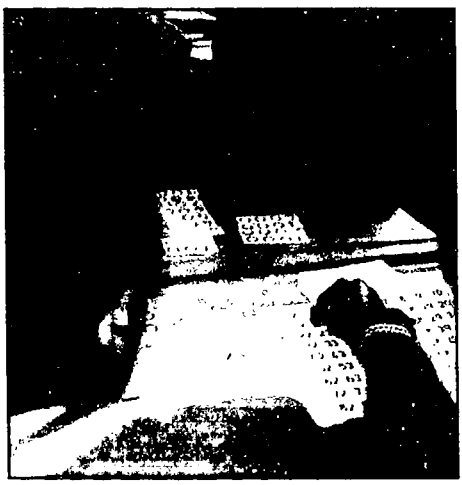
> *"The radio teacher is seen as a non-threatening presence in the classroom giving teachers and pupils time to reflect. Together with the concrete aids, this encourages all pupils, including those who are weak at mathematics to engage with the problems".*[33]

One of the evaluators quoted a teacher as saying,

> *"I learned a lot from the children themselves. How they got different solutions. The kids' solutions are better than your own. The teaching aids are new to them which is good. They had everything next to them for problem solving".*[34]

While South African evaluators noted great promise in the programs, they advised more action research with teachers. The most often cited issue was the language of instruction: while pupils in urban areas were better able to manage the English, rural pupils often struggled. Some pauses in the program were seen to need adjustment as well.

The programs relied on a kit of manipulable materials.



In keeping with current practice in maths reform, the evaluators felt the programs would benefit teachers more with greater inservice teacher training. Evidence suggested that teachers needed additional support in such areas as managing language scaffolding strategies and effective use of manipulables. Yet even with little inservice support, it was demonstrated that teachers' methods could be upgraded through contact with classroom audio.

"Original" and "New" Models: What's the Difference?

We have described ways in which the South African IRI English and mathematics series differed significantly from earlier IRI designs. Some of the specific differences relate to:

- using students' experience and personal approaches to self expression and problem solving;
- emphasis (especially in EIA 2 and math) on use of audio drama (for natural language/context, math in real life);
- new, "musicalized" instruction formats;
- acceptance that a free market exists for instructional materials in South Africa and that project materials had to compete with commercial publishers' colorful offerings;
- emphasis on peer and expert assistance through Teacher Support Groups;
- substantial use of modular video for teacher training.

These distinctions fall under three areas of difference of a more general nature:

A multichannel approach: more explicit attention to IRI as only one of a wide range of learning channels to be integrated (e.g., video, audio cassette, print, experts and peers providing face-to-face teacher support).

The project needed to be a vital part of a crash program of educational renewal. It had to simultaneously address problems of pupils' learning and teachers' skills and confidence. It also wanted to address issues of community involvement in education. In doing this, it would need to be cost conscious while modeling something more than a "least cost" system.

To do this, it devised a system that could be flexibly tuned to available funds. On the materials side there are more and less expensive options: cassette recorder/players or radios; audio cassettes or radio broadcasts; color comic readers or black and white, etc. For teacher development, the project created and

followed an "optimal" system model, seeking to do its best service in the critical transition period. Under this model in one year a teacher would participate in face-to-face workshops with trainers (3 days), TSGs (4), monthly visits from regional coordinators (5), and receive audio cassettes (2-5). But understanding government budgets and possible problems in sustaining intensive teacher training at scale, the project also costed less intensive "intermediate" and "minimal" teacher development systems.

The project is discussing an accreditation scheme for teachers through association with other ESL projects and certificate and degree granting institutions. This would add value to its teacher development efforts. Here, voluntary written assignments for teachers could be distributed with the audio tapes and through a mixture of conventional correspondence methods and the unique practice support provided by daily audio (EIA for example) and the TSGs, a more effective and highly incentivized system could be created.

Finally, on the community development side, involving parents in focus groups and teacher support meetings built support for the "culture of learning" and participation in school life. Many of the activities suggested in the materials make use of the community as a learning resource.

Thinking both systematically and laterally, the project has also discussed producing an "Education Forum" radio program. This would be a call-in/magazine program covering a wide range of issues relevant to parents, teachers, and the entire education community.

The new model exploits 65 hours of classroom contact with teachers yearly.

Adapting to changes in teaching and learning: the project adopted greater integration of cognitive and constructivist learning theories, promoting communicative and investigative teaching practices. In tune with these theories and practices, the programs build on prior knowledge and accommodate personal styles/approaches to learning and problem solving. The two levels of EIA and the final math series (to varying degrees) were hybrids of earlier interactive approaches (e.g., radio-led practice of language structures, math table "drill") and new approaches which called for teachers to structure activities making use of manipulables, local resources, children's personal knowledge, and other unpredictable elements.

Integrating teaching practice into radio lessons: the new programs described and called for open-ended teacher-led activities during the radio lessons, thus accommodating progressive development of teachers over years of engagement with the same series. This commitment meant higher risks of ineffective teaching under worst case conditions, but it also meant that excellent teachers would not feel unappreciated or that programs had been "teacher-proofed." This design makes more room for teacher growth. Perhaps with the exception of radio science, the South African designs make room for (and indeed call for) teacher excellence in a way no IRI programs have before.

As a system for teacher development, the new IRI model exploits 65 hours of classroom contact with teachers each year (virtually the only guaranteed time); and teachers develop an enriched set of skills based on the many ideas for child-centered activities they encounter in the programs.

How Well Do the New Models Work?

English In Action

Evidence from evaluations in terms of student performance shows that the new EIA models work. While there are some differences between EIA 1 and 2, there is a key commonality in the teacher led activities. These have been judged to be innovative, acceptable to teachers, and effective. The series also has a very good chance of becoming institutionalized as a part of the South African primary education system (for at least as long as any publisher's product can be). This is noteworthy in that all evidence suggests that the original EIA programs would not have had any chance of institutionalization in South Africa.

Tests have shown EIA to be very effective at both levels. EIA 1 pupils performed on average 20% better than comparison pupils. EIA 2 children beginning at these elevated levels widened the margin of difference attributable to both levels of the program by an additional 5% with less than 50% exposure to EIA 2. And significantly, the most disadvantaged students, starting with the lowest scores, showed the greatest learning gains.

A test of speaking skills confirmed EIA 2 pupils' superior performance over comparison students, and found special benefits for rural students where school-based English study may be virtually the only exposure to English that children have. Both speaking and listening/reading tests indicate that English language deficits of rural children relative to their urban peers was largely eliminated in two years.[35]

Evidence also clearly shows that teachers' skills are being developed. Independent external evaluation confirms that *"...comments made by the teachers by and large indicate that involvement in the programme has led to improvement in their teaching ability".*[36]

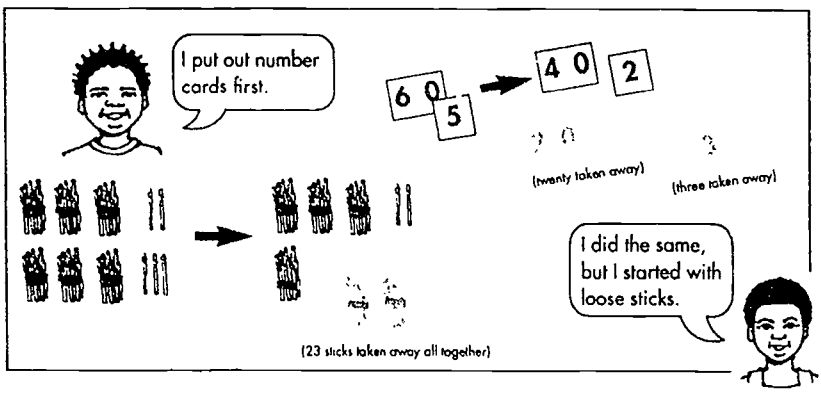
Of course, EIA can only be said to "work" if it is affordable. Materials costs for EIA are very competitive with other publishers' options. A study of costs (using the conventional five year depreciation schedule for all materials) found that with radio distribution (as distinct from cassettes) EIA 1 costs per pupil in a class of 45 (close to the current national average) were estimated at R4.19. Other publishers' Grade 1 materials ranged from R6.67 to R11.39. Materials costs for EIA 2 by radio were estimated at R7.25 and others' ranged from R9.91 to R11.39. In both cases, even when used by cassettes EIA was only slightly more expensive than the most expensive alternative. Clearly the system has been designed to provide an financially attractive option to education planners.[37]

The other main variable cost is that of teacher development. How little teacher training can produce significant teacher growth while assuring student learning? By outlining a "minimal" model of teacher support the project in effect proposed an answer to this question. For various reasons, some teachers, in fact, received "minimal" support. While they would have benefited from more services, they demonstrated that with only the two-day introductory workshop, and some audio cassette support, (as well as the material support of the daily classroom audio and the print for teachers), they and their students could stay creatively engaged with and gain from the system.

New Mathematics Programs

There were simply not enough programs to conduct a valid evaluation of learning outcomes. The 30 mathematics programs in the series *My Maths: Many Times*, together with manipulables and print, were observed to promote positive shifts in teachers' and students' approaches to teaching and doing maths.[38] Teachers frequently expressed their appreciation of the training and materials offered.

Frame 2: A taxi takes 65 litres of petrol but it uses only 23 litres in a day.



Word problem

The taxi driver drove 260 kilometers in one day. The next day he drove only 125 kilometers. How many kilometers was he short?

Though the programs were designed to provide subtle and gradual inservice training, it was evident that many teachers would have been able to manage much more effective lessons much earlier if the project had provided more face-to-face training. The observed effects in classes depended in part on teachers' prior maths inservice training (some had none).

Some teachers had already received inservice training by the project's partner NGOs and these teachers were better able to integrate the radio in their teaching. At a focus group meeting, Lisbeth, a Soweto teacher said, *"Radio found us on the way and accelerated us"*. Overall, however, evaluators questioned the ability of average teachers with no prior inservice training to come to a two day preparatory workshop and then to take away a radio (or radio/tape players and cassettes) plus some new materials and teach successfully with them.[39]

Radio has difficulty dealing with some aspects of constructivist mathematics. Children are not "programmed" to respond in the same way to solving a problem. Consequently, they take different lengths of time. Also, by choosing to weave students' use of manipulables into the audio programs, some children's investigations are sure to be interrupted. So, the most frequently cited problem in these pilot programs was that even the extended pauses (1-2 minute) were often felt to be too short. Some teachers found this to be less of a problem than others. One teacher said, *"It was hard at the beginning but now it is OK, the children are time conscious now. It sharpened the pupils' listening skills and encouraged communication. Children think faster than before."*

A fully constructivist environment may require setting problems for students only as the radio program signs off. (In the OLSET programs problems were set this way, though not exclusively so.) Alternatively, the programs may be designed with stopping and starting of cassettes in mind.[10]

The use of English in the programs was cited as the other main problem. Regional differences were noted with fewer difficulties apparent in multilingual urban townships than in deep rural areas which are largely monolingual. Actual effectiveness depended both on teachers' general maths teaching skills but also on their language "scaffolding" strategies.[11]

One evaluator suggested that the programs could be used for *"teacher support, where the site of delivery is teacher workshops rather than classrooms. Teachers would then be free to decide whether or not to use the lessons in their classroom untranslated, or mediate their use by translating lessons or to use them to prepare her lessons and not introduce them to the pupils."* [12]

What Teachers, Principals, Parents Said

In addition to analytic reports, the project's case studies and focus groups furnished views of teachers and others directly involved in the project:

> *"It has improved my methods of teaching. It has improved my confidence in teaching English. It has made it simple for me to communicate with the pupils."* [13]

The principal of the Roodewal Farm School in the Free State described years of struggling to provide education under deprived circumstances and his encounter with the OLSET program:

> *"From that time improvement starts at my school. Parents start sending their children at my school because of English In Action... Even teachers we have improved a lot... The most important consideration for the project is that people learn. The pupils live with stimulation, they learn to be confident since they met this OLSET programme".*

'RLP provides teaching and learning aids for both teacher and child'.

Principal Florence Makubela from Soweto's Giyani school:

> *"The children are free to participate in the lessons. They communicate easily and enjoy the rhymes, the games they play which makes the children learn with ease. The vocabulary increases daily.... The radio learning project has been one of the best approaches tried by the school which provides teaching and learning aids for both teacher and child."*

Principal Welcome Hlela of KwaZulu/Natals' Mdumezulu Community Primary School showed how the project has promoted links with the parental community and motivated learning:

> *"EIA has been effective in our school. It has added to the items performed during our parents day, because pupils dramatise the radio lesson for the parents...Pupils do not need to be told when it is time for English. They tell the teacher themselves that the time for English has come".*

'The pupils learn to be confident since they met this programme'.

Many principals and teachers note that enthusiasm for the lessons translates into reduced absenteeism:

> *"The children's attendance has improved and also the relationship between the teacher and the pupils has greatly improved".*
>
> Teacher, Visnet Farm School

> *"Since we have this project the state of absenteeism is very very low comparing the past years. Pupils enjoy coming to school every day".*
>
> Principal, Roodewal Farm School

And, confirming that teacher development is being accomplished, Ms. D. Mbuli, a Grade 2 teacher from Matlapaneng school in Randfontein, described the value she finds in teacher support groups:

> *"Let's share more ideas of methods and teaching styles by having more meetings of this kind".*

Her colleague, Ms. E. Motsepe agreed:

> *"I think that I have gained a lot. I made all effort to attend all the meetings that were organized. These served as a common ground for sharing of ideas amongst teachers and the implementors, too".*

Reflections on this Model of Change

The changes in the design of IRI programs that occurred in South Africa were the product of a number of forces and processes, the understanding of which may be useful for future projects. These forces include:

- the need for wide consultation, participation and consensus; and
- the need for relevant curriculum materials, created and evaluated locally.

How do we measure the efficacy of the project's adaptation/development model? In the past, perhaps the ultimate criterion of the "success" of IRI has been its institutionalization by educational administrations - usually governments. This has always been a goal of the SARLP. It is too early to predict to what extent the project will be absorbed and/or promoted by government. With decision making in education in South Africa decentralizing to the nine provincial Ministries of Education and Culture, there will be no single act of adoption for the entire country - as in some other cases of IRI - no single marker of success.[44] Use at scale will be gradually attained. That the project has been formally accepted for implementation by a number of the new provincial ministries indicates that the change process was healthy and adequate. It has been recognized as an instructional system designed to achieve quality as it can be effectively adopted on a very large scale.

But as larger scale adoption occurs it will be only another beginning. Sustainability will depend on the strength of collaborations of associated institutions, their commitment, and their skills. These and many other factors will affect government choices, and "success" in market terms can never be assured. Nor should it be the sole measure of the value of a system's design.

Other criteria should include whether and how end users see needs being met. All indications are that students, teachers, principals, and parents see great value in the system.

So who do you listen to? In a highly fluid political situation, with future authorities and criteria uncertain, the project had to reach out widely and integrate relevant ideas from progressive subject experts, teachers, and principals. However, materials development can be easily muddled, and great inefficiency result if there are "too many cooks". What to do if an expert feels that a design is fundamentally flawed and most teachers believe it is excellent? Whose opinion counts? In an atmosphere of democratic inclusion, everyone's should. But it's impossible to accommodate all ideas in a materials development project.

With much invested in former IRI designs, it might have been tempting to cite constraints imposed by budgets, time, and available creative resources, and downplay the importance of local critiques. Instead, the project responded honestly and thoroughly. It learned from its critics and reflected this learning in the project materials and support systems. What resulted was an innovative and flexibly designed, flexibly costed, multichannel system fusing student learning and teacher development. There is no simple, replicable way to respond creatively to challenges to a design. However, useful suggestions might include:

- ❖ articulating current operating principles (in pedagogy, and materials design);
- ❖ understanding the research those principles are based on;
- ❖ being willing to question the foundations of one's practice and responding creatively to new ideas with more new ideas.

The early 1990's in South Africa was a dynamic and fertile period. The country's unique history produced strong and inspired imperatives. The powerful demand for progressive thinking about designs for education in the new South Africa strengthened IRI programs and systems. As a result, these programs and designs now have a very good chance of gaining widespread acceptance within South Africa. It is also likely that their offspring will have greater acceptability in other countries. For while South Africa is unique, the same transforming forces are surely at work elsewhere. Had it not been South Africa, another country would soon have stimulated similar changes.

Postscript

To date the SARLP has reached approximately 35,000 pupils in 600 classrooms in six of the country's nine provinces. While this is a large group to serve, it is very small compared to the national potential envisioned. In May 1995 the project began national broadcasting by FM radio.

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Endnotes

1. From its inception to date the project produced and evaluated 130 half-hour audio programs for Grade 1 English; 130 half-hour programs for Grade 2 English; and a ten-week print and audio cassette-based school readiness program. Based on evaluations these materials were revised. It also produced and evaluated a series of 30 twenty-minute programs for Grades 3 and 4 math; and a separate model series of three 25-minute programs for Grade 7 math. All programs include integral print for students and teachers. Also, audio and video programs were produced for teacher training. All of this work was embedded in a flexible system of workshops and schools-based support for teachers.

2. The SARLP has not confined itself to radio as a delivery mechanism, employing cassettes during the developmental phase. It now supports both audio cassette and radio distribution mechanisms. It now speaks of "audio-assisted" instruction in many cases where IRI might have been used. (It has seriously considered changing the project's name from the "South Africa Radio Learning Project" to reflect its committment to freedom of choice and flexible delivery options.) It would certainly be more accurate where we speak of the "radio lessons" to use "radio-audio" or simply "audio" (in the inclusive sense). However, where we discuss radio or audio programs somewhat interchangeably, with the focus on the program and not the distribution mechanism, we tend here to use the term radio.

3. Leigh, Stuart, *The South Africa Radio Learning Project, Final Report, English In Action, A Pre-Pilot Study*, June 1992, Appendix 2.

4. Rodseth, Vic, independent assessment in Leigh, *op. cit.*, Appendix 4.

5. Langhan, David, independent assessment Leigh, *op. cit.*, Appendix 4.

4. Provisioning of schools (largely books) had been done by a few large publishers who maintained very close relationships with the government education departments. Delivery was spotty and options were multiple but few. Approved texts guaranteed substantial profits and so government approval and expressions of interest from schools was jealously sought and fought for. In addition to the few big publishing houses there were also other

small NGO publishing projects. Most of these were also seeking relationships with the established publishers, just as publishers were (are) seeking fresh materials from the NGOs.

7. "Behavioral and associationist theories have now been subsumed by cognitive theories, which often add insight to their foundations". From Moulton, Jeanne, *Interactive Radio Instruction: Broadening the Definition*, LearnTech Case Study No. 1, January 1994.

8. Moulton, Jeanne, *op. cit.*, p. 29-32, 43.

9. Imhoof, Maurice and Christensen, Philip R., eds., *Teaching English by Radio, Interactive Radio Instruction In Kenya*, p. 59-63.

10. It is unfortunate that the early discourse around IRI English relied so heavily on the terminology of behaviorism. In South Africa, any instructional system which seems largely based on such foundations is suspect. In fact, much in the original "English In Action" programs and methodology cannot be defined in terms of simple stimulus and response. Yet there is enough that appears to be based on audio-lingualism to give critics cause for concern.

11. Stern, H. H., Fundamental Concepts of Language Teaching, 1983, p. 299-301. The decline of behavioristic explanations of language reaches back the genesis of psycholinguistics as a discipline and to Chomsy's 1959 article in the journal "Language" on Skinner's 1957 book, Verbal Behavior. Stern writes, "It is interesting to observe that the main theoretical concepts which were introduced by research since the mid-seventies by implication expressed a bias against the contribution of language teaching and bias in favour of naturalistic language learning". In South Africa particular attention has been paid to the work of Krashen who drew a firm distinction between language "learning" and language "acquisition", the latter being seen to be more fundamental., p. 413.

12. Stern, H.H., Fundamental Concepts of Language Teaching, 1983, p.405.

13. Goldstein, C., P. Mnisi, T. Tshongwe, "Medium and Message", p. 2., in *Political Dimensions of Mathematics Education*, NECC, 1993.

14. Murray, Hanlie, Alwyn Olivier, and Piet Human, *Junior Primary Mathematics: The Development of Number Sense*, Primary Mathematics Project, Communique No. 15, Research Unit for Mathematics Education, University of Stellenboch, July 1992.

15. Friend, Jamesine, Barbara Searle, and Patrick Suppes, *Radio Mathematics in Nicaragua*, 1980, p.71.

16. Imhoof and Christensen, *op. cit.*, p 23.

17. Imhoof and Christensen, *op. cit.*, p. 60

18. Macdonald, C. A., *The Main Report of the Threshold 2 Project*, 1993.

19. A primary school language policy was promulgated in 1994 enshrining "the equality of all languages", freedom of choice of medium of instruction at the school level (and indeed at the level of the individual), "multilingual education" as a goal, and "gradual introduction of a language of wider communication, such as English". (Draft of *A Policy Framework for Education and Training, Education Department of the African National Congress*, January 1994. p. 59-64).

20. Language of instruction issues were just as critical to the development of the mathematics programs as they were to *English In Action*. The project attempted to produce math programs in English and find the grade level at which students and teachers could succeed with them. Where a transition to another medium of instruction has occurred or is imminent, skilled "codeswitching" and "language scaffolding" can greatly facilitate learning. One math materials evaluator (Mashishi) noted that "scaffolding is a far more complex concept (than codeswitching) and its use in a teaching/ learning situation requires training and practice".

21. Leigh, Stuart, Gordon Naidoo, and Lebo Ramofoko, "New Dimensions in Audio-Assisted Multi-Channel English Instruction", in *The Journal of the Southern African Applied Linguistics Association*, 1994.

22. Test scores for project and control schools exist for two years of *English In Action* (see Arnott, Mentis, and Mansfield, as well as Hingle); a cost study based on various models of teacher training and materials provision was done (see Cobbe).

23. Arnott, Mentis, and Mansfield, *A Summative Evaluation of OLSET's "English In Action", Radio Learning Programme*, 1994, p. 18.

24. Nene, Sbongile, from Potter, Nene, Arnott et. al., "OLSET Focus Group Project", in *The Development and Implementation of English In Action in South Africa: Interim Evaluation Report*, September 1993, p. 55.

25. Potter, Charles, *The Development and Implementation of "English In Action" in South Africa: An Interim Evaluation Report*, September 1993, p. 1-6.

26. Advisor Vic Rodseth assisted the project in clarifying the distinction between signification and value as made by Widdowson in 1972. (See Rodseth, J.V., *The Molteno Project Report, Mother Tongue Reading Instruction and English Language Teaching in African Primary Schools, Evaluation and Recommendations*, Rhodes University, 1978, p. 14.)

27. Arnott, Mansfield, and Mentis, *A Summative Evaluation of OLSET's "English In Action" Radio Learning Project*, 1995.

28. Hingle, Ishbel and Linington, Viv, *The Design, Administration and Evaluation of the OLSET Test of Oral Production - a Pilot Study*, 1995, p. 1.

29. This project was done with Hanlie Murray of RUMEUS (Research Unit for Mathematics Education, University of Stellenbosch). An attempt was made to include it as part of the 1993 independent evaluation of the PMP/OLSET math series (see *Interactive Audio-cassette Instruction in Primary Mathematics: A Pre-pilot Evaluation*, by Adele Gordon and Cyril Julie); however, no formal evaluation of the single RUMEUS/OLSET program could be completed.

30. This project, entitled "MathsTime", was undertaken with the Primary Maths Center - Western Cape. It was evaluated by two independent maths educators. See "Interactive Audio-cassette Instruction in Primary Mathematics: A Pre-pilot Evaluation", by Dr. Adele Gordon and Dr. Cyril Julie under the heading "MathsTime" in the compendium *Evaluations of Olset's Collaborative Multi-media Mathematics Projects, 1993-1994*, LearnTech/OLSET, 1995.

31. The lead collaborator in this project was Nick James of the Center For Productive Education of the National Productivity Institute (and formerly of the British Open University). James and the Maths Center for Prmary Teachers (Johannesburg) developed a series of booklets called "My Maths" for primary maths at Grades 3 and 4. The series was organized in 5 modules roughly tracking the following sequence: addition and subtraction, multiplication, division, fractions, and shapes. The OLSET pilot project module dealt with multiplication, and it used the same title as the booklet it tied in with, "Many Times".

32. The project was assisted in this regard by Dr. Alexander Romiszowski of Syracuse University during two weeks in April 1994. See his *Primary Radio Mathematics in South Africa, Report on Mission to OLSET*, June 1994.

33. Gordon, Adele, "Evaluation of the OLSET Multi-Media Programme 'My Maths: Many Times'", December 1994, p. 21, in *Evaluations of OLSET's Collaborative Multi-Media Mathematics Projects, 1993-1994*, LearnTech/OLSET, March 1995.

34. Potter, Charles, "An Evaluation of OLSET's 'My Maths: Many Times'", 6.1.2, in *Evaluations of OLSET's Collaborative Multi-Media Mathematics Projects, 1993-1994*, LearnTech/OLSET, March 1995.

35. Arnott, *op. cit.*, 1995, p. 1.

36. Potter, Charles, *An Evaluation of "English In Action", Second Interim Report*, December 1994, p. 22.

37. Cobbe, James, *Report on the Economics of OLSET's English In Action*, July 1994, p. 47-48.

38. Evaluation was largely qualitative, based on classroom observations, questionnaires, and focus groups. While testing of pupils was done before and after the intervention, analysis of results done to date was based on observations of a small sample of the total. Future statistical analysis of the complete set is possible.

39. Ideally, use of the programs should be introduced with more than the minimal teacher training offered during the pilot. The project took the stance that evaluators would not intervene and provide training during frequent observations. This more accurately modeled what would happen in a large scale intervention.

40. Cassettes appear to have certain advantages over radio, such as allowing stopping and starting, free choice of time of use, and replay for revision. Radio broadcasts have other advantages. Costs are lower for purchase and maintenance of radios (vs. radio/tape players); for battery consumption (no need to wind tape with motors); and for program distribution (depending on the cost of airtime, loss of tapes, etc.). Also, with cassettes teachers progress through the syllabus at very different rates. While it seems better pedagogy to have teachers personally shape progress through the syllabus rather then move to a standardized schedule, cassette use can result in excessive revision, failure to cover a year's content, and

missing entertaining serial aspects of the design. A policy of free choice of radio listening or cassette purchase (or even recording off-air) allows for standardized broadcasting or individual departure from a fixed schedule.

In the future, where there is such a committment to free choice and multi-channel design, it may be desirable for reasons of accuracy to rename IRI. Even elegant neologisms take time to get established, and no convincing replacement now suggests itself. The term "multi-channel" while accurate is imprecise- IMI (Interactive Multichannel Instruction)? IMCI? Perhaps IAI (Interactive Audio Instruction), but here the emphasis is on audio. An accurate term (with appropriate emphasis on the teacher) was developed in South Africa: "Interactive Audio-Assisted Instruction", which offers the acronyms IAAI or IA-AI.

41. Teacher, cited in Potter, *op. cit.*, 1995, p.1.

42. Where English language versions of the mathematics programs for these grades are acceptable, certain changes ot the 1994 format are recommended, include lengthening certain pauses and fusing the "In Depth Exploring" and "Transfer/Practice" segments. Beyond these changes the main issue for expanding use of such programs at these grade levels is adapting programs into various African languages.

43. Gordon, *op. cit.*, p.23.

44. As of this writing three of the nine provincial Ministers of Education and Culture have asked OLSET to provide service on an expanded scale and daily broadcasts are building interest nationally.