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An Evaluation Report

MODERN AIDS TO EDUCATION

Project 620-11-690-203

June, 1968

Educational Testing Service
Princeton, New Jersey

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Broadcasting Media in the Teaching of Primary 5 English in Nigeria
An Evaluation Report

S. M. Zdep

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The authors would like to express their appreciation for the efforts of the Schools Broadcasting Unit in northern Nigeria, and the project Field Liaison Officers, Mr. Peter Callas and Balla Ibn Garba, without whose cooperation this report would not have been possible.

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
List of Tables	iv-vv
Preface	vi-vii
Abstract	1-3
Project History	4-5
Implementation	5-6
Scope of the Work	6
Advisory	7
Executive	7
Training	7
The Process of Evaluation--A Preface	8
Initial Considerations	8
Basic Design	8
Assigning Groups	9
Measuring Instruments	9
Sources of Error	10
Sex Differences	11
Interpretation of Results	11
Evaluation Design--Northern Region	12
Schools	12
Hypothesis	13
Treatments--Assignment of Schools	13
Treatments--Other Factors	13
A Further Attempt at Control	14
Conditions and Focus for the Study	15
Measures Used--Locally Constructed Achievement Tests	15
Measures Used--Additional Material	17
Analysis of Achievement Tests	18-23
Pretest, January, 1967	18
Posttest, November, 1967	19
Analysis of Reading Test	21-23
Achievement Tests--Total Gains and Differences	24-32
An Analysis of Sources of Influence	24
Providing a Base-Line	24
Other Motivational Aspects	25
Crucial Sources of Influence	25

<u>SECTION</u>	<u>PAGE</u>
First Category of Effects	27
Second Category of Effects	27
Treatment Differences	30
Discussion--Posttests	31
Discussion-- <u>Reading 12A</u>	31
Results From One School in Which Three Classes Participated	32
Student Attitudes Toward this Educational Experience	36-40
Validity Check	36
Analysis of Attitude Questions	37
Attitudes of Teachers and Headmasters	41-43
Conclusions and Recommendations	43-48
Conclusions	43
Recommendations	46
Recommendations (Postscript)	47-48
References	49
Appendix A. Summary of Pretest and Posttest Scores	51-53
Appendix B. Statistical Treatment of Data	54-59
Appendix C. <u>Reading 12A</u> --Administration	60-62
Appendix D. Data on Participating Classes	63-65
Appendix E. Language Skills	66
Identification of Schools	67

LIST OF TABLES

<u>TABLES</u>	<u>PAGE</u>
1 Variables involved in the MATE-Nigeria evaluation	14
2 Composition and schedule of achievement testing program	16
3 Average unadjusted pretest achievement scores in English for each of the treatments	18
4 Percent of children passing each of the items on the Pretest and Posttest	19-20
5 Percent of children passing each of the items on <u>Reading 12A</u>	22
6 Average <u>Reading 12A</u> scores for classes at the end of the school year	23
7 Average gains in student achievement tests at the end of term 3	24
8 Mean posttest scores used to assess Hawthorne effect.	25
9 Schematic representation of analysis of variance design showing number of students in each of the cells.	28
10 Summary of analysis of covariance on student achievement scores for males and females in which teacher skill is the variable considered	29
11 Summary of analysis of covariance on student achievement scores for males and females in which treatment is the variable considered	30
12 Adjusted achievement means for groups in the different treatments	30
13 Average pretest and average adjusted posttest means for classes in School 10	33
14 Adjusted achievement mean scores for parallel tests, unique tests, and reading-test for classes in School 10	35
15 Percent of students responding to the question "Were you able to understand the broadcasting very well?"	38
16 Percent of students responding to the question "How do you feel about your school?"	38
17 Percent of students responding to the question "How do you feel about learning English?"	38
18 Percent of students responding to the question "How do you think your teacher feels about you?"	39
19 Percent of students responding to the question "How do you feel about the book <u>Straight for English?</u> "	39
20 Percent of students responding to the question "How do you feel about the use of (Television or Radio) in school?"	39

TABLES

PAGE

21 Percent of students responding to the question "Would you like to use (Television or Radio) for lessons in English next year?". 39

22 Percent of students in TV classes responding to the question "Would you like to have TV lessons next year in the other subjects listed below?" 40

23 Percent of students in Radio classes responding to the question "Would you like to have Radio lessons next year in the following subjects? 40

24 Percent of students in the Contrast classes responding to the question "Which do you like better?" 41

Preface

In September 1967, the Washington County Board of Education in Hagerstown, Maryland, requested that Educational Testing Service (ETS) consider the feasibility of completing the analysis of data previously gathered in a planned evaluation of the effect of supportive educational broadcasting in Nigeria carried out under U.S.A.I.D. Contract 620-11-690-208.

After consultation, two ETS staff members conducted a feasibility study in Nigeria during the month of November while the final achievement tests for the evaluation were being administered. On the basis of these experiences the ETS team decided to conduct an analysis in an attempt to provide meaningful interpretation of data gathered during the evaluation process.

Consequently, this report is based upon an experimental design that ETS played no part in formulating. It tries to answer the question that the fieldworkers were most concerned with--the question of the influence of broadcasting, by television or radio, on the English achievement of Nigerian students.

That an evaluation was possible at all seems, in retrospect, largely due to the untiring efforts of the Northern Nigeria Schools Broadcasting Unit, and particularly to the attempts of the field liaison officers, in gathering every item of relevant material. Without such material the complexities of evaluation in this rapidly expanding and constantly changing system of education would have been obscured both to the consultants and to the readers of this report.

It is against the background presented here and against similar backgrounds all over a continent undergoing dramatic social and technological change that future educational innovations will occur. The report is offered to readers with this thought uppermost in our minds.

S. M. Zdep

S. H. Irvine

Abstract

This report presents the results of an evaluation of TV and radio supportive educational broadcasting at the Primary 5 level in northern Nigeria. The project was carried out by the Washington County Board of Education, Hagerstown, Maryland, under a contract with the United States Agency for International Development. The role of Educational Testing Service consisted of analyzing data gathered by the Maryland group in connection with the evaluation. It should be pointed out that Educational Testing Service did not participate in the formulation of the evaluation design nor the gathering of the bulk of the data; nevertheless, from experience gained on a factfinding trip to northern Nigeria and a subsequent detailed study of the data, Educational Testing Service concluded that the data were of such a nature as to allow valid statistical analysis.

Approximately 1200 students in 35 classes participated in this evaluation in which English grammar was taught. All classes utilized regular classroom teachers, but in addition, some had supportive TV broadcasts, others had supportive radio broadcasts, and the Contrast classes had neither.

A great many restraints were placed on the study by the extended nature of the design which spanned an entire school year, the civil disturbances which occurred, and by consequent difficulties of liaison with various agencies which resulted in the abandonment of the evaluation in the Eastern, Western, and Federal regions in Nigeria. Therefore, those results which are reported herein are based on a restricted sample which makes generalization to other parts of Nigeria inadvisable.

The objective of the evaluation was to assess achievement gains in English for the TV, Radio, and Contrast classes as well as to assess the attitudes of both students and teachers toward the introduction of broadcast media. The

achievement tests constructed were based upon the textbook used by all classes, and the test items proved to be far more difficult than was desirable. The result was that no differences in achievement could be demonstrated among classes exposed to different treatments. Those English achievement differences that were observed were attributed to differences in teacher skill rather than to participation in TV, Radio, or Contrast classes.

This does not imply that treatment differences did not exist, but merely that they were not measured by the English achievement tests. The results of a post-test administered by Educational Testing Service entitled Reading 12A indicated that classes exposed to TV, on the average, outperformed classes in the Radio and Contrast conditions. Inasmuch as Reading 12A measured English comprehension and was based on a visual-verbal format, it was not surprising to discover that students in the TV classes had developed these skills to a greater extent than students not having this experience.

In terms of attitude assessment, students in both the TV and Radio classes had positive feelings toward the broadcast media, and teachers expressed similar feelings. In addition, teachers' knowledge of teaching methodology appeared to have been enhanced by the broadcasts, and the motivational value to teachers provided by these modern aids should not be overlooked. The major criticism of the teachers was that the broadcasts were too few and not nearly long enough.

An interesting discovery in terms of teacher motivation was discovered in the single school that had a class participating in each of the treatments. The teacher chosen for the Contrast class was disappointed at not having been selected to teach either the TV or Radio class. Thereupon, at the outset of the study she stated that she would do all in her power to see to it that her class outperformed the other classes having the added benefit of TV or Radio instruction. Although her outlook in this matter destroyed the intended comparability of classes, her determination did result in a higher average score for her class, indicating that a motivated teacher can sometimes outperform the benefits provided by modern aids to education.

In addition to the major objectives of the study, some concrete evidence pertaining to the suitability of subject matter for the Primary 5 level was discovered. Item analyses of the achievement tests indicated that students registered substantial improvement on test items dealing with language usage, but on the other hand, they failed to learn a great deal of the material involving the mechanics of the language. Perhaps this might indicate that the teaching of English grammar at this stage is inappropriate and should be postponed. Concentration on English usage and comprehension might benefit the pupils more at this time.

Project History

A project agreement in the area of educational radio and television was signed by the International Cooperation Association ^{advised by} and the Nigerian Ministry of Economic Development in June, 1962. The International Cooperation Association, now the United States Agency for International Development (U.S.A.I.D.), agreed to give such assistance and advice as the Nigerian Government requested in the production, distribution and transmission of educational broadcasts. The agreement stipulated that U.S.A.I.D. would supply a U.S. contractor who would assume, with Nigerian colleagues, responsibility for planning and implementing the project. The Washington County Board of Education, Hagerstown, Maryland was subsequently asked to provide this team. The choice was made in view of their extensive practical experience in the field of educational radio and television broadcasting. Their schools had at that time completed a five-year project sponsored by the Ford Foundation and the Electronic Industry Association in which broadcasting resources were used to enhance and extend their instructional programs. No attempt was made, however, to have Nigeria copy this project; it was intended that the Washington County experiences would serve as a springboard for the development of a program unique to the Nigerian situation.

A project proposal was submitted on January 21, 1963. The proposal outlined the general aims, objectives and plans as foreseen by the Maryland group. It was their feeling, however, that they did not know enough about Nigeria to submit a series of specific plans. As a result of this, four staff members were sent to survey the utilization of schools broadcasting facilities of Nigeria in the spring of 1963. The field study was specifically designed to review existing equipment and to determine the kind of expansions and modifications required. Then, after conferences with Nigerian officials, they were to prepare a working plan and budget. The recommendations resulting

from this study served to give direction to the project's development. The staff returned impressed with the excellent broadcasting facilities already available and under expansion. Some educational programs had existed as early as 1953 and by 1961 Northern and Western Nigeria were producing eight different radio broadcasts thirty weeks of the school year. To best meet the Nigerian needs, the Maryland staff proposed a six-year project sequence: the first two years would be devoted to orientation, planning, and decision making in Nigeria; the remaining four years would consist of carrying out plans, adjusting the program and evaluating the results.

From July to September, 1963, a seminar was conducted in Hagerstown with the Washington County Board of Education, U.S.A.I.D., and Nigerian officials and teachers in attendance. The results of these meetings consisted of the development of project workplans, specimen lessons, and equipment requirements. In addition, it was decided to station seven permanent staff members in Nigeria, two of whom would live in the Northern Region.

Implementation

The considerations that guided the formulation of strategy for putting the recommendations of the seminar into effect were primarily of a technical nature. First of all, TV and radio broadcasts were restricted to areas equipped with transmitting facilities. Second, it was desirable, in view of the considerable regional autonomy then enjoyed by the Ministries of Education, to train personnel in all four regions of Nigeria--Northern, Eastern, Western, and Federal. Also, the proposed experiment was meant to span primary and secondary schools, as well as initial instruction in the teacher training colleges.

The Federal and Western regions were selected for secondary school work because of the ministry's desire to concentrate on science at this level; the Eastern region concentrated on teacher training, especially since new centers

of higher learning were being established at Enugu; and the Northern region initiated an intensive primary school program.

Work in all four regions progressed slowly but then with increasing tempo until the end of 1965. By that time all four teams had attempted to produce experimental programs, train local staff, and establish working relationships with schools and colleges.

A dramatic change occurred, however, in the fortunes of the project when changes in government structure in mid-1966 made the unity of the project difficult to sustain. Long-term coordinated planning became a matter of speculation as each region began to function more or less independently and the Eastern and Western teams, as well as Lagos, gradually lost impetus in situations where liaison and cooperation were constrained by political events. When civil war broke out in 1967, the project based in Eastern Nigeria faltered beyond hope of renewal, and only the primary school project in Northern Nigeria remained to offer some hope of systematic progress and evaluation.

This project in Northern Nigeria became the focus of the effort, and the evaluation which shall be reported took place there. The evaluation was mainly concerned with the achievement results of the teaching of English in the fifth year of the primary school through the use of radio and television. But in addition, it also considered some of the behavioral side-effects associated with the broadcasting.

Scope of the Work

The scope of the work under the terms of the agreement between the Nigerian government and U.S.A.I.D. fell into three main areas, advisory, executive, and training. The terms of reference for the proposed enterprise, which subsequently became known as the Modern Aids to Education (MATE) Project, were as follows:

Advisory

To assist and advise the regional and Federal Ministries:

- (a) on a thorough consideration of the educational, administrative, and fiscal problems involved in the use of broadcasting media and other modern aids to education.
- (b) on the use of such aids, particularly radio and television, in close cooperation with local specialists with particular emphasis on student participation, materials and exercises.
- (c) on the establishment and operation of regional services to continue to produce materials supplementary to the media broadcasts and telecasts.

Executive

The executive functions of the participants were:

- (a) To assume primary responsibility for the detailed planning, production, and evaluation of experimental lessons in areas selected and designated by the Nigerian ministries.
- (b) To prepare plans and specifications for the procurement of technical materials and equipment necessary to implement the project.
- (c) To assist in the establishment and operation of a National Educational Resource Center for the distribution, evaluation and control of instructional aids.
- (d) To maintain records, prepare reports, and to maintain an ongoing subjective evaluation in terms of the broadcasts' effectiveness and benefit to education and in relation to the costs involved.

Training

The training included the following:

- (a) an orientation of Nigerian Education personnel toward the project's aims in close cooperation with local government specialists.

- (b) an enlistment of the cooperation of teacher training colleges in the establishment of a media-oriented training program.
- (c) the training of counterpart personnel both in Nigeria and the U.S. so as to insure the continuation of the project through the provision of a highly-trained technical staff. This included the training of four Nigerians in the areas of broadcasting, equipment repair, tests and measurements, and effective audio-visual communications.

The Process of Evaluation--A Preface

Initial Considerations

The evaluation of any educational program or treatment is an extremely complex undertaking. Before one embarks on the problems of method and design, one must necessarily ask the question, "Is it realistic to expect some sort of effect as a result of the treatment?" In this particular evaluation, the educational treatment involved the use of supportive radio and TV programs in English at the Primary 5 level. Hence it is reasonable to suspect that classes having the benefit of these broadcasts should have an advantage over classes having only the teacher to guide them. This supposition presented a prima facie case for an evaluation.

Once the decision is made to evaluate, a long process of technical decisions is involved. One must immediately decide what to measure and how to measure it. Conventionally, studies of this nature have measured student achievement and student and teacher attitudes.

Basic Design

The initial evaluation steps involved are simple enough. Any scientific study requires observation of at least two separate groups, with one being subjected to the experimental treatment, and a similar group being subjected

to "normal" conditions. This experimental design is based on the assumption that the treatment will result in a difference between the groups and that this difference can be measured and subjected to statistical tests in efforts to determine if it is a real one or merely due to chance.

This evaluation of the MATE Project in Nigeria was designed to conform to the classical experimental design described above. It utilized two experimental treatments, radio and television broadcasts to separate classes, and for comparison purposes it used contrast classes consisting solely of teacher instruction. Thus far, based upon the criteria listed above, the design is a perfectly good one without serious methodological inadequacies.

Assigning Groups

Therefore, it is possible to go to the next step in the design--that of assigning classes or students to particular treatments. Rigorous methodology demands that assignment be carried out in a truly random fashion. As this is not always feasible if existing classrooms are to be used, complete randomness must often be compromised to some extent. If one does use existing classrooms, one must have additional evidence confirming the comparability of classes on relevant variables or else one must know to what extent they differ on these variables. The present study is less than perfect in this respect inasmuch as the assignment of television sets was dictated, for the most part, by the presence or absence of electricity in the school. There is the possibility that those schools having electricity might have educational climates more conducive to learning than less fortunate schools, although this could not be documented in the present study.

Measuring Instruments

The next decision involves how to measure all selected variables. Usually specific tests and other instrumentation are required, and for the most part these must be constructed to conform to the unique nature of the experimental

setting. If adequate test development does not precede the actual study, the difficulty level, reliability, and validity of the tests involved come under question. Furthermore, when working with Nigerian primary school students, only a limited background of testing information is available (Schwarz, 1961, 1963). For example, the evaluator does not know how the student will react to a paper-and-pencil achievement test. Can he read it, comprehend it, and respond effectively on a machine scored answer sheet? Also, what do attitude questionnaires mean to students who are the product of educational systems in which discipline and conformity are continually stressed? The "correct" response for these children on a question such as "Do you like school?" obviously is "Yes, I like it." The question "How do you feel about your teacher?" might not only fail to show variance within responses, but furthermore, this sort of question may be considered inappropriate on cultural and ethical grounds. When the socially-accepted behavior does not provide for expressing preferences for educational practices at this age level, how does one measure attitudes? The problem is further compounded by teachers who are products of the educational system and therefore tend to respond to similar attitude questions in a manner which they feel is socially desirable or which expresses traditional African courtesy to the inquirer. In addition, if these teachers are asked to contribute to the evaluation by collecting attendance figures, by recording the amount of time they devoted to the experimental topic, by indicating their teaching practices before, during, and following the broadcasts, they may regard these duties as being outside the realm of their responsibilities as teachers.

Sources of Error

This leads to another consideration which must be taken into account. If there are errors in recording data which enter into the evaluation, they will obviously influence the results in direct proportion to their severity

or preponderance. Still other factors which detract from the usefulness of the data occur when students take some tests and not others, or when students fail to respond to several items on any given test, respond in a random manner, or check more than one response for a given item which should have only one correct response.

Sex Differences

In educational evaluations at the primary level it is quite common to find differences in achievement results between boys and girls. These differences usually make it necessary to treat sex as an additional variable. The statistical procedures which do this assume that the number of boys and girls in the various classes is comparable. If it turns out that some of the classes have only boys or girls, as in this study, the power of the statistical procedures used decreases markedly. Moreover, as the amount of missing, incomplete, or otherwise unuseable data increases, the point is soon reached where the data become impossible to analyze meaningfully.

Interpretation of Results

Now that the design of the study has been discussed, it is possible to look forward to experimental results in efforts to determine how they may be interpreted. One of the simplest methods of interpreting results is to look at the difference between pretest and posttest scores for the experimental and contrast classes. Chronologically falling between the pretest and posttest is the school year in which English was taught to grade 5. During this time certain classes received supplementary TV broadcasts, others received supplementary radio broadcasts, while still other classes received instruction without the benefit of either type of broadcast. If we compare the average gains of the students on the posttest one might expect to find that students in TV classes on the average showed the greatest gains, possibly followed by the radio classes, then the contrast classes.

However, if the purpose is to evaluate the effectiveness of the broadcast media apart from all other considerations these results would be, not surprisingly, meaningless in isolation. Even if the TV classes were to show the greatest gains and the contrast classes show the smallest gains, we might not know to what these gains could be attributed. Several influences on gains can be identified. Among these are: teacher effectiveness, teacher knowledge and usage of English, class size, student attendance, problems in reception of broadcasts, the broadcasting instruction in English, motivational influences due to the TV being present in the classroom whether or not the sets were ever turned on, and the total amount of time devoted to the teaching of English.

Finally, there is evidence to show that usual interests in the performance of any group may motivate learning even under the most severe conditions. This tendency is known as the Hawthorne effect. For this study one would like to know if the scores for the contrast classes, having no television or radio broadcasts, were affected by the interest shown them by field liaison officers and visitors. To answer this question, information on performance by comparable groups of students working outside the experiment with the same textbook and having no contact with field personnel is necessary. If, for example, one found no differences existed between the contrast classes and the "outside" groups, one then might assume that the performance of the contrast classes was not abnormally raised or depressed as a result of participating in the experiment. Therefore, an attempt was made to investigate the possible influence of the Hawthorne effect on the scores of the contrast group.

Evaluation Design--Northern Region

Schools

As mentioned earlier, an evaluation of differential achievement rates and other behavior effects for students receiving either radio or television instruction was begun in the Northern Region in January, 1967. The subject

matter chosen for this evaluation was English at the Primary 5 level. Approximately 1200 students from areas adjacent to Kaduna and Zaria participated. These students came from 35 classes in a total of 23 schools, 25 of which were in the Kaduna area. One of these schools had three classes participating, (a matter that proved of special significance as will be observed later), and four other schools were each represented by two classes. The remainder of classes involved each came from separate schools.

Hypothesis

The single hypothesis advanced at the outset of the study by the field staff and which was subsequently tested by the EIS evaluation team within the existing design was: Students who received supportive radio or television instruction would show greater gains in achievement than students in classrooms not receiving these broadcasts as a complement to the activities of the regular classroom teacher.

Treatments--Assignment of Schools

In order to test this hypothesis, three participation schedules (treatments) were established. These were Radio, TV, and Contrast classes, with the latter treatment consisting of a teacher only, while the former two had supportive radio or TV broadcasts in addition to their teachers. Attempts were made to assign each of the participating classes on a random basis to one of the experimental treatments. This was not possible for TV reception, since many of the schools did not have an electricity supply. For radio broadcasting the lack of electricity was not a major problem because battery-powered sets were used. There were twelve classes each in the TV and Contrast treatments and eleven classes in the Radio treatment.

Treatments--Other Factors

As was indicated previously in this report, the assignment of schools to treatment based on the presence or absence of a source of electricity concealed many more factors than were immediately apparent, and consequently these had to be studied with care and evaluated. Table 1 summarizes all the variables, and among

these are some that were considered potential sources of influence on the results of the experiment. The variables are listed according to whether attempts were made to analyze their influence statistically, whether they were studied actively but not subjected to statistical operations, or whether they were recorded but ignored in the analysis. This table also constitutes a reference point for the ensuing discussions. Finally, it can be used as an early reminder of the complexity of the problems forced into prominence by long-term evaluation studies.

Table 1

Variables involved in the MATE-Nigeria evaluation

<u>Variables Statistically Evaluated</u>	<u>Variables Studied Actively</u>	<u>Variables Measured but Ignored</u>
Pretest score	Absenteeism	Student age
Posttest scores	Language spoken at home	Student rank in class
Reading score	Control of School	Teacher training
Teacher rating	Teacher turnover	Teacher experience
Primary 4 language	Lead-in time	Headmaster training
Student sex	Lead-in activities	Headmaster experience
School class	Follow-up time	School ratings by Ministry of Education
	Follow-up activities	Student home conditions
	Student attitudes	Student usage of English
	Teacher attitudes	
	Headmaster attitudes	
	Time devoted to English	
	Class size	
	Percent of broadcasts heard	

The information on variables presented above was collected by the Project Liaison Officer as a routine part of the overall design of the study. (See Appendix D for data on Classroom variables and Appendix E for the statistical treatment used.)

A further attempt at control

An attempt to assess Hawthorne effect was made by administering the most recently taught parts of the posttest (C' and F, see Table 2) to classes which had used the same textbook but had not known about or participated in the

evaluation. Five such classes in the vicinity of Jos were tested at the beginning of the 1963 school year, after assurances had been given that no selection system had operated between Primary 5 and Primary 6 in that area.

Conditions and focus for the study

All classes used the text entitled Straight for English Book 5, (Longmans, Nigeria, 1965) and all were to follow the same instructional schedules determined by the program syllabus. The students' books were readers, while the teacher's book contained the mechanics of grammar on which the achievement tests were based. The teachers in those classes who received either TV or radio broadcasts also received plan books from the field officers listing the objectives of each broadcast. These also contained notes on lesson preparation, classroom activities, and follow-up exercises. Meetings to explain the use of TV and radio receivers and methods of utilizing lesson programs were held with the teachers, and handbooks were compiled for this purpose.

All classes were to devote approximately 400 minutes per week to the study of English. Included in this time block were three 20-minute telecasts or three 15-minute radio broadcasts per week in which the appropriate classes participated.

Measures used-locally constructed achievement tests

Actual achievement in English was assessed by a 50-item pretest (five item multiple choice) administered before instruction began, and three 50-item posttests, one of which was administered at the conclusion of each of the three subsequent terms in the 1967 schoolyear. The pretest was divided into three subtests, each being approximately 17 items in length. For practical purposes, these subtests might be referred to as A, B, and C. A covered material which was to be taught during the first school term; B covered material that was to be taught during the second term; and C

tested children on material that was to be taught during the third and final term of the school year. Table 2 presents a summary of the achievement testing program.

Table 2
Composition and schedule of achievement testing program¹

<u>Time of Administration</u>	<u>Test</u>	<u>Test Composition</u>
Prior to Instruction	Pretest	A, B, C (Material to be taught during Terms 1, 2, and 3).
Conclusion Term 1	Posttest 1	A, A', D (A from pretest, its parallel form, non-pretested material).
Conclusion Term 2	Posttest 2	B, B', E (B from pretest, its parallel form, non-pretested material).
Conclusion Term 3	Posttest 3	A, B, C, C', F (original pretest, parallel form of C, and non-pretested material).

¹See text for a more complete description of test composition. All tests contained five-item multiple choice type questions.

In addition, each posttest was also made up of subtests. For example, posttest 1, administered at the conclusion of Term 1, consisted of A (exactly the same items that appeared in A in the pretest), a parallel form of A which has been labeled A', and a third subtest composed of items covering material taught during Term 1, but these items did not appear in the pretest. This subtest has been labeled D (unique items).

The arrangement of subtests within posttests 2 and 3 was based on a similar format. In posttest 3, however, parts A and B were again administered in order to make possible a direct comparison with the pretest.

The actual administration of the testing program was carried out primarily by the Project Liaison Officer, and he was later assisted by his Nigerian

counterpart who returned from training in the United States in September, 1967. Each of the testing programs spanned a period of two weeks, and test security was strictly enforced, although many teachers requested copies of the tests. Students responded on machine-scorable answer sheets on each of the achievement tests. They probably had no previous experience with this type of answer sheet in the past, and although they were given a great deal of instruction in their use, it seems reasonable to suppose that clerical response errors did occur among classes in all the treatments, especially on their first encounter with these answer sheets. This clerical transfer problem was avoided in Jos by having the students respond by circling their response choice directly in the Test booklet.

Measures used--additional material

Near the end of Term 3, it was decided to gather additional information about students' attitudes toward school, and it was also considered necessary to assess the reading ability of students to determine if differential performance on the achievement tests might be a function of reading ability. (See Appendix E for further discussion of English language abilities.) Therefore, in this respect attitude questionnaires for both teachers and students were constructed, and student reading ability was assessed through use of an ETS Cooperative Primary Test entitled Reading 12A. This latter test had been designed to be administered to younger children in the United States and, to our knowledge, had never before been used with an African population. It was decided to use this test inasmuch as time limitations precluded development of one standardized on Nigerian students at the primary 5 level. A more detailed description of the adaptation of this test and the precautions observed in its administration are presented in Appendix C, and an item analysis is presented later in this report.

Analysis of Achievement Tests

Pretest, January, 1967

Since the identical 50-item test was administered in January, 1967, in the form of a pretest and again in November, 1967, as a posttest, it was decided first to carry out a detailed analysis on this particular test. Initially, the average pretest scores obtained by classes in the three treatments were compared. These scores are found in Table 3.

Table 3

Average unadjusted pretest achievement scores in English
for each of the treatments

Television			Radio			Contrast		
<u>\bar{X}</u>	<u>S.D.</u>	<u>N</u>	<u>\bar{X}</u>	<u>S.D.</u>	<u>N</u>	<u>\bar{Y}</u>	<u>S.D.</u>	<u>N</u>
14.33	5.84	390	13.61	5.37	356	13.28	5.69	433

Although slight differences in pretest scores are apparent at the beginning of the school year, they are not significantly different from what one would expect on the basis of fluctuations in the scores of the groups due to sampling. On the basis of this finding all of the pretest scores were pooled, and a detailed analysis of the individual test items was carried out.

This analysis revealed, first of all, that the pretest was an extremely difficult one. The average scores in Table 3 indicate that the students were able to answer correctly approximately 28% of the items on the 50-item test (only 8% greater than chance on five-choice multiple choice items). Inasmuch as this particular test was based on material that had not yet been taught, but would be taught during that school year, these results are not surprising.

The most difficult items for the children were the ones in which they had to identify or label various parts of speech. Other difficult areas included the use of the apostrophe, whether it was used to indicate the possessive

case or in the formation of contractions. Students did best of all in choosing a sentence that made sense from among alternatives composed of jumbled word orders, and they also did well in joining two sentences with a connective.

Ignoring difficulty and concentrating on the validity of individual items, it was quite clear that the most valid items (based on an item-total score correlation) were those in which the student had to choose the sentence that made sense, followed closely by completion-type items and items which called for the selecting of a correct sentence from a group of alternatives. Items displaying the least validity dealt with identifying parts of speech as well as direct and indirect objects. In short, the pupils did poorly on the mechanics of grammar and best in items dealing with language usage. Students who got the difficult and untaught items correct did so on the basis of chance--and this is not surprising.

Posttest, November, 1967

The most important information came from an analysis of the same test when it was readministered as a posttest after three school terms during which test content material (but not test questions) was taught. Since TV, Radio, and Contrast classes were exposed to different educational treatments, they were treated separately in the test analyses. Table 4 presents a comparison of the percentages of children passing each of the items on the pretest and posttest.

Table 4
Percent of children passing each of the items
on the Pretest and Posttest

Item ¹	Percent Passing			
	Pretest	Posttest		
	(January, 1967)	(November, 1967)		
	All Groups	TV	Radio	Contrast
11. Identify adverb	15	62	38	30
12. Completion (using verb)	55	72	65	61
13. Choice of correct pronoun	54	81	75	75
14. Identify verb	18	46	40	36
15. Completion (using verb)	57	78	77	69

Table 4 continued

16. Choice of correct pronoun	25	51	48	46
17. Identify noun	37	68	65	62
18. Rephrase as question	19	30	20	19
19. Choose sentence making sense	62	89	86	77
20. Identify adjective	19	33	30	24
21. Rephrase as question	23	30	32	30
22. Choose sentence making sense	70	89	84	78
23. Use of negation	17	43	43	31
24. Choice of correct pronoun	46	79	69	64
25. Use of negation	19	39	32	27
26. Identify subject	25	64	48	44
27. Use of apostrophe	17	28	25	21
28. Use of adjective	45	67	62	59
29. Choice of correct pronoun	43	77	69	62
30. Identify verb	25	57	41	46
31. Use of adjective	34	56	50	41
32. Use of verb	21	28	33	31
33. Use of apostrophe	34	64	50	52
34. Use of adjective	16	31	28	29
35. Choice of indirect object	11	23	16	19
36. Choice of verb	20	31	32	27
37. Choice of verb	29	35	35	32
38. Choice of direct object	22	26	27	27
39. Use of apostrophe	13	38	27	30
40. Change singular to plural	17	30	27	27
41. Use of adverb	12	21	23	19
42. Choice of non-rhyming words	15	25	28	21
43. Make adverb from adjective	25	63	50	42
44. Identify noun	23	25	32	26
45. Identify subject	27	42	26	33
46. Use of verb	22	50	52	44
47. Joining two sentences	37	72	64	58
48. Use of pronouns	31	68	63	59
49. Identify verb	21	48	39	35
50. Identify subject	29	34	23	34
51. Change singular to plural ¹	12	26	26	27
52. Identify verb	13	41	32	28
53. Change to indirect speech	13	20	26	19
54. Joining two sentences	25	56	52	42
55. Identify adjective	11	29	25	25
56. Choose correct word order	36	81	75	69
57. Change to question form	15	46	47	31
58. Identify pronoun	09	20	19	24
59. Change singular to plural	23	78	64	63
60. Use of adjective	23	70	63	58

¹Items 1-10 were practice items on both pretest and posttest.

On inspection it would seem that the TV classes had registered the greatest improvement on the individual items of the posttest and that they were followed by the Radio and Contrast classes in that order. It is not possible, however, to claim that the differences can be attributed to the influence of the different treatments as will be demonstrated later. Due to the number of uncontrolled sources of influence, one can at this stage offer only a qualitative evaluation of the improvement of all groups on the items listed.

The greatest gains were made in the students' ability to use English correctly, and some gain was registered in ability to identify parts of speech. On the other hand, least improvement was noted in students' ability to identify subjects, direct objects, and indirect objects of sentences.

Analysis of Reading Test

The ability of those classes participating in the evaluation in the Kaduna area was assessed in November, 1967. The test, Reading 12A, was developed by the Cooperative Test Division of Educational Testing Service. This administration of the test to Nigerian students, however, constituted the first attempt to use it with an extensive African population. Nevertheless, as the subsequent analysis presented in Table 5 revealed, the test adequately measured reading comprehension at this stage.

Comments are confined to content analysis based on item difficulties presented in Table 5 as they affect all participating students, although they are listed for convenience according to the treatment groups.

If the reader compares this table with Table 4 he will observe that these items were considerably less difficult than the items in the English posttests. For example, 29 of the Reading 12A items were passed by more than half of the students, while on the posttests there were only 16 such items. These 29 items sampled the various reading skills represented in the test. As these skills included picture vocabulary, concept discrimination, and sentence and paragraph comprehension, a broader picture of the abilities of the students emerges than one would have achieved by simply relying on the results of the pretest and posttests.

Table 5
Percent of children passing each of the items on Reading 12A

Item Number	Television	Radio	Contrast
1. Word Comprehension (Concrete)	89	89	86
2. Word Comprehension (Concrete)	98	97	96
3. Word Comprehension (Abstract)	70	64	64
4. Word Comprehension (Concrete)	61	51	50
5. Word Comprehension (Concrete)	94	93	91
6. Word Comprehension (Concrete)	44	36	49
7. Word Comprehension (Concrete)	95	93	91
8. Word Comprehension (Abstract)	71	66	63
9. Word Comprehension (Abstract)	67	59	60
10. Word Comprehension (Concrete)	23	16	27
11. Word Comprehension (Abstract)	81	74	74
12. Word Comprehension (Concrete)	79	71	70
13. Word Comprehension (Abstract)	77	63	66
14. Word Comprehension (Abstract)	51	47	48
15. Word Comprehension (Concrete)	22	29	30
16. Sentence Comprehension	91	88	88
17. Sentence Comprehension	83	79	72
18. Sentence Comprehension	68	70	68
19. Sentence Interpretation	14	12	10
20. Sentence Interpretation	37	38	38
21. Sentence Comprehension	29	27	31
22. Sentence Interpretation	65	61	63
23. Sentence Interpretation	57	49	52
24. Sentence Comprehension	82	73	74
25. Sentence Interpretation	88	84	82
26. Paragraph Comprehension (Poetry)	59	56	55
27. Paragraph Interpretation (Narrative)	17	13	17
28. Paragraph Comprehension (Poetry)	56	51	56
29. Paragraph Interpretation (Narrative)	61	64	58
30. Paragraph Interpretation (Narrative)	75	76	70
31. Paragraph Extraction (Narrative)	86	83	82
32. Paragraph Interpretation (Narrative)	64	56	45
33. Paragraph Extraction (Narrative)	67	60	60
34. Paragraph Interpretation (Narrative)	37	29	29
35. Paragraph Interpretation (Narrative)	27	32	32
36. Paragraph Extraction (Narrative)	39	44	32
37. Paragraph Interpretation (Narrative)	62	57	55
38. Paragraph Interpretation (Narrative)	18	20	14
39. Paragraph Interpretation (Poetry)	73	62	64
40. Paragraph Interpretation (Poetry)	29	21	24
41. Paragraph Extraction (Exposition)	76	73	70
42. Paragraph Extraction (Exposition)	43	42	39
43. Paragraph Interpretation (Exposition)	59	60	57
44. Paragraph Interpretation (Exposition)	21	22	24
45. Paragraph Interpretation (Exposition)	55	54	51
46. Paragraph Extraction (Narrative)	54	48	44
47. Paragraph Interpretation (Narrative)	58	52	48
48. Paragraph Interpretation (Narrative)	69	64	61
49. Paragraph Interpretation (Narrative)	41	44	38
50. Paragraph Interpretation (Narrative)	50	47	47

The primary purpose for using Reading 12A was to determine if there were wide-spread group reading ability deficiencies that would prevent the students from understanding the items on the posttest. Table 6 shows means, standard deviations, and numbers of students tested for the three groups. From the item statistics and mean scores it can be concluded that all groups were functioning, on the average, at a level that would not invalidate the posttests. There are large individual differences within each group, however, and the lowest-scoring students (approximately 16%) might well have encountered difficulty in comprehending the posttests.

Table 6

Average Reading 12A scores for classes at the end of the school year

	\bar{X}	S.D.	$\frac{N}{}$
Television Classes	29.35	5.37	395
Radio Classes	27.60	6.42	340
Contrast Classes	27.15	6.47	360

By referring to Table 5 one can locate those items that fewer than 1/3 of the students correctly answered (chance level with three-choice multiple choice questions). Three of these dealt with climatic conditions not encountered in Nigeria. Item (10) asked students to read and identify the word "mitten", item (27) dealt with the use of a sled in snow, and item (35) required the student to locate the month "April" in one of three seasons which only occur in temperate zones.

Other items which proved to be extremely difficult were (15), (19), (38), and (44). The difficulty connected with these items could have been attributable either to good distractors requiring keen perceptive discrimination, or in other cases, the questions called for the student to supply a title for a story, supply a rhyming word, or accomplish some other unique task with which these children had little or no previous experience.

In light of this it must be concluded that patterns of answering these very difficult items were greatly influenced by culture, and several questions were incorrectly answered because the task to be performed was beyond the limits of the students' learning experiences.

Achievement tests--total gains and differences between groups

An analysis of sources of influence

There are two simple questions that might be asked at this time. First, did the students show, by their results on the posttest as compared to the pretest, that they had improved their skills in English? Second, were there differences in achievement between the groups of classes assigned to different treatments? Listed in Table 7 are the achievement gain scores for students who participated in the evaluation.

Table 7

Average gains in student achievement tests at the end of Term 3

<u>Students involved</u>	<u>Gain Score</u>	<u>Number of Students</u>
Classes having TV	10.34	366
Classes having Radio	8.46	322
Contrast classes	7.12	405

Note.--These results are based on tests containing 50 items.

It is clear that all groups of students registered gains as measured by the tests. There also seem to be differences between the groups of classes assigned to different treatments. But at this stage it is impossible to say what specific influences are responsible for these differences simply by comparing the averages. Any one or combination of influences could have produced these differences.

Providing a base-line

Before one can examine apparent differences between groups one must have a base-line. The scores of the Contrast group, presumably unaffected by supportive broadcasts, were designed to provide such a base-line. As was previously indicated this base-line might have been inflated by a potential Hawthorne effect. Therefore, the results of the non-experimental classes tested at Jos may be compared with those of the Contrast classes to determine, albeit roughly, whether participating in the evaluation affected the gain of the Contrast classes against which all other gains were to be compared. Table 8 contains these results.

Table 8

Mean posttest scores used to assess Hawthorne effect¹

<u>Class</u>	<u>Mean Score</u>
Television	14.40
Radio	13.36
Contrast	11.66
Nonexperimental (Jos)	11.61

¹The results presented in this table are for combined scores for C' and F. (Subject matter taught during Term 3). Parts A, B, and C were to have been administered to the 200 students in five Jos classes, but through a misunderstanding in instructions relayed from a distance, this did not occur.

The difference between the averages of the Contrast classes and Jos classes is not statistically significant, indicating that the most recent learning experiences of the Contrast classes were unaffected by participation in the evaluation. If one assumes that learning experiences for the two previous terms were similarly unaffected, then the posttest base-line established by the Contrast group is appropriate for comparison purposes.

Other motivational aspects

It should be pointed out, however, that the very placing of a TV or radio receiver in a classroom may have an effect in addition to that provided by visitors expressing an interest in the class. Although the experimental design did not provide for assessment of this lateral effect, an instance of a similar effect is given in the detailed analysis of the results from the one school which had all three treatments (see Pp. 32-35)

Crucial sources of influence

The results quoted above have simply noted (a) apparent gains over the pretest for the experimental groups, (b) apparent differences between the TV, Radio, and Contrast groups and (c) apparent similarities between the Jos

schools and Contrast schools. Throughout the discussion of these results there has been an insistence that, as yet, there is insufficient evidence to indicate what caused these apparent differences between the groups. The problem of disentangling sources of influence on the test scores is now dealt with.

After a critical examination of all the possible influences on test scores (listed previously in Table 1), the following were chosen on the basis of the available data as crucial to the interpretation of such differences between the participating groups as existed.

1. Individual differences among the pupils themselves accounted for by initial differences in the pretest.
2. Differences among classes due to the range of teacher skills. An estimate of differences between classes was provided by term ratings of teacher behavior compiled by a senior field officer.
3. Differences in abilities due to sex.
4. Differences between classes accounted for by the number of students in each class who had been taught mainly in the vernacular language rather than English prior to Primary 5.
5. Differences directly attributable to the treatment (TV, Radio, Contrast).

Many more hypothetical influences could have been postulated. For example, pupil attendance, teacher turnover, frequency of broadcast reception, and total time actually devoted to the teaching of English could all have influenced final test scores. The five influences chosen for actual comparison in analysis of variance were as many as were considered possible to test initially with the numbers of students and the data available. Their potential effect on the results is now considered.

First category of effects

For purposes of analysis, the five variables were divided into two categories. The first category (covariate) was composed of variables dealing with individual student differences and differences in teacher skill. The rationale for this category is that student achievement would be related to both individual student capacity to learn and to the skills of the teacher in imparting the material to be learned. Therefore, through the use of appropriate statistical techniques, these differences were removed after ascertaining that they were real differences and not due to chance. The analysis of variance showed significant effects due to teacher classroom rating (TCR) and individual differences measured by pretest performance within overall treatment groups.

Second category of effects

Having taken note of these differences and allowed for them, one may now turn to other major effects (factors). The analysis was designed to study the possible effects of sex, language (I1=students taught in the vernacular in Primary 4, I2=students taught in English in Primary 4), and exposure to each of the three treatments (TV, Radio, Contrast). The design of the analysis is laid out schematically in Table 9. This was the maximum use that could be made of the data after restricting the breakdown of the sample into these few categories from the large number of variables considered in Table 1. Even then, the inequality of number in the cells and the prevalence of zeros made analysis extremely difficult.

After repeated attempts at analyzing the data as presented in Table 9, it proved impossible to disentangle the three influences and isolate the effect due to either TV, Radio, or Contrast exposure on the performance of the pupils.

Table 9

Schematic representation of analysis of variance design
showing number of students in each of the cells¹

<u>Language</u>	<u>TV Classes</u>		<u>Radio Classes</u>		<u>Contrast Classes</u>	
	<u>M</u>	<u>F</u>	<u>M</u>	<u>F</u>	<u>M</u>	<u>F</u>
L1	7	1	1	1	2	
L2	15*	8*	12*	6*	29*	7*
L1	2	1	2	2	1	
L2	15*	6*	12*	7*	23*	10*
L1	6	2	1	1	2	
L2	18*	14*	17*	13*	18*	15*
L1	7	2	3	2	1	
L2	3	6	17	2	7	5
L1	10		1	1	25	7
L2	9	12	36	3	1	1
L1		1	5			
L2	22*	8*	14*	6*	28*	6*
L1		2	2		32	6
L2	2	23	16	10	5	
L1						1
L2	20	21	26	10		31
L1					30	10
L2	14	14	16	8		
L1		5		2	26	7
L2		31		32		

¹Classes are nested within treatments.

*Indicates class selected for subsequent analyses.

It became apparent that this question could be pursued only by controlling for the gross inequality in numbers. This meant restricting the analysis to separate groups of males and females who had been taught in English prior to Primary 5. Asterisks in Table 9 identify the groups that were chosen for

further analysis. By examining this table the reader may conclude that ensuing analyses were performed on an extremely restricted sample that was, in effect, the only one amenable to further exploration.

Subsequent analysis of the further restricted sample

This design made it possible to explore achievement as reflected in both the English posttest scores and Reading 12A. Reading 12A was included in this analysis because it covered material that went beyond the syllabus and perhaps was more indicative of generalized skills involved in English comprehension. Three sources of influence on both posttest and Reading 12A scores were considered. These were individual differences as measured by the pretest, teacher skills, and treatment effects. These analyses assessed the relative contributions of teacher skills and treatment after controlling for individual differences among the students.

Teacher Influences

When achievement was considered in terms of teacher skill, as measured by field officers' teacher classroom rating (TCR), it can be noted in Table 10 that this variable was a very powerful, although not all-pervasive ingredient. Teachers were shown to exert a great deal of influence on achievement on all posttests except Test B for females and Test C for males, indicating that the classes of better teachers showed the greatest gains, irrespective of whether or not they had the benefit of supportive broadcasts.

Table 10

Summary of analysis of covariance on student achievement scores for males and females in which teacher skill is the variable considered

	<u>Source</u>	<u>F</u>	<u>df</u>	<u>p(F)</u>
Test A	TCR-Males	5.99	1, 210	.025
	TCR-Females	4.41	1, 93	.05
Test B	TCR-Males	2.98	1, 200	.05
	TCR-Females	.03	1, 89	--
Test C	TCR-Males	.39	1, 189	--
	TCR-Females	3.27	1, 86	.05

Treatment Differences

Achievement was similarly studied in terms of the effect of exposure to either TV, Radio, or Contrast classes. The results of these analyses, presented in Table 11, showed that in terms of English posttest scores, it made very little difference whether a child was in a TV, Radio, or Contrast Class. However, in terms of Reading 12A, students in the TV classes, on the average, significantly outperformed those students who were either in Radio or Contrast classes, even after individual differences in ability (pretest scores) had been taken into consideration.

Table 11

Summary of analysis of covariance on student achievement scores for males and females in which treatment is the variable considered

	<u>Source</u>	<u>F</u>	<u>df</u>	<u>p(F)</u>
Test A	Treatment-Males	1.54	2, 210	.22
	Treatment-Females	1.22	2, 93	.30
Test B	Treatment-Males	4.06	2, 200	.02*
	Treatment-Females	1.86	2, 89	.16
Test C	Treatment-Males	1.84	2, 189	.16
	Treatment-Females	.04	2, 86	--
Reading 12A	Treatment-Males	6.06	2, 175	.003*
	Treatment-Females	2.83	2, 85	.065*

*Indicates a probability which is considered to be statistically significant.

Table 12 which follows shows adjusted means for those groups listed in Table 11 for which there is a significant treatment effect.

Table 12

Adjusted achievement means for groups in the different treatments

	<u>Test B</u>		<u>Reading 12A</u>	
	<u>Males</u>	<u>Females</u>	<u>Males</u>	<u>Females</u>
Television group	7.15	---	23.67	24.11
Radio group	6.13	---	20.73	23.08
Contrast group	5.99	---	20.97	21.24

Note.—The pretest score was used as covariate in these adjustments.

Discussion-Posttests

The inescapable conclusion is that teacher skills must be considered as extremely important sources of influence on pupil performance in syllabus materials. On four out of the six occasions in which the teacher effect hypothesis was tested (See Table 10), teacher differences had a statistically significant effect. Only on one occasion, however, (Males, Test B) did broadcasting appear to have any significant effect. This latter result must be treated with reserve because it is relevant only to 202 males out of the 1200 students who participated in the study initially.

Because the data could not be analyzed in its entirety, a conclusion must be reached from the data that are available. With all the qualifications in mind that this decision imposes, it is not possible to assert that the broadcasting media had any significant or substantial effect on the learning of prescribed textbook material.

Discussion-Reading 12A

A correlation between TCR and student scores on Reading 12A was $-.01$ indicating that performance on this test was almost completely independent of teacher skill. This was not surprising in light of the fact that interviews with the classroom teachers revealed that they had never before come in contact with a test employing a pictorial-verbal format as is found in Reading 12A. Upon seeing this test for the first time, many of the teachers requested a personal copy so that they might in the future design both tests and instructional material according to its format.

Having demonstrated its independence of TCR, Reading 12A was analyzed in terms of a treatment effect, and this proved to be significant in this respect (see Table 11). Students exposed to TV did significantly better than students exposed to either Radio or Contrast classes. This finding stands out in marked contrast to the results on the English posttests.

Based on a post-hoc analysis, several reasons for this may be postulated. First of all, the posttests were extremely difficult as was evidenced by the low scores that were obtained. Second, the posttests sampled an extremely limited area which was confined to actual syllabus content. Reading 12A, on the other hand, sampled a far greater range of language skills involved in reading comprehension rather than those involved in disentangling the mechanics of the English language. It may be recalled that based on the item analysis of the posttests, students did best on items dealing with language usage and poorest on items involving the mechanics of English.

Although both the TV and Radio classes presumably involved English comprehension to a greater degree than did the Contrast classes, only the TV classes had the benefit of an accompanying visual component. Since Reading 12A contains many visual representations, one would expect the TV classes, on the average, to outperform classes in either the Radio or Contrast groups. This is exactly what happened, and the effect is noted for both males and females, although the effect is more pronounced among the males. Hence, it must be concluded that although TV classes did not outperform other classes on the syllabus content tests, they proved to be significantly superior in terms of English comprehension, especially on their handling of unique visual stimuli. This strongly suggests that there may have been other non-measured benefits associated with the broadcast lessons.

On this basis it is also reasonable to suppose that the listening comprehension of TV and Radio groups might also be superior to that of the Contrast groups. No tests were available to test this hypothesis, but it seems that it ought to be tested in the future.

Results from one school in which three classes participated

A final analysis of achievement scores took place using the results from School 10 which had a TV, a Radio, and a Contrast class. Although this

school was included in the previous sample chosen for analysis, it was decided to study this school in isolation and thereby control a number of relevant variables.

Since this sample came from a single school, the three classes involved were quite similar in class size, teacher skills, teacher turnover, student ability, student attendance, etc. Presumably they differed only on experimental treatment. Hence, the three classes were compared on their performance for each of the three terms (Tests A, B, and C) after their scores had been adjusted to compensate for individual differences on the pretests. Pretest and adjusted posttest average scores for each of the classes appear in Table 13.

Table 13

Average pretest and average adjusted posttest means
for classes in School 10

	<u>Term 1 Material</u>		<u>Term 2 Material</u>		<u>Term 3 Material</u>	
	<u>Pre A</u>	<u>Post A</u>	<u>Pre B</u>	<u>Post B</u>	<u>Pre C</u>	<u>Post C</u>
TV Class	6.18	4.77	5.47	6.30	4.26	6.44
Radio Class	4.89	3.73	4.97	5.59	3.11	5.26
Contrast Class	5.08	3.95	5.11	7.64	3.95	7.76

Note.—Maximum score possible on any test = 17. (Unadjusted)

An examination of the results presented in Table 13 reveals a very interesting phenomenon. When posttest scores were adjusted for differences that existed on the pretest, it was discovered that although no significant differences existed among the means on Posttest A, very significant treatment effects appeared on Posttest B, $F = 5.21$ ($df\ 2, 80, p = .007$) and on Posttest C, $F = 7.20$ ($df\ 2, 79, p = .001$). These treatment effects showed that the Contrast class had learned most, followed by the TV class, while the Radio class had learned the least!

In attempting to explain the above finding, it was recalled that when the Educational Testing Service team visited Nigeria in connection with this

evaluation in November, 1967, they talked with the Headmistress of School 10. During this discussion she pointed out that when initial plans for the evaluation were being formulated, all three Primary 5 teachers in her school wanted to teach the class for which a television receiver was to be provided. Their second choice was to teach the Radio class; but no one was interested in teaching the Contrast class. The teacher who was finally selected for the Contrast class was quite displeased with the outcome. At that time she expressed her determination to the Headmistress that she would see to it that her class would outperform either the TV or Radio classes. The results indicated that her class was able to overtake the TV class during the second term, and this lead was maintained through the remainder of the school year.

The heightened motivation of this teacher has been labeled an "over-compensation effect," and the net outcome was to destroy the comparability of the classes if, in fact, this teacher was actually teaching her students more English as a result of her increased motivation.

An alternate explanation was that this teacher did not teach more English, but rather, she might have taught the children to pass specific test items that she recalled from the pretest. To investigate this possibility, the classes were compared on all other parts of the posttests (A', D, B', E, C', and F) as well as on Reading 12A. The results presented in Table 14 indicate that, beginning with Term 2, the Contrast class outperformed both TV and Radio classes on all aspects of the English achievement tests, including the parallel pretest items and the unique items. Since the teacher of the Contrast class had never previously seen these particular parts of the achievement tests, it was obvious that the performance of her class was due to having learned more of the syllabus material during the school year.

Table 14

Adjusted achievement mean scores for parallel tests, unique tests,
and reading test for classes in School 10

	Test						
	A'	D	B'	E	C'	F	12A
TV Class	5.08	3.27	6.02	1.46	7.93	6.06	24.57
Radio Class	3.99	2.73	5.52	0.80	6.81	4.77	20.98
Contrast Class	4.68	4.13	7.42	2.60	9.21	5.30	21.62

Note.-Maximum score possible = 17 on English Tests and 50 on Reading 12A.

On Reading 12A it was discovered that the TV Class outperformed both Contrast and Radio classes, a result which does not differ from previous findings. Inasmuch as Reading 12A assessed skills that were not specifically part of the syllabus, it appears that they fell outside the area stressed by the teacher of the Contrast class. On this basis it can be concluded that the teacher of the Contrast class, as a result of her increased motivation, was able to overcome effectively the benefits provided to the other classes by the broadcast media on syllabus content material, but it was also evident that there were lateral benefits associated with TV viewing, and these were not so effectively taught by the Contrast teacher.

Based upon these findings, it would appear that a major component in the acquisition of skills in the Primary School depends on the motivation of the teacher. Therefore, ways of increasing motivation must clearly be sought; and broadcasting may have an important role to play in stimulating the receptive teacher. This particular study shows that broadcasting depends heavily on the active support of the teacher who, in the last analysis, comprises a considerable investment in human potential. Although certain serendipity effects may accompany the TV broadcasts, it appears that other important benefits might also be obtained by concentrating on improving teacher skills and by motivating them through the establishment of conducive educational environments.

Student Attitudes toward this Educational Experience

Near the conclusion of the school year students in all classes completed an attitude questionnaire which also elicited certain factual data about their participation in the evaluation. Two questions in this inventory were questions of fact, and their accuracy could be independently checked. Since this was probably the students' first encounter with any sort of attitude questionnaire, the factual questions on which external data were available served as an estimate, however crude, of the validity of the responses.

Validity Check

The factual questions and attitude questions both used a format which required the student to select one of three response choices. Different forms of the questionnaire were used for TV, Radio, and Contrast classes. Students responded by circling one of the three choices provided. All questionnaires were completed in class, with the proctor reading the instructions, the practice items, and each question together with its response choices as the children followed on their individual copies of the questionnaire.

The factual questions were (1) How many terms have you studied Straight for English in class 5? and (2) How long have you had a copy of Straight for English book 5? Responses to the first question were compared to attendance figures. Responses to the second question were considered in light of the fact that it was not possible for students to have had a copy of the text for longer than they indicated they had studied Straight for English in Primary 5.

An analysis of the replies to these questions led to the discovery of a substantial amount of error which was interpreted as a tendency on the

part of many of the children to choose the first response, regardless of the verbal content of that item. This, however, was not the only basis for errors. A number of students inappropriately chose the second and third alternatives, and although there may be particular reasons for these responses, they have been presently attributed to inexperience with questionnaires of this sort.

The tendency to respond to the first alternative was in all cases greater among males than among females. In fact, among the TV and Radio classes the female responses to the factual questions were correct approximately 90% of the time, but among Contrast classes both males and females responded correctly only 70% of the time.

Analysis of attitude questions

Of course there are no "correct" responses to attitude questions, but based on the evidence obtained from the factual questions, it may be assumed that the responses given differ somewhat from the true attitude. There probably are more instances of acquiescence to the desirable response than one would like. Unfortunately, the first of the three provided responses was also positive, and this probably encouraged acquiescence. Although one may assume that the percentage of acquiescent responses is probably inflated, it is probably lowest among females in the TV and Radio classes.

One important question which probably is based on an attitude component dealt with the students' ability to understand the TV or radio broadcasts. This question is, of course, a composite of student ability and interest as well as the quality of the broadcast reception, the child's location in the room, etc. The responses to this question are presented in Table 15.

Table 15

Percent of students responding to the question
"Were you able to understand the broadcasts very well?"

<u>Response</u>	<u>TV Classes</u>		<u>Radio Classes</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
Most of the time	84	57	79	77
About half the time	13	09	19	20
Almost never	03	04	02	03

In terms of attitudes toward the educational experience, these may be broken down into attitudes toward the school, learning English, the teacher, the textbook, the TV or radio receiver, and the use of the receiver to supplement the regular instruction in Straight for English. Tables 16 through 21 present the results to these questions.

Table 16

Percent of students responding to the question
"How do you feel about your school?"

<u>Response</u>	<u>TV Classes</u>		<u>Radio Classes</u>		<u>Contrast Classes</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
Like	97	96	95	91	92	93
Do not know	01	03	04	03	06	06
Dislike	02	01	01	01	02	01

Table 17

Percent of students responding to the question
"How do you feel about learning English?"

<u>Response</u>	<u>TV Classes</u>		<u>Radio Classes</u>		<u>Contrast Classes</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
Like	97	96	88	97	89	96
Do not know	01	03	07	01	04	03
Dislike	02	01	05	02	07	01

Table 13

Percent of students responding to the question
 "How do you think your teacher feels about you?"¹

Response	TV Classes		Radio Classes		Contrast Classes	
	Male	Female	Male	Female	Male	Female
Likes me much	83	77	79	73	74	72
Likes me some	12	15	12	10	13	12
Dislikes me	05	03	09	12	13	16

¹The question "How do you feel about your teacher?" was a socially unacceptable one for this population, but the question stated in its obverse form should yield substantially the same results.

Table 19

Percent of students responding to the question
 "How do you feel about the book Straight for English?"

Response	TV Classes		Radio Classes		Contrast Classes	
	Male	Female	Male	Female	Male	Female
Like it	95	95	92	91	88	85
Do not know	04	03	06	06	07	10
Dislike it	01	02	02	03	05	05

Table 20

Percent of students responding to the question
 "How do you feel about the use of (Television or Radio) in school?"

Response	TV Classes		Radio Classes	
	Male	Female	Male	Female
Like it	95	92	92	89
Do not know	03	06	06	08
Dislike it	01	02	02	03

Table 21

Percent of students responding to the question
 "Would you like to use (Television or Radio) for lessons in English next year?"

Response	TV Classes		Radio Classes	
	Male	Female	Male	Female
Yes	87	83	77	71
Do not know	10	15	15	27
No	03	02	08	02

Table 22

Percent of students in TV classes responding to the question "Would you like to have TV lessons next year in the other subjects listed below?"

		<u>Male</u>	<u>Female</u>
English	Yes	73	68
	Not Sure	13	19
	No	09	13
Arithmetic	Yes	44	40
	Not Sure	41	41
	No	15	19
History	Yes	45	49
	Not Sure	41	40
	No	14	11
Geography	Yes	45	40
	Not Sure	45	46
	No	10	14
Science	Yes	47	43
	Not Sure	43	49
	No	10	08

Table 23

Percent of students in Radio classes responding to the question "Would you like to have Radio lessons next year in the following subjects?"

		<u>Male</u>	<u>Female</u>
English	Yes	77	78
	Not Sure	15	18
	No	08	04
Arithmetic	Yes	48	41
	Not Sure	38	43
	No	14	16
History	Yes	48	46
	Not Sure	39	45
	No	13	09
Geography	Yes	46	43
	Not Sure	42	48
	No	12	09
Science	Yes	48	45
	Not Sure	42	47
	No	10	08

Table 21

Percent of students in the Contrast classes responding to the question
"Which do you like better?"

	<u>Male</u>	<u>Female</u>
Television	80	75
Radio	19	24
No Response	01	01

The whole picture presented by the replies of the students is one of agreement and acquiescence to the status quo. Only when they were asked to project their experience with broadcasting to other areas of the curriculum (see Tables 22 and 23) do they show any variance, and most of that is accounted for by a shift to the "Not Sure" category.

On the basis of these findings, and from evidence provided by observing the pupils and conferring with their teachers, it is evident that there were positive attitudes towards the use of TV and radio broadcasting. It is therefore reasonable to believe that this receptiveness of teachers to the broadcasts might in the future be capitalized upon in efforts to upgrade teacher effectiveness through the use of these media.

Attitudes of Teachers and Headmasters

Near the end of the school year both the teachers and headmasters involved in the evaluation were asked to complete an information sheet on the experiment. Many of the questions on this form dealt with their attitudes toward the broadcasts. For the Contrast classes, the teachers and headmasters were asked to give their reactions to having been involved in the evaluation, and their responses to this question were overwhelmingly positive.

Listed below is a compilation of responses by teachers and headmasters concerning the broadcasts. It can be seen that, in general, they were

satisfied with the broadcasting and that there was a definite hierarchy of responses both in terms of what they liked and also in terms of their suggestions for improvement.

Teacher and Headmaster Evaluation Sheets

Below is a record of the responses to the first four questions on the "Evaluation--1967" sheets as answered by teachers and headmasters in the Radio and TV groups.

Teachers Responding

- Question 1. How would you improve the Straight for English Radio lessons?
1. increase the time allotted for the program (4)
 2. dramatize the meanings of the words (1)
 3. visit the radio teacher and discuss lessons (1)
 4. provide special help for slow students (1)
 5. use visual aids (1)
- How would you improve the Straight for English TV lessons?
1. increase the time allotted for the program (3)
 2. make apparatus to use with the lesson (2)
 3. administer weekly spelling tests (1)
 4. use visual aids (1)
 5. have dramatizations (1)
- Question 2. What things did you and your class like best about the Radio lessons?
1. pronunciation drills (9)
 2. presentation of new words (6)
 3. storytelling (3)
 4. greetings (2)
 5. good teacher's notes (1)
- What things did you and your class like best about the TV lessons?
1. "Aku" (9)
 2. use of apparatus (6)
 3. signs and pictures (5)
 4. music (3)
 5. pronunciation (1)
 6. dramatization (1)
 7. teaching of new words (1)
- (One teacher also mentioned the visits by the officials.)

Question 3. Name three (3) subjects you would like to be taught over Radio/TV next year.

A weighted mean was derived by assigning three points for choice number 1, two points for choice number 2, and one point for choice number 3. The total points were then divided by the number of teachers who actually chose that particular subject.

English	64/26	2.46
Social Studies	92/44	2.09
Arithmetic	16/9	1.77
Science	35/22	1.59

One may conclude from the suggestions for improvement that the teachers were aware of the different methods that could be tried in teaching English by way of the broadcasts. The teachers, regardless of whether they were in the TV or Radio groups, seem to agree that they would have liked more time to be devoted to the broadcasts, and this is an indication of interest and involvement.

Of particular interest is the endorsement of the value of the Television bird puppet "Aku", a Nigerian parrot and a symbol of skill in storytelling. There was clearly a pupil-teacher identification fostered by the relationship between Aku and the program presenter. In addition, the pronunciation drills were appreciated indicating that correct spoken English was of some importance to the participants.

The responses to the final question show the combined TV-Radio preferences for broadcasting assistance. The weighted mean values presented are probably reliable, although it would hardly be possible to teach arithmetic by radio without accompanying visual aids.

Conclusions and Recommendations

Conclusions

1. Conclusions presented in this report are based on such analyses as were possible, given the original design. Generalization of these results to other primary schools in Nigeria is therefore inadvisable.

2. The initial design was of such an extended nature that it made analysis of all the data, so conscientiously collected by the field officers, an extremely difficult task.
3. The English achievement posttests used in this evaluation were based on the most frequently encountered material in the text Straight for English as approved by the Northern Ministry of Education, and they proved to be more difficult than the level of achievement of the pupils warranted, regardless of the treatment involved. In this respect the evaluation was severely handicapped because measured gains in all treatments were small.
4. The poor performance on the posttests also suggested that attempts of teaching the mechanics of language as required by the text were unsuccessful in all treatments, and the only area where substantial gains were registered was on English usage. However, those gains which were registered could not be attributed to the influence of the broadcasts. Rather, it appeared that these gains were discovered in classes having better teachers, regardless of whether that class had supplementary broadcasts or not.
5. Reading 12A proved to be a test more suited to the students' abilities and assessed a wide range of English comprehension abilities. It was discovered that the TV classes, on the average, outperformed both Radio and Contrast classes on this test. The superior performance of the TV classes might be associated with gains in visual comprehension skills as a result of viewing TV classes inasmuch as the format of Reading 12A is highly pictorial.

6. No appreciable Hawthorne effect was observed on the base-line scores of all the Contrast groups considered together.
7. A special kind of Hawthorne effect was noted in the one school which had a class in each treatment. In this school the least desirable treatment from the teachers' point of view, proved to be the Contrast Class. The teacher assigned to teach this class voiced dissatisfaction and expressed her determination to have her class outperform the other classes which had the benefits of TV or Radio instruction. The teacher's "overcompensation effect" was indeed successful, as the superior mean scores of the Contrast class indicated.
8. This "overcompensation effect," although highly undesirable in an evaluation which required a valid base-line, is just one example of the role broadcasting could have in stimulating the teacher. Other evidences of increased teacher interest appeared on information sheets filled out by participating teachers in which it was apparent that they had learned a great deal about different methods of teaching English and were employing these methods.
9. The results of Reading 12A and the teacher information sheets suggest that there may have been other non-measured benefits associated with the broadcasts (examples might be increased listening comprehension, greater pronunciation skills and upgrading of teacher skills).
10. Teachers attitudes toward the use of broadcast media were generally favorable. Their replies to the questions in the inventory indicated that they had benefited from the wide variety of teaching methods employed. Their major criticism was that they

felt more time should be devoted to the broadcast lessons and a greater variety of lessons should be presented.

11. Students' attitudes reflected acquiescence to desirable statements in the inventory, an expression of traditional African courtesy, and other indirect methods of attitude assessment will have to be developed for future investigations of this kind.

Recommendations

1. In future projects involving the use of modern aids to education in developing countries it is imperative that an evaluation be built into the project from its very inception. The evaluation team should be in the field as early as possible and should remain with the project for its duration. The team members should act in the role of participant-observers wherever this is feasible, and they should preferably have or should gain before the project starts detailed knowledge of local conditions.
2. Under conditions of rapid social and educational change, a number of short-term, well-designed studies spanning a single term, covering several subjects, and using a minimum of comparable classes are preferable to a single long-term effort where the possibilities of confounding are increased as time goes on. There are two main advantages of short-term studies. These are feedback which may be used for modification and less loss of data due to extraneous social factors.
3. In light of experience with the use of difficult tests in this study, it is strongly recommended that all measures used should be subjected to rigorous field trials and be adapted to local conditions before they are employed in the actual evaluation.

4. In view of the difficulty experienced by students in dealing with the mechanics of English grammar, it is recommended that consideration be given to the appropriateness of the content of the syllabus at the Primary 5 level. The results indicate that students would respond more effectively to the teaching of English usage and comprehension.
5. Modern aids to education are being increasingly used in developing countries at all levels of education. Perhaps it is now appropriate to pool the experiences gained from all evaluations so that future planning may derive maximum benefit from past successes and failures.

Recommendations (Postscript)

Although the achievement data gathered in this evaluation provide little support for or against the continuation of educational broadcasting in Nigeria, the adequacy of this report demands that, as evaluators, we must also report what we feel to be the overall affect generated by the introduction of supportive broadcasts. This affect, observed during our on-site inspection of classrooms, was overwhelmingly positive causing us to recommend, although admittedly these are subjective recommendations, that:

1. Broadcasting should be continued at the primary level. In the teaching of English it would be advisable to stress reading, writing, listening, and speaking skills rather than formal grammatical rules which are poorly understood and inefficiently learned in the primary years.
2. While new emphases in broadcasting are being actively sought, it is recommended that efforts be made to record ongoing programs, to collate them with previously recorded programs, and to evaluate all of them so that they can be revised if necessary and used effectively in the future.

3. Priorities in primary, secondary, teacher, and technical education will necessarily determine the future role of broadcasting. It is therefore recommended that these priorities be established to accomplish both short and long-term goals. In particular, the criteria for establishing these priorities should relate closely to manpower requirements that are not being adequately met, and these are reflected by poor performance on national examinations.

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Appendix

APPENDIX A

Summary of pretest and posttest scores

Television Groups

	10	30	40	71	72	73	74	75	76	77	78	92	Total
<u>Pretest</u>													
<i>N</i>	38	39	29	38	36	37	46	27	29	7	23	41	390
μ A	6.18	5.26	6.31	3.95	5.33	5.58	6.35	7.29	5.14	7.00	5.74	6.49	5.81
σ_A	2.00	2.22	1.93	1.80	2.32	2.09	2.15	2.91	2.03	2.83	2.83	2.26	2.13
μ B	5.47	4.23	5.52	2.97	4.22	5.00	4.83	7.56	4.14	5.29	5.43	5.51	4.92
σ_B	2.04	2.61	2.86	1.85	2.28	2.31	2.15	2.52	2.22	2.43	2.35	1.99	2.18
μ C	4.26	2.69	4.62	2.63	2.75	4.21	2.39	6.11	3.41	3.00	3.04	3.39	3.60
σ_C	2.84	2.26	2.44	1.79	2.43	1.93	2.21	2.45	2.37	2.16	2.90	2.51	2.54
μ {ABC}	15.92	12.18	16.45	9.55	12.31	15.19	14.07	21.56	12.69	15.29	14.22	15.39	14.33
$\sigma_{\{}}$	4.88	5.61	5.26	3.85	5.31	4.70	4.49	6.05	5.76	6.92	6.58	5.15	5.84
<u>Posttest 1</u>													
<i>N</i>	36	39	27	37	31	36	41	27	29	7	22	41	373
μ A	8.44	6.67	8.67	5.32	6.48	8.21	8.00	10.11	8.21	10.57	7.59	8.71	7.91
σ_A	2.60	2.96	3.04	2.84	3.22	2.62	3.26	2.21	3.26	4.93	3.49	2.55	3.20
μ A'	8.83	6.74	7.74	4.70	6.84	7.21	8.05	9.21	8.10	9.86	7.59	9.07	7.76
$\sigma_{A'}$	2.91	3.36	3.24	3.22	3.22	3.14	2.91	2.22	3.11	4.45	3.49	2.97	3.35
μ D	7.44	6.38	7.85	4.86	6.32	7.73	7.61	11.01	7.48	9.57	7.45	8.66	7.50
σ_D	3.41	3.29	3.79	2.96	3.77	3.53	3.93	3.63	3.93	5.44	4.44	3.90	3.93
<u>Posttest 2</u>													
<i>N</i>	34	38	25	31	31	35	42	21	25	6	16	40	347
μ B	8.18	6.79	8.80	4.81	7.45	7.91	9.26	11.00	7.40	11.00	7.38	9.30	8.16
σ_B	2.78	2.44	2.87	1.97	3.40	3.13	3.26	2.93	2.80	4.34	3.81	3.26	3.41
μ B'	7.82	6.11	8.08	4.48	6.16	7.26	8.95	11.21	7.76	11.00	7.00	8.65	7.68
$\sigma_{B'}$	2.95	2.40	3.52	2.74	3.07	3.35	3.53	3.39	3.37	3.16	4.05	3.59	3.61
μ E	3.21	2.84	4.48	3.39	3.42	3.26	5.14	5.73	4.28	5.50	2.50	4.88	3.99
σ_E	1.82	1.53	2.10	1.71	1.73	1.63	2.27	2.13	2.28	2.26	1.75	2.51	2.21
<u>Posttest 3</u>													
<i>N</i>	38	38	35	28	28	36	43	27	32	8	16	37	366
μ A	9.13	8.05	8.91	6.82	7.96	9.33	9.12	11.33	9.03	10.12	8.50	9.38	8.92
σ_A	2.58	3.17	2.36	2.78	2.87	2.86	2.77	2.00	3.25	3.44	3.54	2.36	2.92
μ B	9.29	6.84	8.57	5.71	8.32	9.11	10.05	11.25	8.41	9.75	8.31	9.70	8.84
σ_B	2.54	2.69	2.80	3.31	3.52	2.63	3.60	2.90	3.06	2.38	4.50	3.04	3.39
μ C	6.87	5.55	6.94	4.54	6.50	7.36	8.19	9.22	6.84	7.00	6.19	7.05	6.90
σ_C	2.17	2.15	2.52	1.93	3.04	2.43	2.62	2.50	2.46	3.34	3.41	2.04	2.68
μ C'	7.53	6.24	8.54	5.68	7.36	8.03	8.67	10.15	7.50	8.25	7.62	8.76	7.86
$\sigma_{C'}$	2.21	2.12	2.24	2.44	2.72	2.38	2.63	2.04	2.86	3.20	3.23	2.51	2.70
μ F	6.74	6.03	8.23	4.32	4.96	6.53	6.00	9.33	5.73	7.62	5.56	7.59	6.54
σ_F	2.15	2.20	2.45	2.58	2.65	2.59	2.73	2.10	2.89	2.67	3.67	2.77	2.88
μ {ABC}	25.29	20.45	24.46	17.07	22.79	26.14	27.35	32.11	24.28	26.88	23.00	26.14	24.67
$\sigma_{\{}}$	5.98	6.88	5.90	6.81	8.34	6.53	7.92	6.12	7.67	8.15	10.51	6.05	7.85
Gain	9.37	8.27	8.01	7.52	10.43	10.95	13.23	13.35	11.59	11.59	8.78	10.75	10.34

Radio Groups

	10	40	50	60	70	80	81	82	83	84	85	Total
<u>Pretest</u>												
N	38	31	42	36	43	27	27	25	33	30	24	356
μ_A	4.89	5.61	4.74	6.19	6.53	3.89	5.63	4.72	4.82	4.73	4.25	5.17
σ_A	1.80	2.26	2.22	1.65	2.46	2.39	2.34	2.11	2.70	2.07	1.54	2.29
μ_B	4.97	4.84	4.52	5.83	5.47	3.70	4.93	4.20	4.15	5.27	3.33	4.74
σ_B	2.31	1.81	2.21	2.08	2.44	1.90	2.64	1.91	2.25	1.68	1.63	2.21
μ_C	3.11	4.42	3.40	4.89	3.77	2.67	4.15	4.24	3.47	4.80	1.46	3.71
σ_C	2.23	2.49	2.25	2.68	2.44	1.82	2.90	2.17	2.50	2.23	1.86	2.49
$\mu_{\Sigma ABC}$	12.97	14.87	12.67	16.92	15.77	10.26	14.70	13.16	12.33	14.80	9.04	13.61
σ_{Σ}	4.73	4.97	5.28	5.10	5.37	4.17	5.70	5.17	6.07	3.80	3.32	5.37
<u>Posttest 1</u>												
N	36	29	40	34	41	26	24	24	32	29	21	336
μ_A	7.17	7.10	6.08	7.47	9.10	6.03	8.21	5.21	7.38	6.83	5.62	7.04
σ_A	2.74	2.41	2.96	3.26	2.54	3.33	3.67	2.96	3.81	2.35	2.97	3.17
$\mu_{A'}$	6.94	7.79	5.62	7.24	8.20	6.04	7.17	4.38	7.34	6.66	4.57	6.67
$\sigma_{A'}$	3.09	2.54	2.96	3.46	2.94	3.67	4.26	2.37	3.50	2.27	3.53	3.32
μ_D	6.03	7.55	6.88	7.38	8.56	5.46	7.96	5.83	7.59	6.62	4.81	6.91
σ_D	3.86	2.92	3.38	2.77	3.56	3.65	4.30	2.15	3.82	2.48	3.01	3.46
<u>Posttest 2</u>												
N	33	30	34	32	41	20	20	22	30	27	21	310
μ_B	7.12	7.90	6.71	8.50	9.56	4.70	9.65	5.32	7.43	5.96	6.43	7.38
σ_B	2.26	2.34	3.20	3.39	2.98	1.92	3.73	2.17	2.99	2.93	3.33	3.21
$\mu_{B'}$	6.45	7.00	5.79	7.53	7.46	4.05	8.50	4.73	6.80	5.67	4.67	6.38
$\sigma_{B'}$	2.27	2.45	2.99	3.14	3.53	2.24	3.71	2.00	3.49	2.53	3.37	3.16
μ_E	2.52	3.53	3.29	5.22	3.90	1.80	5.10	3.23	3.47	3.15	3.57	3.55
σ_E	1.84	1.55	2.04	2.04	2.36	1.15	2.31	1.45	2.15	1.90	1.72	2.11
<u>Posttest 3</u>												
N	34	35	35	37	38	19	29	20	27	26	21	321
μ_H	7.15	8.14	7.23	8.65	9.00	5.89	9.66	6.35	9.22	7.96	7.76	8.04
σ_H	2.82	2.68	3.38	2.63	2.08	3.09	2.26	2.28	3.40	2.39	2.93	2.90
μ_B	7.38	8.17	6.54	8.32	9.05	4.35	10.34	4.95	8.22	6.77	8.62	7.71
σ_B	2.81	2.85	3.28	2.75	3.14	2.11	2.95	2.01	3.34	2.73	3.69	3.29
μ_C	5.94	7.17	5.77	6.54	6.76	4.45	7.23	4.45	7.56	6.73	5.48	6.34
σ_C	2.63	2.20	2.64	2.82	2.39	2.28	2.93	2.48	3.45	2.68	2.38	2.78
$\mu_{\Sigma ABC}$	20.47	23.51	19.51	23.51	24.82	14.40	27.23	15.75	25.00	21.46	21.86	22.07
σ_{Σ}	6.94	6.72	8.47	6.85	6.37	5.60	6.93	5.05	9.27	6.92	8.20	7.85
$\mu_{C'}$	7.00	7.35	6.31	7.49	8.24	4.30	9.27	5.60	7.78	8.31	6.29	7.26
$\sigma_{C'}$	2.37	2.83	2.52	2.73	2.39	2.55	2.73	2.09	3.27	2.02	3.07	2.82
μ_F	5.85	6.21	4.69	7.24	7.24	4.90	7.33	4.15	5.96	5.88	5.71	6.10
σ_F	3.17	3.00	2.23	2.55	2.48	2.22	2.23	1.76	2.98	2.86	2.03	2.77
$GAIN$	7.50	8.64	6.84	6.59	9.05	4.14	12.73	2.59	12.67	6.66	12.82	8.46

Contrast Groups

	10	30	50	60	70	79	86	87	88	89	90	91	Total
<u>Pretest</u>													
<i>N</i>	37	43	40	36	45	44	38	37	19	39	40	15	433
μA	5.08	3.91	4.72	5.28	6.18	4.43	6.18	5.22	6.16	5.72	4.40	6.60	5.20
σ_A	2.22	2.37	2.24	2.71	1.91	2.88	2.09	2.63	2.48	2.52	1.96	2.23	2.47
μB	5.11	2.95	4.70	5.22	5.80	3.59	4.53	4.73	5.42	4.82	3.82	4.93	4.57
σ_B	1.74	1.99	2.24	2.63	2.36	2.02	2.13	2.10	2.91	2.01	1.97	2.28	2.30
μC	3.95	2.79	3.78	4.17	5.02	2.52	3.95	3.43	4.58	3.05	2.28	3.00	3.52
σ_C	1.82	2.22	2.27	2.04	3.32	2.19	1.89	1.77	3.06	2.81	1.93	2.36	2.45
$\mu \Sigma ABC$	14.14	9.65	13.20	14.67	17.00	10.55	14.66	13.43	16.16	13.59	10.50	14.40	13.28
σ_{Σ}	4.21	4.80	5.17	6.22	6.34	5.73	4.77	5.11	6.31	5.48	3.82	5.57	5.69
<u>Posttest 1</u>													
<i>N</i>	35	42	40	34	43	43	34	35	19	38	39	13	415
μA	7.31	6.10	5.38	6.85	7.51	4.72	7.44	6.57	7.74	6.18	7.41	8.08	6.61
σ_A	2.48	3.24	2.56	3.12	2.47	3.01	2.75	3.96	2.54	1.96	3.28	3.30	3.04
$\mu A'$	7.46	5.26	5.35	7.24	7.58	3.84	7.12	6.31	7.26	6.24	7.64	7.77	6.43
$\sigma_{A'}$	3.20	3.39	2.43	3.31	2.55	3.31	3.79	4.14	2.68	2.58	3.30	2.80	3.37
μD	7.29	5.21	5.15	7.32	6.79	4.30	6.53	6.40	8.05	5.05	6.33	8.62	6.16
σ_D	2.91	3.88	2.92	4.03	3.35	3.47	3.30	3.39	3.57	2.20	2.90	4.82	3.53
<u>Posttest 2</u>													
<i>N</i>	36	36	35	34	39	40	37	36	16	31	35	11	386
μB	9.17	6.89	5.66	6.91	7.82	4.62	6.70	6.53	9.44	7.00	6.37	7.64	6.89
σ_B	2.71	2.81	2.44	3.33	2.78	2.37	2.65	2.86	3.39	2.25	2.65	3.20	2.93
$\mu B'$	8.00	5.78	4.57	6.85	7.31	4.30	5.46	5.39	8.25	5.48	5.06	7.36	5.96
$\sigma_{B'}$	2.94	3.63	2.98	3.22	3.86	2.33	1.79	3.05	3.02	2.45	2.27	3.32	3.15
μE	4.19	3.50	2.89	4.21	3.69	2.98	3.62	3.23	4.69	3.52	3.94	3.64	3.62
σ_E	1.94	2.38	1.78	2.61	1.73	2.12	1.85	2.29	2.02	2.01	2.18	2.34	2.13
<u>Posttest 3</u>													
<i>N</i>	36	38	37	37	39	38	38	37	18	32	40	15	405
μA	8.92	7.29	6.81	7.49	7.77	5.29	7.37	6.92	8.94	7.03	7.18	7.87	7.30
σ_A	1.98	3.67	3.15	2.99	2.36	2.81	2.73	3.40	1.73	2.43	3.49	3.27	3.02
μB	10.00	6.79	6.49	8.30	8.05	5.26	6.82	6.05	9.39	7.38	6.85	6.53	7.26
σ_B	3.01	2.86	3.44	2.98	3.23	2.59	2.26	3.09	2.57	2.57	3.56	2.53	3.19
μC	8.17	4.89	5.76	6.03	6.62	4.18	5.32	5.03	8.28	5.75	5.02	6.93	5.83
σ_C	2.55	2.76	2.74	2.98	2.79	2.33	2.23	2.73	2.54	2.06	3.05	3.28	2.88
$\mu \Sigma ABC$	27.11	18.97	19.05	21.81	22.44	14.74	19.53	13.05	26.61	20.16	19.05	21.33	20.40
σ_{Σ}	6.14	8.13	8.18	7.77	7.22	6.62	5.95	7.36	5.48	5.47	8.90	7.43	7.83
$\mu C'$	8.97	6.21	6.03	7.00	7.79	4.45	5.97	6.32	7.83	6.53	6.05	7.60	6.62
$\sigma_{C'}$	2.12	2.79	2.07	2.77	2.74	2.32	2.49	3.06	2.55	1.92	2.85	2.75	2.77
μF	6.78	4.74	3.97	5.30	5.46	3.58	4.21	4.24	6.50	5.75	5.31	6.47	5.04
σ_F	2.47	2.37	2.65	2.90	3.26	2.55	2.06	2.62	2.94	2.27	2.73	2.29	2.76
Gain	12.97	9.32	5.85	7.14	5.44	4.19	4.87	4.62	10.45	6.57	8.55	6.93	7.12

Appendix B
Statistical Treatment of Data

Nigeria Study

Description of Data

Teaching of 5th grade English in Nigeria

3 treatments $T_1 = \text{TV}$, $T_2 = \text{Radio}$, $T_3 = \text{Contrast or text book only}$.

Comments on data collection

TV had to be assigned to schools having an electricity source.

Radios operated off batteries and did not depend on an electricity source.

Teacher skills (TCR) varied wildly and is an important factor.

Teacher turnover is rapid but was ignored.

The students had been taught in Primary 4 in the mode of two languages: the local vernacular and English. A statistical distinction was drawn between vernacular (L1) and English (L2).

Each classroom was treated as a separate sample.

Some classrooms were of one sex only.

Some classrooms contained students who had received 4th grade instruction in one language only.

All sample sizes were unequal.

Three areas of English instruction were distinguished. They were broken into term units and covered three achievement tests:

Sem 1	Test A
Sem 2	Test B
Sem 3	Test C

All three tests were also administered before classes started in the form of a pretest.

Analysis of covariance sequence

Each test (A, B, or C) was handled as a separate univariate analysis of covariance with the appropriate pretest as the covariate.

The first pass at the data was laid out as a 4-factor analysis of variance.

Treatment x Sex x Language with classes nested within each treatment sex-language combination.

Due to computer capacity, only data from 10 schools in each treatment were retained. This caused a loss of 27 cases in Test A data and was not considered serious.

A number of classes were missing one or more Language-Sex combination and produced missing cells in the analysis.

<u>Test</u>	<u>No. of Missing Cells</u>
A	30
B	?
C	?

Extreme inequality of cell size made it impossible to analyze data from students who received 4th grade instruction in a vernacular language although average test scores are reported for non-statistical comparison with those who received 4th grade instruction in English.

Testing Teacher Effectiveness (TCR)

One piece of information collected each semester was a rating of teacher skills.

It was suggested that this was undoubtedly one of the more crucial measurements in the study and that it would be a mistake to ignore this information in the analysis.

To analyze this information a statistical test was devised whereby the teacher rating was correlated with student scores after those scores had the effects of classes, treatments, language, sex and pretest score removed from them. This amounted to a linear test of the homogeneity of regression of teacher ratings against student performance.

Separate analysis of Teacher Ratings were made for each semester of instruction. Table A presents the results.

Table A

	<u>SSq</u>	<u>MS</u>	<u>df</u>	<u>F</u>	<u>p(F)</u>	<u>r</u>
Test A	71.53	71.53	1	11.73	<.001	.117
Error	5112.05	6.10	833			
Test B	61.34	61.34	1	3.61	<.005	.109
Error	5607.36	7.12	787			
Test C	27.35	27.35	1	4.33	<.05	.077
Error	4606.46	6.25	733			

Testing the Effect of Television, Radio, and Contrast

As was commented upon earlier, the analysis was laid out as an analysis of covariance. Three factors seemed necessary: Treatment (3 levels), Sex (2 levels), and Language of grade 4 (2 levels). Two covariates were used: The appropriate pretest and teacher ratings. For test A the number of observations in each cell is tabled below.

Table B

<u>Language</u>	<u>Treatment 1</u>		<u>Treatment 2</u>		<u>Treatment 3</u>	
	<u>M</u>	<u>F</u>	<u>M</u>	<u>F</u>	<u>M</u>	<u>F</u>
L1	7	1*	1	1	2	
L2	15	8	12	6	29	7
L1	2	1	2	2	1	
L2	15	6	12	7	23	10
L1	6	2	1	1	2	
L2	18	14	17	13	18	15
L1	7	2	3	2	1	
L2	3	6	17	2	7	5
L1	10		1	1	25	7
L2	9	12	36	3	1	1
L1		1	5			
L2	22	8	14	6	28	6
L1		2	2		32	6
L2	2	23	16	10	5	
L1						1
L2	20	21	26	10		31
L1					30	10
L2	14	14	16	8		
L1		5		2	26	7
L2		31		32		

*The unit represented by the box represents an individual classroom. Classrooms are nested within treatments.

The extreme inequality of the number of subjects in each cell made analysis of variance of the total sample impossible. Unfortunately it is impossible on logical grounds to eliminate any factor: sex, language of grade 4 or class. Several stratagems were attempted: none worked as the data refused to yield mathematically acceptable estimates for treatment effects. The stratagems used were:

1. nesting of all effects within each language
2. ignoring data from L1 completely
3. eliminating classes which contained students of one sex exclusively
4. use of orthogonal contrasts
5. elimination of all classes with less than 5 students in I2 (English language) regardless of sex.

The next attempt at data analysis was made on a restricted sample consisting of four classes in each treatment, and furthermore, only data for students who had been taught in English in Primary 4 were used (see underlined cell counts in Table B). The analyses consisted of covarying the appropriate pretest score on each of the posttest scores. Reading 12A scores were also used as a variate with the covariate in this case being the total pretest scores (sum ABC).

The final attempt was to analyze the data from the one school which had three classes, one in each treatment. This utilized only 90 subjects from a total of nearly 1,000. In this school it was possible to obtain a mathematically acceptable analysis. Its statistical shortcomings are:

1. Classroom differences are confounded with Treatment making it logically impossible to separate the two.
2. Inability to determine the effect of standardized instruction via mass communications media on students with vernacular backgrounds in grade 4. This is a most serious shortcoming since the gains of these students should be quite different than those with English backgrounds in grade 4.

The analysis of covariance produced the following results:

Test A

<u>Source</u>	<u>SS</u>	<u>MS</u>	<u>df</u>	<u>F</u>	<u>p(F)</u>
Regression	161.33	161.33	1	30.68	<.0001
Treat. x Sex	3.40	1.70	2	.32	.72
Sex	1.08	1.08	1	.20	.65
Treatment	13.79	6.89	2	1.31	.27
Error	436.51	5.26	33		

Test B

<u>Source</u>	<u>SS</u>	<u>MS</u>	<u>df</u>	<u>F</u>	<u>p(F)</u>
Regression	42.71	42.71	1	7.06	.01
Treat. x Sex	20.58	10.29	2	1.70	.19
Sex	0.09	0.09	1	.02	.90
Treatment	63.03	31.52	2	5.21	.007
Error	483.87	6.05	30		

Test C

<u>Source</u>	<u>SS</u>	<u>MS</u>	<u>df</u>	<u>F</u>	<u>p(F)</u>
Regression	6.72	6.72	1	1.10	.30
Treat. x Sex	1.36	0.68	2	.11	.90
Sex	0.21	0.21	1	.03	.85
Treatment	88.02	44.01	2	7.19	.001
Error	483.16	6.12	79		

Since Treatment was significant in both tests B and C, the adjusted treatment means are relevant to interpretation. These and their standard errors are shown.

	Test B		Test C
T_1	6.30	T_1	6.44
T_2	5.59	T_2	5.26
T_3	7.64	T_3	7.76
$S_{\bar{x}}$	2.46	$S_{\bar{x}}$	2.47

In both cases T_3 seems superior

Parallel Forms analysis of the Achievement Tests

In order to study the relationships between parallel forms of each test, all information due to sampling fluctuation was removed from the data. This eliminated from the correlations the confounding effects of sample mean

differences due to treatment sex-language of grade 4 instruction and classrooms and reduced the data to within-sample variations. This is the most efficient method of estimating population values. The resultant data is given below:

Test	A	A'	D
A	1.00	.75	.62
A'		1.00	.67
D			1.00
Mean	7.3	7.1	6.9
σ_E	2.8	3.0	3.3
N=930			
Test	B	B'	E
B	1.00	.67	.46
B'		1.00	.47
E			1.00
Mean	7.5	6.6	3.7
σ_E	2.7	2.9	2.0
Test	C	C'	F
C	1.00	.57	.51
C'		1.00	.50
F			1.00
Mean	6.3	7.2	5.8
σ_E	2.5	2.4	2.5

The means and standard deviations are cited as a crude check of symmetry of distribution. Only Test E seems to be skewed (i.e., the zero score is less than two standard deviations below the mean).

Appendix C

Reading 12A--Administration

Reading 12A published by Educational Testing Service, Princeton, New Jersey, is a group test of reading comprehension in booklet form requiring that the answers to questions be indicated by placing a cross through the correct response from three possible correct answers. The questions in the test require (a) interpretation of pictures to correspond with a written work (picture-vocabulary) and ordinary vocabulary items; (b) comprehension of sentences; (c) comprehension of short paragraphs. The items increase in difficulty and the test is untimed. It was originally standardized on American children and was designed for use in the first grade.

The administration of this test in America is made relatively easy by the training that children who have learned to read have had in picture recognition and in exercising choices from flash-card games that normally accompany reading preparation. Furthermore, the conventions of line-drawing and two dimensional representation are part of this reading environment and are usually well understood by children, very often before they come to school.

Recent work in Africa on group test administration, particularly by Schwarz (1961) and Irvine, McArthur and Brimble (1964) indicate important conditions that have to be met before tests can be administered successfully to pupils in the primary schools. These are (a) that the subjects know how to record their answers, (b) that subjects understand the item types and have encountered them in practice and in demonstration, (c) that the conventions underlying verbal, pictorial, or figural presentation are familiar to everyone. Finally, there is general agreement that demonstration before the test is essential, that this demonstration should be carefully planned to cover all the

salient aspects of presentation peculiar to the test and that learning during the test demonstration should be cooperative, well motivated and must actively seek the participation of the subjects.

As a test, Reading 12A had some advantages for presentation in Africa. These were: (a) its answers could be recorded directly onto the booklet eliminating clerical and perceptual errors in transfer to separate answer sheets, (b) the choices for each question were restricted to three, involving less distraction for subjects who found difficulty with storing all the information presented in multiple-choice format, and (c) the pictures were simply drawn and relatively free from concepts that required fine perceptual judgments for their understanding.

The subjects themselves brought to the task certain skills that helped administration. The previous program of tests had made them familiar with the principle of multiple-choice items. They had spent five years in school, and the drawing conventions used in the test items were familiar because they had been encountered in textbooks. Lastly, they seemed well able to comprehend and act upon simple verbal instructions given in English.

In conclusion, it was felt that the test could be used with the pupils because the test itself covered a broad domain of verbal skills and its format, together with the previous experience of pupils and the test administration team, lent itself to valid administration. Although it was recognized that certain items would not be valid for the pupils for cultural reasons, an item analysis was a conceived part of the exercise, and the small proportion of these items were not considered to present a motivational barrier to the pupils.

Pilot Study

The test was tried out in a Primary 5 class with 32 pupils. A special introductory set of items, using a format identical with that of the test, illustrating each type of item at least once, was demonstrated on the

blackboard and emphasized pupil participation. All members of the test administration team were present as observers. The teacher assisted as a proctor. After discussion, the test introduction procedure was standardized for ensuing test sessions and gradually testers took over the administration independently after first working in pairs.

The results of the pilot study gave a mean of 28.0, an estimated standard deviation of 6.0, and an estimated test reliability of .78. A teacher's estimate of the top and bottom five members of the class gave a mean difference between the groups of 11 points, almost 2 standard deviations. These results, in conjunction with experienced observers' estimate of the representativeness of the class as a group likely to carry a range of skills to be found in the sample at large, were sufficient to suggest that the test be administered to the whole sample.

Data on Participating Classes

Term 1

		Teacher English Usage ¹	Teacher Classroom Rating ²	Number of Teachers	Average Days Absent	Minutes Devoted to English/Week	% Programs Heard
Television Classes	72	4	50	1	.98	445	100
	92	4	62	1	8.67	380	100
	76	4	63	1	2.00	420	80
	75	6	73	1	.10	350	100
	10	4	63	1	.25	345	95
	73	4	63	1	4.27	385	85
	30	6	67	1	2.15	420	100
	77	4	52	1	4.67	300	95
	74	4	62	1	2.77	450	95
	71	4	57	1	1.46	455	90
	78	4	59	1	.41	395	80
	40	4	59	1	5.77	360	100
Radio Classes	10	4	66	1	1.85	380	95
	83	4	57	1	4.22	485	100
	85	4	53	1	2.36	390	90
	84	4	52	1	.94	350	90
	40	4	46	1	2.97	450	100
	60	6	62	1	4.85	420	95
	50	4	50	1	2.65	300	50
	82	4	72	1	.18	350	80
	80	6	63	1	5.39	390	95
	70	4	66	1	.47	460	90
	81	4	59	1	9.99	450	95
Contrast Classes	10	4	59	1	1.44	360	
	30	4	57	1	3.29	420	
	79	4	62	1	0	390	
	50	4	35	1	1.70	300	
	70	4	63	1	.93	385	
	60	4	59	1	3.54	420	
	90	6	66	1	1.04	520	
	88	4	53	1	3.00	390	
	91	4	60	1	9.99	360	
	87	4	62	1	1.80	420	
	89	4	22	1	2.22	455	
86	4	62	3	1.65	360		

¹Maximum score possible = 8²Maximum score possible = 100

Term II

		Teacher English Usage	Teacher Classroom Rating	Number of Teachers	Average Days Absent	Minutes Devoted to English/Week	% Programs Heard
Television Classes	72	4	53	1	4.82	445	95
	92	4	64	2	5.71	380	91
	76	4	72	1	6.86	420	82
	75	6	73	1	.46	350	95
	10	4	64	1	.67	345	91
	73	4	54	2	3.22	385	82
	30	6	76	1	4.51	420	95
	77	4	62	3	1.75	300	91
	74	6	58	1	3.11	450	91
	71	4	58	3	2.94	455	95
	78	4	62	1	1.33	395	77
	40	5	63	1	5.66	360	95
	Radio Classes	10	4	75	1	2.10	380
83		4	70	1	5.49	485	91
85		4	58	1	.41	390	91
84		4	67	1	1.67	350	91
40		4	48	1	2.45	450	95
60		6	69	1	8.46	420	91
50		4	52	1	4.32	300	91
82		4	67	1	1.39	350	91
80		4	41	2	2.35	390	82
70		4	53	1	2.67	460	95
81		4	72	1	5.38	450	95
Contrast Classes	10	6	70	1	3.03	360	
	30		57	2	9.00	420	
	79	4	64	1	.08	390	
	50	4	43	1	1.19	300	
	70	6	71	1	4.80	385	
	60	6	74	1	4.08	420	
	90	6	70	1	.96	520	
	83	6	70	2	4.15	390	
	91	4	60	1	7.77	360	
	87	4	58	2	4.20	420	
	39	4	44	1	9.99	455	
	86	4	61	2	3.35	360	

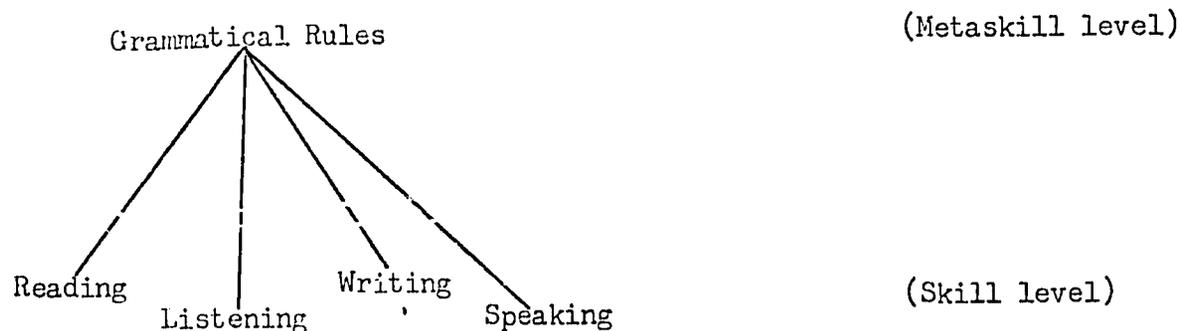
Term III

		Teacher English Usage	Teacher Classroom Rating	Number of Teachers	Average Days Absent	Minutes Devoted to English/Week	% Programs Heard
Television Classes	72	4	53	1	4.46	445	93
	92	6	70	1	3.92	380	82
	76	6	70	1	3.39	420	100
	75	4	53	2	2.34	350	96
	10	6	62	2	.24	345	82
	73	4	51	2	3.40	385	82
	30	6	70	1	3.73	420	96
	77	4	53	2	0	300	93
	74	6	63	2	2.36	450	82
	71	4	53	2	2.84	455	93
	78	4	43	1	0	395	79
	40	6	67	1	2.51	360	89
Radio Classes	10	6	73	1	2.20	380	92
	83	6	72	1	8.31	485	96
	85	4	63	1	.14	390	100
	84	6	65	1	2.16	350	96
	40	4	53	1	2.22	450	96
	60	6	71	1	2.95	420	96
	50	4	55	2	4.48	300	88
	82	4	60	1	1.50	350	81
	80	5	43	1	4.73	390	92
	70	4	70	1	2.33	460	88
	81	6	73	1	6.93	450	96
Contrast Classes	10	4	53	2	2.81	360	
	30	6	55	1	4.42	420	
	79	4	61	1	.02	390	
	50	4	57	2	3.08	300	
	70	6	81	1	1.79	385	
	60	6	87	2	7.19	420	
	90	6	72	1	.90	520	
	88	4	71	2	1.19	390	
	91	4	53	1	9.00	360	
	87	6	63	3	1.37	420	
	89	4	51	3	6.08	455	
86	4	53	1	4.03	360		

APPENDIX E
Language Skills

In the acquisition of any language, it is common to speak of four skills that are involved. These skills include (a) the ability to read and comprehend the language, (b) the ability to listen to and understand the language, (c) the ability to speak the language, and (d) the ability to write the language.

At the Primary 5 level in Nigeria, these skills are taught, but there is a tendency to stress, in teaching, the rules of English grammar. The success of this latter objective depends on the extent to which the basic skills have been mastered, and when such learning has not yet taken place, mastery of the rules of grammar becomes an extremely difficult proposition. Conceptually, the relationship of grammatical rules to the basic skills is presented below.



Identification of Schools

10	Baptist Kigo
30	Maiduguri Rd. N.A.
40	U.N.A.
50	Sabon Gari
60	O.L.H.S.
70	St. Michael's, Const. Rd.
71	Tudon/Wada
72	Methodist
73	Anglican Girls'
74	St. Michael's, Market Rd.
75	St. Anne's
76	Baptist Makera
77	First Field Battery
78	St. Mary's (Zaria)
79	Kofar Doka
80	Kawo N.A.
81	St. Peter's D.S.
82	Ungwar Sarki
83	St. Augustine's
84	Baptist Tudon/Wada
85	Darnawa
86	Shanu/Abakpa
87	Makera N.A. '
88	St. Andrew's
89	St. Gregory's
90	Ungwar Rimi
91	St. Theresa's
92	Baptist Kawo