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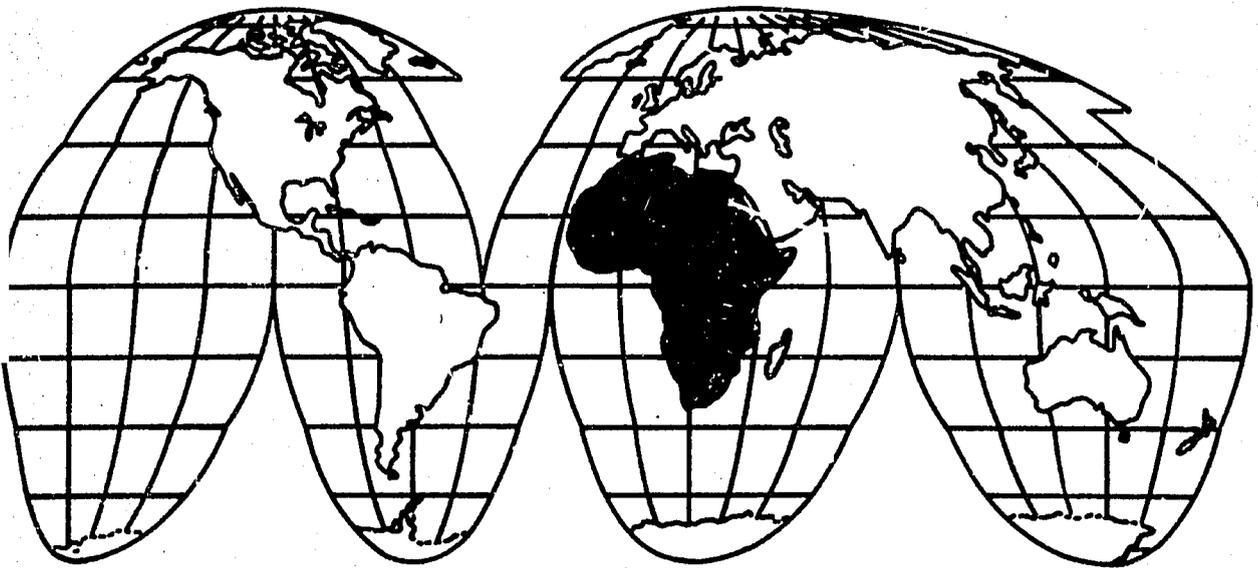
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SUMMARY REPORT



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**DEVELOPMENT AND APPLICATION
OF AFRICAN ABILITY TESTS**

Paul A. Schwarz

**A final report submitted to the
United States Agency for International Development**

NOVEMBER 1964

**American Institutes for Research in the Behavioral Sciences
Contract ICAc-2155**

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ACKNOWLEDGEMENTS

THE AID-AIR TEAM

My associates on this project were six AIR staff members who performed at a level for which all project leaders hope, but which none really expects. They were responsible for most of the accomplishments described on the following pages, and it is fitting that the report begin with their names.

In the order of their length of service, the following individuals made up the AID-AIR field teams:

-Mr. Daryl G. Nichols was stationed in Lagos from November 1961 to June 1963, and then moved on to Monrovia to direct the project in Liberia that followed the present research. He took major responsibility for the development of I-D tests, many of which are based on his ideas; for statistical analysis, including the development of several useful short-cut procedures; for the standardization study in Northern Nigeria; and for the preliminary research in Liberia that led to the creation of the Liberia Testing Center. The incredibly high quality and quantity of his output each day of our tour deserve special mention.

-Mr. Richard A. Cohen served in Lagos from November 1961 to June 1963, and then continued on the home office staff for nine additional months supervising the production of tests and

reports. His overseas responsibilities included the management of the AIR Lagos office, the conduct of the standardization study in Eastern Nigeria, the collection of most of the validity data assembled in Nigeria, and the research in the Republic of Mali. He also took charge of most of the training sessions, and contributed substantially to the evolution of the I-D testing procedures.

-Dr. Harold M. Chapman served in Lagos from November 1961 to June 1963, and then returned to his regular position of Director of the Psychological Services Center at Southern Methodist University. As the Deputy Director of the project, his overseas responsibilities encompassed all aspects of the research; but he devoted particular attention to data processing and new test development, and supervised the Ghana study as the AIR resident representative in Accra.

-Mrs. Jacqueline M. Schwarz, who served also on the preceding Nigeria project, continued her work as staff artist through June 1963. Her responsibilities were for the production of experimental test forms, including the design, drawing, and make-up of the materials, and the supervision of printing operations. As necessary, she assisted also with the test administrations and statistical computations; and continued to provide such assistance on an informal basis after her "retirement" as a regular staff member.

-Dr. Richard R. Rowe arrived in Lagos in December 1963 as a member of the second field team. He has been instrumental in the planning, development, and organization of the Nigerian Aptitude Testing Unit, and in the completion of the present operational testing procedures. He currently holds the dual position of AIR Chief of Party in Nigeria and of Director of

the Nigerian Aptitude Testing Unit, and will probably remain in these assignments for two additional years. His progress in building a professional testing establishment in Nigeria has been outstanding.

-Mrs. Marcia E. Mendell also arrived in Lagos in December 1963, and is at present completing her one-year assignment. In addition to her basic administrative responsibilities, she has taken on many professional duties including training, test administration, item analysis, and the development of alternate test forms. She has also been an active participant in the field work, taking sole responsibility for a number of important testing operations.

Among this list of team members it seems not inappropriate to include a seventh name. We are most grateful for the close working relationship we enjoyed with

-Dr. Clifford S. Liddle, who was the Chief Education Officer in USAID/Nigeria throughout most of the project. Dr. Liddle participated actively in all of the crucial activities of the past two years, and many of the "AIR accomplishments" owe equally much to his energy, wisdom, and judgment. No one associated with the project made greater personal contributions.

In the AIR home office, Dr. John C. Flanagan, President of the American Institutes for Research, took personal responsibility for the technical and administrative support of the project. He provided liaison with A.I.D. in Washington, supervised the activities of our home office associates, and -- through personal visits and frequent correspondence -- gave the field staff continuing guidance and counsel. His inputs are tangibly reflected in the I-D test materials, which are unmistakably "Flanagan" in theory and orientation.

Assisting the AIR field team was a sizeable local staff that performed with great diligence and effect. Our data processing supervisor during the initial tour, Mrs. Odile Treadway, organized a highly efficient operation to manage the vast quantities of data cited in this report. Her replacement, Mrs. A. A. Esogbue, has been equally effective in this phase of the work; and, in addition, has become indispensable in the scheduling and conduct of testing sessions, and in the control and distribution of materials processed by the Aptitude Testing Unit. Their assistants -- Miss Helene Nuga, Mrs. Christey Musah, Miss Beatrice Torimiro, Miss Omelara Oshodi, and Miss Felicia Opanubi proved conscientious and able; as did Mr. Ernest Odum, Mrs. Amy Muggli, Mrs. Renee Pritchard, and other clerical staff. Our drivers, Mr. Adebisi Omotayo and Mr. Adisa Morgan, were invaluable, especially during the field phases, when they served as proctors and assistants far outside the scope of their normal job functions.

Assisting Dr. Flanagan in the home office were Mr. Jack K. Greenberg and Mrs. Arlene Rigot of the Cross-Cultural Research Program. Mr. Greenberg coordinated activities in the production of testing materials and in the computer analysis of the data; and the project owes much to his ingenuity in the design of testing aids to fit special conditions, and in the programming of efficient analysis routines. Mrs. Rigot managed most competently the administrative chores related to a seven-thousand-mile line of supply.

Considerable support was also provided by the education specialists in the Washington office of A.I.D. Dr. Robert Jacobs and the late Dr. Ras O. Johnson were intimately involved in the design of the study, and participated actively in the initial phases. Later, it was Dr. Harold Adams and Mr. Leroy Sands who provided the energetic and sympathetic back-stopping the project enjoyed. Miss Joanne S. Cowell was invaluable in the efficient resolution of administrative problems and needs.

COLLABORATORS AND PARTNERS

Anyone who has participated in development projects knows that even small accomplishments are the result of joint efforts by many people. During the past four years, my associates and I have been dependent on literally hundreds of collaborators who made possible the progress described in this report. The vast majority of them -- civil servants, administrators, educators, managers, teachers, missionaries, military officers, foreign service personnel, and consultants from many other sources -- we must necessarily thank as a group. But we hope that each will find individual gratification in reading about the contributions of the particular test, technique, or institution that he helped to create.

A few of the individuals who influenced the course of the entire project over a substantial period of time I shall try to acknowledge individually. It goes without saying, however, that the following list could readily be expanded to include two or three times the number of names I have selected as representative of the AID-AIR partners.

Nigeria

The most significant accomplishment in Nigeria was the establishment of the Nigerian Aptitude Testing Unit. Credit for this accomplishment belongs to three people:

-Chief S. O. Awokoya, Permanent Secretary and Chief Federal Adviser, Federal Ministry of Education. Chief Awokoya was the prime architect who designed the structure of the Nigerian Aptitude Testing Unit to fit Nigerian needs and conditions,

and who made possible the broad base of support on which it was eventually founded. In reconciling the not congruent needs of governmental, educational, and private institutions, it was his incisive insights that again and again produced effective solutions.

-Professor Thomas A. Lambo, Chairman of the Department of Psychiatry and Neurology, University of Ibadan. As the leader of the Africa-wide movement toward improved psychological measures, Dr. Lambo was an invaluable resource throughout the entire project. He provided professional assistance during the experimental phases, served as the eloquent and persuasive Chairman of the planning sessions that led to the Aptitude Testing Unit, and now is a most able Chairman of the Board in the Unit organization. His professional and personal kindnesses to our group are too numerous to enumerate fully.

-Mr. John E. Deakin, Registrar of the West African Examinations Council. The rapidity with which the Testing Unit moved from plan to reality must be credited almost entirely to the efforts of Mr. Deakin. For it was his administrative skill and his unbelievable energy that kept developmental activities on schedule, and that made the Unit a going concern. For this leadership, and for his counsel and assistance in all aspects of our work we are most grateful.

We are grateful also to Dr. Joel Bernstein, Mr. C. William Kontos, and Mr. W. Haven North of USAID/Nigeria for their steadfast support through all the ups and downs of the project; to Dr. Adam Skapski of USAID and Ford Foundation for his wise guidance; and to Dr. Robert Mitchell of the Ford Foundation for his active assistance throughout the planning phases.

Liberia

Although subsequent projects led to a greatly expanded program in Liberia, this project encompassed only the experimental research. Three people contributed substantially to the success of this initial venture.

- Dr. J. P. Mitchell, Secretary of the Department of Education. Dr. Mitchell provided the high-level support that any new project requires. He took a personal interest in the work, and saw to it that all technical and logistic needs were efficiently fulfilled. Subsequently, it was through his efforts that the Liberia Testing Center was created.
- Mrs. Bertha Azango of the Department of Education. As the supervisor of testing activities in the Department of Education, Mrs. Azango played a key role in the design and conduct of the research, and in the planning of a national center for testing. The expansion of the Center to include the national achievement examinations and other important activities was one of her many contributions.
- Mr. M. F. B. Adler, then Acting Director of the U.S.A.I.D. Mission. The decision to include Liberia in the small sample of countries that could be studied under this project was influenced mainly by the enthusiasm and convictions of Mr. Adler. After the study began, he continued to provide the full support of the Mission, and was instrumental in the rapid completion of the research.

Special thanks are due also to Mr. Michael Vinton and Mrs. Sadie DeShield of the Department of Education for their assistance in the collection and analysis of the data.

Other Countries

In other countries, research was carried out on a much smaller scale. But in each location, there was at least one individual without whose active participation the work could not have been adequately completed.

In Tunisia, the progress that was made is attributable to Mr. Burnie Merson, then of the U.S.A.I.D. Mission, whose dedication and effectiveness in this project were as remarkable as in his many other ventures; and to Dr. C. G. Fontaine, who supervised the technical developments here and in Mali, translated the materials into French, and worked with the team also in Lagos.

In Ghana, the project was planned and coordinated by Mr. William J. Lawless Jr., Director of the U.S.A.I.D. Mission, Dr. Robert Loken of the Ford Foundation and Mr. Arbon C. Lang of the U.S.A.I.D. Mission. Dr. Loken continued to provide much valuable assistance throughout the remainder of the project; Mr. Lawless and Mr. Lang moved on to Nigeria and Liberia, respectively, and were most helpful in implementing the projects there.

In Mali, Dr. Samuel C. Adams Jr., the USAID Director, made all the arrangements for the research, and participated actively in its implementation. This is the same Dr. Adams cited in preceding reports for his contributions to the initial Nigeria studies. We were most appreciative also for the very active interest of the Hon. Singare Abdoulaye, Minister of Education, and for the assistance of M. M. Diop in assembling the data.

The New Teams

By the end of this project, much of the work in Nigeria and Liberia had been taken over by local officers who, as AID-AIR participants, had received graduate training in the measurement field. These officers include Mr. Samuel Aleyideino, Mr. Simeon Ogbonna, and Mr. Askia Usoro of the Nigerian Aptitude Testing Unit; Mr. Andrew Davies and Mrs. Grace Morris of the Liberian Testing Center. We were highly gratified by their performance at the University of Pittsburgh, and wish them much success in carrying forward the beginnings that have been made.

I: INTRODUCTION

BACKGROUND

Until recently, there was little interest in the scholastic and occupational abilities of African youth. There had been studies of the "African mentality," in which researchers tried (unsuccessfully) to compare the intellectual equipment of black Africans and white Europeans; and there had been work on low-level screening, in which progress was good. But in the assessment of abilities critical to an industrial society -- of potential for the skilled trades, the civil service, management, the professions -- almost nothing was done.

The reason, of course, was that there was no need for individual ability measures. The economy, which did not depend on indigenous skills in most job categories, had no requirement for accurate selection or placement procedures. The individual, limited to the barest of educational opportunities, could not have profited from vocational guidance. Had aptitude tests been available, they would have found few practical applications.

Then came the preparations for independence and the formulation of new national goals. And African manpower became the key development issue. For each national goal, from the expansion of agriculture to the provision of adequate health services, from efficient government establishments to increased foreign investments, demanded a set of specialized skills; and the aggregate need dwarfed the supply. It was clear that the pace of economic and social development hinged on the speed with which Africa's human resources could be developed.

Now, modern selection methods were essential; but suitable testing techniques had not been devised. In 1959, the African countries held the first of a series of conferences on their mutual testing problems; and by 1960 developmental projects supported by such agencies as A.I.D. (then ICA), CCTA, UNESCO, and Ford Foundation were well underway.

The AID-AIR Project, which was to grow into the largest of these undertakings, began as a feasibility study of modest proportions. Since no one knew five years ago whether or not modern testing methods could be adapted to an African setting, it was necessary to begin with experimental research on the question of "Can it be done?"

On 5 May 1960, the search for answers began.

The Feasibility Study

The preliminary study was carried out in Nigeria, and took thirteen months, ending in June 1961.¹ It resulted in a set of prototype testing procedures, and in a final report that answered most of the feasibility questions.²

The major findings were that

1) Standard aptitude tests are not suitable for Nigerian examinees at or around the middle-school level; but with appropriate modifications in content and administration, effective tests can be constructed.

2) The modified tests result in a level of accuracy comparable to that attained by standard tests in the American setting.

¹ Contract ICAC-1434

² Schwarz, P. "Aptitude Tests for Use in the Developing Nations." Pittsburgh: American Institute for Research, 1961.

3) The modified tests cost only a few pennies per examinee, and can be administered by persons with no formal professional training.

4) Because of their accuracy and economy, such modified tests can make a substantial contribution to Africa's manpower development, which has been limited by the lack of individual ability data.

Twelve prototype tests were submitted with the report, as was a set of principles for modifying other kinds of tests not studied in the initial research.

On the basis of these findings, the Agency decided to extend the project to the indicated next step, and on 21 July 1961 a new contract was signed.¹ It provided for the additional research and development needed to move from prototype tests to operational testing procedures.

PROJECT OBJECTIVES

The present study began with objectives of a purely technical nature. The tasks were to refine the prototype tests and build operational forms of these and such other tests as might be required; to evaluate the effectiveness of the tests in improving manpower development programs; to standardize the tests in Nigeria and a sample of other African nations; and to submit to the Agency complete testing "packages" ready for widespread practical use. A total of 24 months was provided for these activities, 21 of them to be spent in the field.

¹ Contract ICAc-2155

Such were the initial objectives, and the following chapter describes how each was attained. But they represent only part of the story. For as the project progressed, the scope of work was expanded, and eventually a new set of objectives replaced those with which the study began.

The first change was to increase the categories of skilled manpower for which tests were to be provided. Throughout the feasibility study, the emphasis had been on vocational skills related to the selection of trainees for specific occupations. Scholastic abilities and the problems of school selection had been avoided, so as not to duplicate the work other agencies were planning to do under a number of separate projects. All of the prototype tests were non-verbal tests of specific job skills; none of the tests normally used for student selection had been adapted.

Then, at the CCTA meetings of February-March 1962, the AID-AIR Project was asked to take on also the scholastic sector, and this we were eager to do. It had become apparent that secondary and post-secondary education were the major bottle-neck in the production of skilled manpower, and that it was unrealistic to separate occupational testing from selection and guidance in the preparatory institutions. Expanding into the scholastic field would enhance the utility of the AIR testing procedures, and result in a significantly greater contribution. But it did add a large new research component related to the development of verbal testing procedures, and considerable time had to be devoted to these additional studies.

The second change was even more drastic. It had been assumed that once the testing procedures had been developed (under an A.I.D. region-wide project), the installation and use of these procedures would proceed on a country-by-country basis, with the individual countries bearing most of the post-development burdens. But this assumption

proved unrealistic. Institutions that could take over the tests and manage nation-wide testing programs simply did not exist, and without such an institutional base the programs begun under this project would quickly die out. To make inputs of lasting value, the AID-AIR Project would have to assume also the task of institution-building, and, inevitably, this came to pass.

Within a year, the project had been augmented by a sizeable participant training component, and within two years, establishing a Nigeria-wide testing center had become the one all-consuming objective. Building a strong center in Nigeria would not only permit the realization of a three-year investment in this country, but also provide a local resource to accelerate the development of testing capabilities in other African nations, and this dual benefit warranted the full commitment of project resources.

To enable the institution-building component, the project was extended until 30 November 1964, and the final set of objectives became:

- 1) Develop a comprehensive set of scholastic and vocational aptitude tests;
- 2) Validate and standardize these tests, and produce auxiliary materials to permit immediate applications;
- 3) Supply the Agency with complete kits of the above items, suitable for use in English or French;
- 4) Assist the Government of Nigeria in the planning and establishment of a national center for aptitude testing;
- 5) Assist the Governments of Liberia, Ghana, and other countries in the development of testing centers and programs; and

6) Provide interim testing services to educational and industrial organizations in these countries, so as to realize maximum practical benefits while the developmental work is being completed.

Attainment of the non-technical objectives is described in Chapter 3 of this report; Chapter 4 gives an over-all project evaluation.

For a more complete discussion of the activities described only briefly in this summary report, the three major I-D publications should be consulted. These are the I-D Technical Manual, the I-D Examiner's Manual, and the I-D Test Norms.

II: TECHNICAL DEVELOPMENTS

The results of the developmental research carried out under this project are reported in the I-D Technical Manual,¹ which provides descriptive as well as statistical information. The purpose of the present discussion is to tell "why" and "how" the techniques and findings described in the manual come into being.

THE I-D TESTS

By the end of the feasibility study, a total of twelve prototype tests had been produced. Under this project, these twelve tests were refined for operational use, and nine additional tests were developed. This provided a comprehensive set of 21 aptitude tests, each of which is described and illustrated in Chapter 2 of the Technical Manual.

The level of effort required to devise the operational forms described in the Manual varied from test to test. Some were completed rather quickly, while others involved one year or more of developmental research.

The Prototype Tests. Seven of the twelve prototype tests required little or no modification. The tests of Checking, Boxes, Graphs, Coding, Names, Arithmetic, and Marking are essentially the same now as they were three years ago. The remaining five of the original tests -- Similarities, Memory, Figures, Manual Dexterity, and Finger Dexterity -- have been revised substantially.

¹ The designation "I-D" has been adopted as the official name of the tests developed under this project. This seemed less cumbersome than the "AID-AIR" designation earlier used.

The Similarities Test (non-verbal "intelligence") has passed through seven revisions. The objectives have been to sharpen the concepts and to improve the drawings by which these concepts are represented, and considerable progress has been made. This test is probably the one most dependent on cultural factors, however, and further revisions based on the insights of the local specialists trained under the project are planned.

The Memory Test has been changed in two ways. In format, it is now independent of the Coding Test, which had formerly provided the material the examinee had to recall. In content, it has become a test of the ability to memorize material organized in a meaningful way, which seemed more appropriate to occupational testing than the abstract kind of memory evaluated before.

The Figures Test, which had proved much too difficult in the feasibility study, has been completely redone. The present form contains less complex drawings and more practice exercises, and is effective even with primary school students. It has given excellent results in selection for trade and technical training.

The two Dexterity Tests have been revised mainly from the point of view of simplifying the scoring procedures. One early idea was to provide automatic scoring by using a special (NCR) kind of paper, but the chemical process underlying the "no carbon required" principle seemed to break down in the African climate. More recently, a plastic overlay stencil has been introduced, and the sensitivity of this method is now being checked. The tests have continued to prove highly accurate as predictors -- the objective of the revisions has been only to save time in the scoring.

All twelve of the tests have been used extensively, and all have proved ready for operational applications.

The New Verbal Tests. Work on a set of verbal tests to supplement the above non-verbal tests was begun early in the project. It turned out that considerable new research was involved.

The main problem was that in such countries as Nigeria, English is a second language that is learned mainly at school. A test that requires a considerable knowledge of English may well measure not the abilities of the examinee but rather the effectiveness of his teacher. The able but poorly taught youngster would not have much of a chance.

Accordingly, it was decided to keep the level of English used in at least the elementary verbal tests so simple that even examinees with poor language preparation could do reasonably well. The emphasis would be on the concepts with which the examinee has to work; not on the range of vocabulary that he has mastered.

The first step was to develop a "core vocabulary" of the 500 English words most widely used by Nigerian students. This was done through a special study in Western Nigeria. The students of more than 30 schools were asked to write compositions, and the words used in these compositions were tabulated, so that those most frequently used could be determined.¹

On the basis of these findings, it was then possible to write test problems that require only a minimum understanding of English for solution. These problems were tried out, analyzed, and revised many times; and eventually two verbal tests suitable for primary school students

¹ Mr. Barry Eisenberg of the Peace Corps collected these data; Mrs. Joan F. Kontos designed the analysis procedures.

emerged. These are the tests of Verbal Analogies and Reading Comprehension, which have been highly successful in both scholastic and clerical selection programs.

More difficult versions of these instruments were also developed. The high form of Verbal Analogies is effective from the third through fifth years of secondary school; the high Reading test may be used up to and including university level.

The New Interest Tests. The three interest tests included in the I-D series are all tests of information. The hypothesis is that people who grow up in the same environment will nevertheless acquire different kinds of information, on the basis of their individual interests and inclinations. By measuring the degree of information an individual has about some aspect of his environment, an index of his interest in this type of activity is obtained.

The test of Mechanical Information is one of the most important of the new tests, and was one of the most difficult to develop. Its purpose is to assess an examinee's interest and aptitude for technical studies, by determining how much he has learned from the mechanical and scientific phenomena that surround him in his everyday life. Since the test is intended for primary school students, including those from rural locations, finding appropriate illustrations of common technical phenomena required much study. The process of observing village life, writing trial test exercises, and revising them to meet the statistical criteria took more than one year.¹

¹ Much of this work was done by Dr. Frank S. Scott who joined the AIR team in these studies to generate data for his doctoral dissertation.

The tests of Science Information and World Information are analogous instruments, but directed at a much higher (post-secondary) level. The Science test contains questions from many fields of science so that the examinee's general familiarity with things scientific rather than his studies in one or two subjects is measured. The World Test measures interest in business and public affairs through questions on events often discussed in newspapers and similar publications.

Other New Tests. Because of its importance in clerical kinds of occupations, a test of Table Reading was one of those evaluated in the feasibility study. But no effective means of explaining the table-reading procedure to primary school students was found, and the test was discarded.

During the present project, a second attempt was made, and this one eventually resulted in a suitable explanation technique. Since then, the test of Tables has become the most accurate single instrument in the clerical series.

The last of the new tests was developed to fit a specific need in low-level screening decisions. Many jobs that do not require a high degree of literacy nevertheless depend on a functional use of English in taking and relaying instructions. The tests of English grammar that were sometimes used to screen applicants for such jobs seemed highly inappropriate, so a separate test of the ability to understand spoken English was constructed.

Each problem of the Spoken English test contains five sets of symbols, and the examinee's task is to identify the one set that the examiner is describing. (Sample: "One of them is on top of the others.") The test is given orally or by means of tape recording.

The I-D Test Series. These 21 tests constitute, in effect, a set of "building blocks" from which a wide variety of selection or guidance series can be assembled. So far, most of the research has centered on the following ten series:

<u>Type of Series</u>	<u>Individual I-D Tests Included</u>
TECHNICAL	
Semi-Skilled	SIM + CHK + SPK + MRK
Skilled Trades	SIM + MEC + BOX + FIG + MAN or FIN
Technical	VAH + BOX + FIG + GPH
Scientific	RDH + GPH + RTH + SCI
COMMERCIAL	
Junior Clerical	VAL + COD + NAM + RTH + TAB
Senior Clerical	VAH + COD + NAM + RTH + TAB
Commercial	RDH + GPH + NAM + RTH + WLD
SCHOLASTIC	
Academic 1	VAL + RDL + MEM + RTH
Academic 2	VAH + RDH + GPH + RTH
Academic 3	RDH + GPH + RTH + SCI + WLD

But additional series suitable for other kinds of occupations can readily be assembled by using different combinations of the 21 basic tests. The complete set of tests is shown in Figure 1, each with its primary application.

THE I-D TESTING PROCEDURES

Adapting the content of the tests completed only part of the needed modifications. One of the important findings of the feasibility study was that an equally serious limitation of standard aptitude tests lies in the way they are normally given. Most African examinees, especially at the primary and middle school levels, have not the background to cope with the standard instructions; and such changes as the following were specifically recommended:

<u>Code</u>	<u>Name of Test</u>	<u>Primary Application</u>
1. SIM	Similarities	Semi-Skilled
2. VAL	Verbal Analogies	Scholastic
3. VAH	Verbal Analogies, High	Advanced Scholastic
4. RDL	Reading	Scholastic
5. RDH	Reading, High	Advanced Scholastic
6. MEM	Memory	Scholastic
7. MEC	Mechanical Information	Technical
8. CHK	Checking	Semi-Skilled
9. BOX	Boxes	Technical
10. FIG	Figures	Technical
11. GPH	Graph	Technical
12. COD	Coding	Clerical
13. NAM	Names	Clerical
14. RTH	Arithmetic	Clerical
15. TAB	Table Reading	Clerical
16. SPK	Spoken English	Semi-Skilled
17. SCI	Science Information	Scientific
18. WLD	World Information	Commerical
19. MAN	Manual Dexterity	Skilled
20. FIN	Finger Dexterity	Skilled
21. MRK	Marking	Semi-Skilled

Figure 1. The I-D Aptitude Tests

- 1) Eliminate all printed instructions;
- 2) Develop suitable visual aids, demonstrations, and spoken commentaries to explain each step of the test;
- 3) Expand sample and practice exercises, and monitor these to insure comprehension; and
- 4) Simplify the test papers to reduce the number of mechanical operations the student must master.

When these modifications were applied to the prototype I-D tests, excellent results were obtained.

The task for the present study was to refine these initial procedures to increase their efficiency for large-scale administrations. Many technical improvements were made.

The Visual Aids. The basic visual aid for each test is a large display of the sample exercises that the examiner solves in his demonstration. He works the problems on the display while the examinees work them on their sample test papers. Each test begins with the phrase "The front of your test paper looks just like this (Examiner points to display)..."

Supplementing the basic display are such visual aids and models as may be required to explain the test problems. In the Figures test, for example, there are cut-outs to show which figures are exactly the same size and shape; in the Boxes test, there are folding patterns to demonstrate the cube being formed. The purpose is to make clear to each examinee precisely what it is (conceptually, perceptually, and mechanically) that he is to do.

To serve this purpose, the visual aids must have a number of physical properties. They must be large enough to be seen in the back of a class-room, yet not too heavy or cumbersome to be readily transported. They must have a surface on which the examiner can mark his answers, but from which he can easily erase such marks to make changes or to prepare the visuals for the next test group. They must also be manipulable and durable, and as economical as possible to produce.

After some experimentation, an effective solution was found. It consists of two modifications in the earlier procedures.

One change is to seal each display in a thin plastic laminate. This enables the examiner to write on the visual with a marking pencil, then simply to rub off the marks at the end of the session. It also provides light-weight materials that are extremely durable and are not affected by adverse weather conditions.

The second change is to use these visual aids in conjunction with a "Hook 'n' Loop" display board during the demonstrations. Small pieces of nylon hook tape are pasted to the back of each visual, so that it engages on contact with the nylon loop fabric with which the display board is covered. The examiner sets up the board in front of the class-room, and can then easily mount and remove visuals as required by the instructions. In such tests as Boxes, where he wants to achieve the illusion of removing the printed pattern from the sample problem in order to fold it, this property is especially important.

It is thought that the added verisimilitude achieved by these innovations has substantially improved the effectiveness of the instructions. The examiner can now perform each step of each test exactly as the examinee must do it and this has made it possible to teach even complex operations in a relatively short time. Costs have also been

lowered, since the display materials can be re-used many hundreds of times -- displays taken to Africa three years ago and subjected to unusually heavy use show only slight signs of wear.

The Spoken Commentary. Oral explanations have been found to be the most suitable means of integrating the visual aids, demonstrations, and practice papers. But, as noted in earlier reports, the phrasing used in such commentaries must be carefully developed through repeated tryouts and revisions.

Refining the oral instructions was therefore another developmental objective. The goal was to produce an English commentary that would be as effective as comparable instructions given in the examinees' first (indigenous) language, so that differences in English language attainment would not affect the comprehension of non-language aptitude tests. For many practical reasons, a world language has to be used in operational testing sessions.¹

The English commentaries that evolved were evaluated in a special study conducted at schools in and around Onitsha in Eastern Nigeria. At each of four primary schools, the Standard 6 (sixth grade) students were arbitrarily divided into two groups, and tested on a number of I-D tests in two separate sessions. One session was conducted with the regular English commentary; the second was conducted in Ito. No significant differences were found in the test performance of the two groups, leading to the conclusion that the problem of English language handicaps had been adequately resolved.

¹ Some experimental tryouts were conducted in Yoruba and Hausa in Nigeria; and in Kpelle and "Country English" in Liberia. These showed that the tests can be given in local languages, but because of the limited demand for testing people who do not know even basic English this work was not pursued.

² Mr. J. O. Anyaegbunam of the University of Nigeria conducted these sessions.

Effective instructions are now available for each of the 21 tests. They lead to a high level of comprehension for practically all examinees with six or more years of education.

The Test Papers. Because of the high volume of testing inherent in many African selection programs, it was necessary to introduce procedures capable of scoring by high-speed machines. But it was also desirable, especially at the junior levels, to free the examinees of the additional burden of locating the correct spot to mark answers on separate answer sheets.

Accordingly, each test (except such tests as Manual or Finger Dexterity which are not intended for machine scoring) was redesigned so that all of the test problems would fit on the front and back of a single 8½" x 11" sheet of paper. The entire test could then be printed on what would normally be a separate answer sheet, but which in the I-D scheme includes the problems as well as the answer spaces. The examinee works the test using only the one sheet of paper, underlining the correct answer to each problem; and the entire test paper is then processed by the machine. Since the problems are printed in an ink to which the machine is not sensitive, it scores only the marks that he made. The effect is as though a separate answer sheet were being used, and the cost is equally low. But the examinee is spared the burden of coding answers from one sheet to another.

The machine for which the I-D test papers are designed is the IBM 1230 Optical Reader. This scores papers at the rate of 1200 sides per hour, and can automatically punch out Hollerith cards of the results when further analyses are to be done. The I-D tests are printed by IBM to fit the machine, in accordance with AIR specifications.

The sample and practice exercises are printed on separate sheets of paper (one per test) colored green for easy identification. Before

each testing session, the examiner assembles the practice papers for the tests he will administer into individual booklets, stapling them together in the order in which the tests are to be given. The examinees retain these booklets throughout the session, referring to them at the appropriate times, and putting them away while working on the (separately distributed and collected) test papers. This saves considerable time in the distribution of materials, and simplifies the examiner's task.

The average time required for the administration of I-D tests using these revised procedures in only 25 minutes per test.

Scoring Procedures. Although 1230 machines are being installed in the larger test centers (Nigeria and Liberia), such facilities will generally not be available in many locations. Efficient procedures for hand-scoring of the papers had also to be developed.

It was found that the density of the answers on a number of I-D tests precluded the use of standard punched stencils, so a new type of key was devised. This is a "see-through" key printed on mylar by a photographic process that begins with a photograph of a keyed version of the actual test paper. It has resulted in good speed and accuracy of manual scoring, and is being supplied as part of the I-D testing kits.

The Examiner's Manual. All of the above procedures and devices are detailed in the I-D Examiner's Manual which gives step-by-step instructions for administering each test. Guidelines for maintaining adequate inventory and security procedures are also included; as are instructions to proctors.

The Examiner's Manual is also used as a text-book in training new examiners. It contains numerous photographs showing the use of the visual aids, and is available in both English and French versions.

TRYOUTS AND STANDARDIZATION

The third ingredient of an operational testing program is adequate evaluative and reference data. An administrator planning selection or guidance procedures must have specific information on the effectiveness of each test and on its range of utility; later, he must have a means of interpreting the individual test scores. To provide such information about the I-D tests, more than 20,000 African examinees were tested in a variety of research and development studies.

Reliability Studies. The reliability of the tests was checked as part of the Nigeria and Liberia standardization research. As reported in Chapter 3 of the Technical Manual the average reliability coefficient was .80 for the individual I-D tests, and .90 for the I-D test series. It was concluded that the test instruments are sufficiently stable for operational use.

Validity Studies. The validity of the tests in picking out the most able people for different careers was checked through special studies carried out in Nigeria, Liberia, Ghana, Tunisia, and Mali. Chapter 5 of the Technical Manual presents the findings on more than 4000 examinees in the following specific careers:

The Skilled Trades

- General
- Mechanics
- Electricians
- Machinists

Clerical Occupations

- Junior Level
- Senior Level

Higher-Level Careers

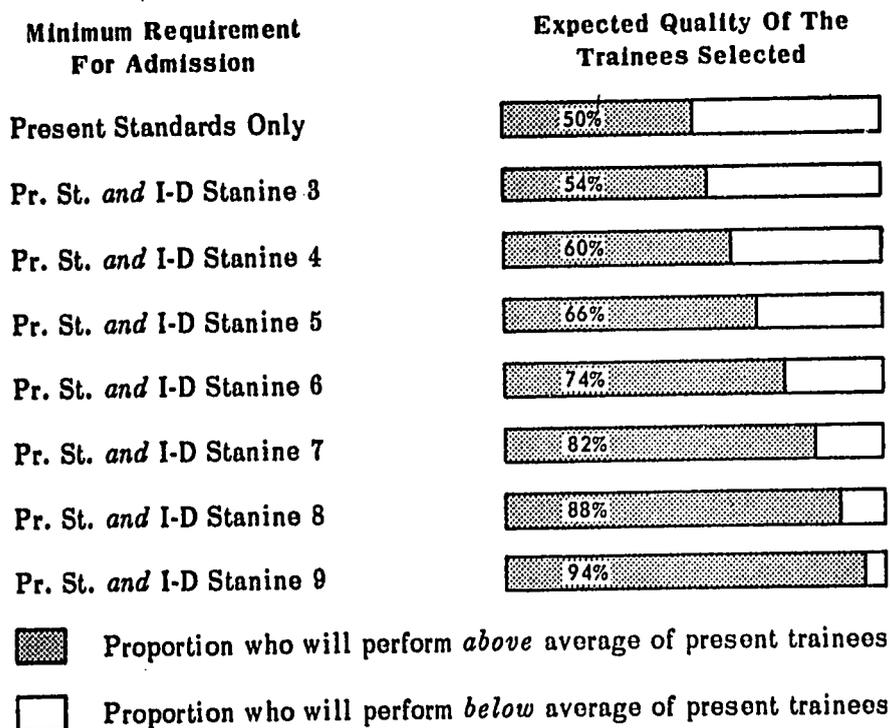
- Technical
- Scientific

and in the following educational programs:

- Scholastic Performance
- Secondary School (Boys)
- Secondary School (Girls)
- Advanced Secondary School (Boys)
- Advanced Secondary School (Girls)
- Post-Secondary Education

Studies of aptitude for the teaching profession were also completed, but not in time for inclusion in the Technical Manual.

The general finding was that use of the I-D tests results in the selection of significantly better trainees in the above fields than are being admitted by present procedures. The following expectancy chart shows a typical level of improvement available from use of the tests:



Standardization Studies. The development of test norms was the most demanding of the data collection procedures. To obtain representative samples, AIR staff traveled many thousands of miles by plane, car, and canoe; tested at many locations that no Americans had visited before.

The first of the large standardization studies was carried out on students in their final year of primary school in Northern Nigeria. Between February and April 1962, one out of every twelve such students was tested according to a sampling procedure developed with the help of the Northern Ministry of Education. The total sample of more than 2700 students provided stable norms on ten I-D tests for the Northern primary schools.

In July 1962, a similar study was carried out in Eastern Nigeria. A total of more than 3200 Standard 6 students was tested on twelve I-D tests, again in accordance with careful sampling procedures. This time, however, it was possible to complete the study in only three weeks by using four testing teams staffed mainly by Peace Corps Volunteers.¹

The results of these two studies were so similar (see Chapter 4 of the Technical Manual) that it was decided not to repeat the design in Western Nigeria as originally planned. The Northern and Eastern data were pooled and, together with supplementary data collected later, became the basis for Nigeria-wide primary school norms.

At and above the secondary school level, a stratified sample was tested in Northern Nigeria but again the results were so similar to those obtained from a more haphazard sample tested in Eastern and Western Nigeria, that also these data were pooled. For tests developed

¹ The Peace Corps was most helpful throughout the project in making available Volunteers interested in this kind of research to participate in special studies during their school vacations.

too late to be included in these studies, norms were developed by testing sizeable samples in Lagos. Eventually, adequate norms became available for most of the I-D tests, and reasonable estimates could be made for the others.

The manual titled I-D Test Norms presents these findings in tabular form ready for practical use. On the basis of the examinee's sex and level of education these tables convert his raw test score to a "standard" score that shows where he ranks with respect to his peers. These tables may be used in Nigeria and, with some modifications, in Liberia. They may also be useful as a first approximation in other countries until local test norms are developed.

THIRD-COUNTRY STUDIES

Limited tryouts of the tests in Kenya and Uganda during the feasibility study had suggested that the procedures developed in Nigeria would be useful in other African countries with little or no modifications. One of the important objectives of the subsequent research was to check this finding in a larger sample of countries, and this was done through special studies in Liberia, Ghana, Tunisia, and Mali.

English-Speaking Countries

The data from Nigeria, Liberia, and Ghana showed that in these countries virtually identical procedures may be applied. Only a few words of the instructions need to be adapted, and these are minor adjustments, such as the change from "write your name in block letters" to "write your name in capital letters" or from "cooker" to "stove."

It seems safe to assume that the I-D tests are effective for all English-speaking countries of Africa.

French-Speaking Countries

In Tunisia and Mali, only the non-verbal tests were evaluated. This was done by using the same test papers and the identical testing procedures, but giving the spoken commentary in French rather than English. As shown by the validity data, excellent results were obtained.

Because of the many revisions through which the English forms of the verbal tests had to pass before they became effective, it was thought that a simple translation of these tests into French would be of limited value. To do justice to the I-D program, it was decided to defer the adaptation of verbal tests until the appropriate research could be done in one of the French-speaking nations.

Accordingly, French forms and instructions are available for the sixteen non-verbal test only. These should prove adequate for most occupational and vocational testing -- for school selection, additional research will have to be done.

THE I-D TESTING KITS

The upshot of the above studies and findings is that the "complete testing packages" specified by the Agency have been produced. All of the necessary forms, manuals, visual aids, and supplementary materials are available and ready for use.

As might be expected in a comprehensive testing program that spans the range from elementary school to university, many separate items are included in the complete testing kit. Figure 2 enumerates these individual items. All of them are necessary for large testing centers, such as those in Nigeria and Liberia; only partial kits would be needed for the more limited operations envisioned for some other countries.

I-D TEST MATERIALS

<u>Item Number</u>	<u>Description</u>
ID-01-P	SIM practice sheet
ID-01-T-A	SIM test paper Form A
ID-01-V-1	SIM visual section (sample)
ID-01-V-2	SIM visual section (practice)
ID-01-SS	SIM scoring stencils (one set--3 panels)
ID-02-P	VAL practice sheet
ID-02-T-A	VAL test paper Form A
ID-03-P	VAH practice sheet
ID-03-T-A	VAH test paper Form A
ID-02/03-V	VA visual aid
ID-02-SS	VAL scoring stencils (one set--2 panels)
ID-03-SS	VAH scoring stencils (one set--2 panels)
ID-04-P	RDL practice sheet
ID-04-T-A	RDL test paper Form A
ID-05-P	RDH practice sheet
ID-05-T-A	RDH test paper Form A
ID-04/05-V-1	RD visual section (paragraph)
ID-04/05-V-2	RD visual section (answers)
ID-04-SS	RDL scoring stencils (one set--2 panels)
ID-05-SS	RDH scoring stencils (one set--2 panels)
ID-06-P-1	MEM practice sheet (with chart)
ID-06-P-2	MEM practice sheet (without chart)
ID-06-T-A	MEM test paper Form A
ID-06-V-1	MEM visual section (chart)
ID-06-V-2	MEM visual section (left of problems)
ID-06-V-3	MEM visual section (right of problems)
ID-06-SS	MEM scoring stencils (one set--2 panels)

Figure 2. Inventory of Materials in Complete I-D Testing Kits

I-D TEST MATERIALS (cont'd)

<u>Item Number</u>	<u>Description</u>
ID-07-P	MEC practice sheet
ID-07-PF	MEC practice sheet (French)
ID-07-T-A	MEC test paper Form A
ID-07-TF-A	MEC test paper Form A (French)
ID-07-V	MEC visual aid
ID-07-VF	MEC visual aid (French)
ID-07-SS	MEC scoring stencils (one set--2 panels)
ID-08-P	CHK practice sheet
ID-08-T-A	CHK test paper Form A
ID-08-V-1	CHK visual section (top 3 problems)
ID-08-V-2	CHK visual section (left 3 problems)
ID-08-V-3	CHK visual section (right 3 problems)
ID-08-SS	CHK scoring stencils (one set--2 panels)
ID-09-P	BOX practice sheet
ID-09-T-A	BOX test paper Form A
ID-09-V-1	BOX visual section (4 pairs of boxes)
ID-09-V-2	BOX visual section (8 folding patterns)
ID-09-V-3	BOX visual section (numbers 1-8)
ID-09-M	BOX model (plastic boxes)
ID-09-SS	BOX scoring stencils (one set--4 panels)

Figure 2 (Cont'd). Inventory of Materials in Complete I-D Testing Kits

I-D TEST MATERIALS (cont'd)

<u>Item Number</u>	<u>Description</u>
ID-10-P	FIG practice sheet
ID-10-T-A	FIG test paper Form A
ID-10-V-1	FIG visual section (figures A,B,C)
ID-10-V-2	FIG visual section (figures D,E)
ID-10-V-3	FIG visual section (problems 1-2)
ID-10-V-4	FIG visual section (problems 3-4)
ID-10-V-5	FIG visual section (problems 5-6)
ID-10-V-6	FIG visual section (problems 7-8)
ID-10-V-7	FIG visual section (5 cut-out figures)
ID-10-SS	FIG scoring stencils (one set--2 panels)
ID-11-P	GPH practice sheet
ID-11-T-A	GPH test paper Form A
ID-11-V-1	GPH visual section (graph)
ID-11-V-2	GPH visual section (problems)
ID-11-SS	GPH scoring stencils (one set--4 panels)
ID-12-P	COD practice sheet
ID-12-T-A	COD test paper Form A
ID-12-V-1	COD visual section (left of key)
ID-12-V-2	COD visual section (right of key)
ID-12-V-3	COD visual section (5 problems)
ID-12-SS	COD scoring stencils (one set--2 panels)
ID-13-P	NAM practice sheet
ID-13-T-A	NAM test paper Form A
ID-13-V-1	NAM visual section (names)
ID-13-V-2	NAM visual section (answer spaces)
ID-13-SS	NAM scoring stencils (one set--4 panels)

Figure 2 (Cont'd). Inventory of Materials in Complete I-D Testing Kits

I-D TEST MATERIALS (cont'd)

<u>Item Number</u>	<u>Description</u>
ID-14-P	RTH practice sheet
ID-14-T-A	RTH test paper Form A
ID-14-V	RTH visual aid
ID-14-SS	RTH scoring stencils (one set--4 panels)
ID-15-P	TAB practice sheet
ID-15-PF	TAB practice sheet (French)
ID-15-T-A	TAB test paper Form A
ID-15-TF-A	TAB test paper Form A (French)
ID-15-V-1	TAB visual section (left table)
ID-15-VF-1	TAB visual section (French)
ID-15-V-2.	TAB visual section (right table)
ID-15-VF-2	TAB visual section (French)
ID-15-V-3	TAB visual section (problems)
ID-15-VF-3	TAB visual section (French)
ID-15-SS	TAB scoring stencils (one set--4 panels)
ID-16-P	SPK practice sheet
ID-16-T-A	SPK test paper Form A
ID-16-V-1	SPK visual section (sample problems)
ID-16-V-2	SPK visual section (practice problems)
ID-16-SS	SPK scoring stencils (one set--4 panels)

Figure 2 (Cont'd). Inventory of Materials in Complete I-D Testing Kits

I-D TEST MATERIALS (cont'd)

<u>Item Number</u>	<u>Description</u>
ID-17-P	SCI practice sheet
ID-17-PF	SCI practice sheet (French)
ID-17-T-A	SCI test paper Form A
ID-17-TF-A	SCI test paper Form A (French)
ID-18-P	WLD practice sheet
ID-18-PF	WLD practice sheet (French)
ID-18-T-A	WLD test paper Form A
ID-18-TF-A	WLD test paper Form A (French)
ID-17/18-V	SCI/WLD visual aid
ID-17/18-VF	SCI/WLD visual aid (French)
ID-17-SS	SCI scoring stencils (one set--2 panels)
ID-18-SS	WLD scoring stencils (one set--2 panels)
ID-19-P	MAN practice sheet
ID-19-T-A	MAN test paper Form A
ID-19-V-1	MAN visual aid (Problem 1)
ID-19-V-2	MAN visual aid (Problem 2)
ID-19-SS	MAN scoring stencil (one set--1 panel)
ID-20-P	FIN practice sheet
ID-20-T-A	FIN test paper Form A
ID-20-V	FIN visual aid (2 sections)
ID-20-SS	FIN scoring stencil (one set--1 panel)
ID-21-P	MRK practice sheet
ID-21-T-A	MRK test paper Form A
ID-21-V	MRK visual aid

Figure 2 (Cont'd). Inventory of Materials in Complete I-D Testing Kits

I-D TEST MATERIALS (cont'd)

Miscellaneous Items

Visual Board
Visual Board Cover
Visual Board Blackboard Attachment
Hook Tape
Loop Tape
Contact Cement
Marking Pencil (Black)
Marking Pencil (Red)
Timer with Bell
Stopwatch
Numbering Machine
Visual Aid for I-D Testing Number

I-D Technical Manual (English)
I-D Technical Manual (French)
I-D Examiner's Manual (English)
I-D Examiner's Manual (French)
I-D Test Norms
Record of Materials Forms

Figure 2 (Cont'd). Inventory of Materials in Complete I-D Testing Kits.

III: INSTITUTION BUILDING

As noted in the introductory remarks, the technical objectives were paramount at the beginning of the program. According to the psychological literature of five years ago, modern aptitude tests could not be used with African examinees; and, clearly, this issue had first to be settled.

When it became apparent that suitable tests could be developed, attention shifted to the problems of putting these instruments into practical use. The needs were for

- 1) A general understanding and acceptance of aptitude tests on the part of teachers, administrators, personnel managers, and other potential users;
- 2) A professional staff of African test specialists trained to install and manage nation-wide testing programs; and
- 3) A permanent institution to supervise use of the tests, and to provide for continuing development and evaluation.

The resolution of each of these needs became an important project objective.

PROMOTING THE ACCEPTANCE OF TESTS

The successful installation of an aptitude testing program depends in the first instance on the educational, governmental, and industrial leaders who must decide whether or not these kinds of tests should be adopted. And the effectiveness of the program thereafter is to be a large extent determined by the enthusiasm of the teachers and administrators who must implement policy decisions. Unless there is widespread recognition of the value of aptitude tests at all levels of the political, professional, and commercial community, a testing program can achieve at best limited gains.

In most African countries, such widespread support does not exist. Below the top professional level, there is little familiarity with the techniques of psychological testing, and much local tradition militates against even the basic principles on which aptitude testing is based.

There is only one kind of ability, for example, that is widely respected. This is scholastic ability, as measured by past performance in school. Individuals are typically judged as able or less able strictly in accordance with their academic records, and the notion that there are abilities of a different kind that may be equally important has not been established. The measurement of such other abilities is therefore of minor concern to many administrators responsible for the selection of trainees, and to most of the teachers who would develop their students' potential.

The effective use of ability data is also complicated by the attitudes of parents who have grown up in a colonial setting, and who still see the civil service as the ultimate in career aspirations; and by the fact that information on the wide range of current job opportunities is not generally provided. The responsibility that members of the same community feel for helping each other find employment, even on bases

other than merit, is yet another problem; as is the number of enlightened managers who have become disenchanted with tests after trying to use imported testing procedures.

One of the crucial steps in implementing modern selection and guidance programs, therefore, is to gain the support of thousands of people who would otherwise be indifferent or hostile to the idea. This is being accomplished in part by the introduction of additional courses on individual differences in the teacher training colleges; by government-sponsored workshops and seminars; and by such important developments as the creation of a Department of Psychology in the University of Nigeria at Nsukka.

The AID-AIR Team has also tried to assist in this effort. One approach has been to participate in a variety of educational and training sessions, and a second has been to publish and disseminate the findings of the research.¹ But by far the most effective means of gaining support for the program has been through demonstration studies carried out at potential user institutions. Each agency that tried the I-D tests on an experimental basis sooner or later came back for more.

The beginnings of this demonstration program were almost accidental. At first, it was mainly the institutions staffed by other A.I.D. Contractors that saw clear-cut opportunities for aptitude testing and that requested specific assistance. But, as these operations began to produce effective results, sister institutions made similar requests, and the program started to grow. Thus, the selection of students for the (NYU-assisted) School of Business of the University of Lagos led to the

¹ The two issues of Testing Notes published by AIR outside the scope of this contract helped greatly in presenting the results to a larger audience than was reached by the technical project reports.

selection of evening-school students for the School of Law; the testing of the (UCLA-assisted) Port Harcourt Comprehensive School led to a Region-wide secondary school selection program involving 25,000 students per year. By the end of the project, operational testing had been done for more than 50 organizations, most of which are enumerated in Figure 3.

The results of many of these operations were such that they could not be analyzed statistically and that they were not suitable for inclusion in the Technical Manual. But their impact was nevertheless substantial. In a study of the Nigeria Military School, for example, it was noted that the I-D test scores of one examinee were far higher than were his standing in class and the evaluations of his instructors. This anomaly was recorded, but did not come to the attention of the Principal until nearly one year later. When he saw the report and checked the subsequent performance of the trainee he found that the boy had since risen to the top of his class, and had been singled out for advanced training in England. This one incident involving a single individual was far more meaningful to the staff of the Military School than had been the report of validity coefficients based on hundreds of cases.

Similar incidents occurred in also industrial settings. One of the more dramatic illustrations took place in the Total Oil Company, which had used I-D tests to select four zone representatives for Western Nigeria. No rigorous follow-up was carried out, but within two years, the people who were selected had passed up all of the more senior employees in the same job position, and were progressing so rapidly that a number of the senior group saw no future in the company and resigned. The management of Total specified that their replacements were to be selected with a repeat I-D test program.

EDUCATIONAL INSTITUTIONS

<u>Name of Institution</u>	<u>Type</u>	<u>Purpose of Testing</u>
Afikpo Grammar School	Secondary	Student selection
Aiyetoro Comprehensive School	Secondary	Student select. & guid.
Anglican Girls' School	Secondary	Student selection
International School	Secondary	Student selection
Nigeria Military School	Secondary	Student selection
Ogbomosho Grammar School	Secondary	Student selection
Owerri Government Sec. School	Secondary	Student selection
Port Harcourt Comp. School	Secondary	Student select. & guid.
Queen's School	Secondary	Student selection
Umuahia Government Sec. School	Secondary	Student selection
Afikpo Grammar School	Sixth Form	Student selection
Queen's School	Sixth Form	Student selection
Federal Adv. Teachers' College	Teacher Training	Student selection
Ibadan Technical College	Technician Training	Student selection
School of Mines	Technician Training	Student selection
Ahmadu Bello Inst. of Admin.	University	Student selection
U. Lagos School of Business	University	Student selection
U. Lagos School of Law	University	Student selection
Ijebu-Ode Trade Centre	Trade School	Trainee selection
Oshogbo Trade Centre	Trade School	Trainee selection
Oyo Trade Centre	Trade School	Trainee selection
Sapele Trade Centre	Trade School	Trainee selection
Yaba Trade Centre	Trade School	Trainee selection

Figure 3. Users of I-D Testing Programs in Nigeria (Partial List)

INDUSTRIAL ORGANIZATIONS

<u>Name of Organization</u>	<u>Purpose of Testing</u>
Book Press Distributors	Selection: Clerks
Bordpak Ltd.	Selection: Machine operatives
C. M. S. Press	Selection: Clerks
Enterprise Development Corp.	Selection: Clerks
Glaxo Laboratories	Selection: Operatives; clerks
IBM World Trade Corp.	Selection: Supvr. students; clerks
Johns Manville Company	Selection: Clerks
Lufthansa Airlines	Selection: Ground personnel
National Cash Register Co.	Selection: Printers
Nigerian Breweries	Selection: Brewmasters, plant personnel
Nigeria Railway Corp.	Selection: Apprentices, clerks, inspectors
Nigerian Sugar Co.	Selection: Machinists
Pfizer Products	Selection: Clerks
Shell-B.P. Company	Selection: Clerks
Tate & Lyle Company	Selection: Machinists; fitters
Total Oil Company	Selection: Zone representatives
United Africa Company	Selection: Clerks
United Bank of Africa	Upgrading: Senior staff

GOVERNMENT AND RELATED AGENCIES

<u>Name of Agency</u>	<u>Purpose of Testing</u>
Civil Service Tng. School	Selection: Stenographer trainees
Nigerian Army Signal Corps	Selection: Trainees
U.S.A.I.D. to Nigeria	Selection: Clerks
U.S.I.S. in Nigeria	Selection: Clerks
West African Exams Council	Selection: Machine ops., clerks, sr.staff

Figure 3 (Cont'd). Users of I-D Testing Programs in Nigeria (Partial List)

Such anecdotal findings, coupled with the more serious data, led to a rapid expansion of testing, and provided an important resource of established clients when the Nigerian Aptitude Testing Unit later opened for business. They also helped to introduce aptitude testing into many organizations that would otherwise not have considered the use of testing procedures, and in this way made some immediate contribution to the development of Nigeria's manpower resources.

In retrospect, the decision made in November 1962 "to meet all requests for testing, even if they do not contribute substantially to the research, and to look particularly for demonstration projects to show off the effectiveness of the tests..."¹ was of critical importance in attaining the over-all project objectives.

PARTICIPANT TRAINING

Throughout tropical Africa, there is only a handful of individuals with professional training in aptitude testing. And most of these people have their primary specialty in another field, so that they are not able to devote significant portions of time to testing affairs. In the African countries in which the AID-AIR team worked, there was no one in a position to take over the research and manage nation-wide testing operations.

Training a nucleus of professionals capable and available to assume these responsibilities was therefore another of the vital objectives. Soon after the project began, a fairly sizeable participant training component was planned.

¹ American Institutes for Research. Fifth Quarterly Progress Report. December, 1962.

At first, it was thought that the implementation of a scholarship program would present no serious problems. But this impression was quickly corrected.

To generate the level of specialists that would be required, it was necessary to plan for a graduate program, which meant that only degree-holders could be considered. Such personnel are scarce, and, as most Contractors discover, it is not easy to obtain the release for training purposes of staff already performing needed operational duties. In the case of the present project, this problem was further complicated by the fact that a number of qualified people who could have been released were unwilling to stake their future on an unknown field with uncertain potential. The queue for scholarships in educational testing was not lengthy.

Among those who were both able and willing to enter the program, moreover, there was not one with a background of related studies at the undergraduate level. Because of the early specialization in British-style university training, none of the candidates had had the basic courses in psychology, education, or statistics that are normal for American students beginning graduate work in the measurements field. The participants would have to receive all of their technical background in graduate school, and a concentrated non-degree program focused on only the most relevant course would have been most desirable from the point of view of the training objectives. But the applicants were not willing to spend a year in courses that would not produce a degree, and the University could not grant a degree to candidates that did not present also the "core" courses required of all graduate students. It was clear that a special program responsive to the needs of the participants and of the project would have to be concocted.

The first step was to locate suitable people. This was accomplished with the most energetic assistance of the governments of the three countries--Nigeria, Ghana, and Liberia--that were to be included. Perhaps no other aspect of the project so convincingly showed the commitment to testing of these countries as did their willingness to release to the project the most able candidates that could be uncovered. In some instances, a considerable sacrifice was involved.

Nigeria provided a total of six participants, all of whom had substantial experience in the field of education. The Ministries of Education of Eastern and Northern Nigeria each provided two education officers; the Western and Federal Ministries provided one each.

From Ghana came four participants, assembled with the assistance of the Manpower Unit of the State Planning Secretariat. Three were drawn from the field of education; one was an officer in the Ministry of Labour.

Liberia sent three participants, all of them representing the Department of Education. The three originally selected by the AIR Team had for a variety of reasons to drop out of the program prior to the time of departure; but, fortunately, replacements were found.

This resulted in a group of thirteen people, distributed as follows:

Mr. S. Aleyideino	Northern Nigeria
Mr. C. Berepiki	Federal Nigeria
Mr. L. Bestman	Liberia
Mr. A. Davies	Liberia
Mr. F. Madike	Western Nigeria
Mrs. G. Morris	Liberia
Mr. C. Nelson	Ghana
Mr. S. Ogbonna	Eastern Nigeria
Mr. A. Ozigi	Northern Nigeria
Mr. Y. Quansah	Ghana
Miss C. Quaynor	Ghana
Mr. E. Safo	Ghana
Mr. A. Usoro	Eastern Nigeria

The size of the group made it possible to devise at only a modest increase in costs a special training program to fit the requirements noted above. This program was carried out at the University of Pittsburgh and at the home office of the American Institutes for Research.

At the University, the group completed three full "trimesters" under the plan that crowds three normal semesters into one year. They took all of the courses required for the Master's Degree in Educational Measurements, and the most relevant elective courses offered by the Department of Psychology and the School of Education. They began their program in September 1962, and in August 1963 all thirteen received their Master's Degrees.

Concurrently, the group also took practical courses arranged and conducted by the American Institutes for Research.¹ This additional work resulted in a highly concentrated program, but seemed necessary to give the group the familiarity with techniques and research problems that they would need in their new jobs. During holidays, they visited testing centers in the United States as another part of their practical training.

At the completion of the course, the group agreed that it had been "humanly impossible," but their progress clearly justified the effort involved. Most of them developed considerable competence in an entirely new field; five attained outstanding results.

One lesson that was learned from this operation concerns the importance of pre-departure training for people unaccustomed to the American university setting. An effort was made to provide three months of on-the-job familiarization training prior to departure, but this was

¹ Dr. Robert E. Krug of the AIR staff developed and supervised this special program.

attenuated by recruiting and administrative problems. Those of the group that could be provided with the greatest amount of field training (about two months) seemed to make a more rapid adjustment, and to find subsequent courses more meaningful. It was decided to insure more comprehensive pre-training for future groups, and this is now being done for the participants (two from Nigeria; possibly up to two from Liberia) planned for the period 1964-65.

Most of the returned group of participants are being utilized in testing assignments. Three of the Nigerians are assigned as counterparts in the Nigerian Aptitude Testing Unit, and a fourth is the Vocational Guidance and Testing Officer in the Federal Ministry of Education. Two of the Liberians are counterparts in the Liberian Testing Center, and the third holds a testing appointment on the University staff. Three of the Ghanaians are being assigned to the West African Examinations Council, which hopes to extend aptitude testing to Ghana in the near future.

This nucleus of trained personnel made possible subsequent progress in the establishment of indigenous testing institutions.

PROFESSIONAL TESTING INSTITUTIONS

The Nigerian Aptitude Testing Unit

History. In 1962, two Nigerian institutions had ongoing test development programs. One was the local office of the West African Examinations Council, which concentrated on the various kind of achievement tests required by the Nigerian system of education. The other was the Institute of Education of the University of Ibadan which had projects to do research on certain types of ability tests. Neither had the staff or the facilities to take over and build on the results of the AID-AIR Project, and it was clear that an institutional base for aptitude testing would have to be developed.

As the basis for such development, the AIR staff in December 1962 prepared a detailed plan for an aptitude testing facility including budget estimates for the initial three years of operation. This plan envisioned financial support from all four governments of Nigeria, supplemented by external aid during the developmental phases. It showed, through projections of anticipated testing volume, that a nation-wide testing service would be viable, and that the examinee's fees could be kept to about six pence per test.

Organizationally, the proposed service was to be operated through the Ministries of Education, by establishing a central unit at the Federal level and field units in the three Regions. This pattern would provide an efficient means of managing nation-wide testing programs; would enable immediate utilization of the returned participants, who were all employees of the Ministries of Education; and would have the additional advantage of avoiding jurisdictional squabbles among the existing institutions within which aptitude testing might alternatively be sited. On paper, it seemed

to be the easiest route toward launching the most testing services within the shortest possible time.

But in approaching the task from the point of view of the country's practical testing needs, this proposal missed the real issues. These were, firstly, to establish aptitude testing as a Nigerian enterprise based not on American but on Nigerian ideas and solutions; and, secondly, to provide for the support of the local institutions that had to be not by-passed but mobilized to sell a new program at the top policy levels. Without a framework built on the political realities, the internal mechanics of a testing service were academic.

In its meeting of January 1963 the Coordinating Committee for External Aid to Education, made up of the Ministers and Permanent Secretaries of the four Ministries of Education, reviewed the proposal. The official decision was to defer action until the May meeting, but it was informally suggested that the role of the West African Examinations Council and other indigenous bodies should be more adequately defined. Clearly, the need was for a more sophisticated proposal developed by the appropriate Nigerian institutions.

To stimulate the development of such proposals, it was necessary to bring the interested parties together. This seemed to be an appropriate function for U.S.A.I.D. and also for the Ford Foundation, which had been providing support to the West African Examinations Council, and which was even then evaluating a WAEC proposal for additional funds. The suggestion that U.S.A.I.D. and the Foundation sponsor a Nigeria-wide conference on testing was received enthusiastically by all of the prospective participants, and this conference was held on 5-6 April 1963 in Lagos.

The major agencies -- government, universities, industry, the Examinations Council -- were well represented at the meeting, and some

progress was made. Everyone agreed that aptitude testing was a priority need, and that action to establish an institutional base for aptitude testing should be taken without further delay. But on the mechanics there were diverse opinions:

1) The Universities felt that the crucial function in continuing the AID-AIR Project was to maintain the research, and that this could be done adequately only if the center of testing was within a university setting. Both the University of Ibadan and the University of Nigeria thought that they could manage the program if sufficient local funds and external aid were provided.

2) Government thought that the emphasis should be on the services, and that these could be managed most efficiently by utilizing facilities already available within the West African Examination Council. The government representatives also indicated that it would be difficult to obtain government financing for any pattern other than one integrated into the WAEC structure.

3) Industry suggested that a unit within WAEC would naturally be slanted toward educational testing services, and that the services to be provided to industry might get lost in the shuffle. Their preference was for a university center, since this was more likely to be sympathetic to industrial needs.

4) The West African Examination Council had no doubt that they could adequately meet all service and research needs, given adequate financing to cover expansion into a new field. They would be pleased to accept an aptitude testing activity if government so desired, but were also willing to cooperate with any other pattern that might be adopted.

The other conferees -- AIR, USAID, and Ford Foundation -- did not intrude into these deliberations. They felt that their inputs would

be most appropriate after the Nigerian agencies had worked out a locally acceptable pattern, in deciding whether or not to provide external aid in support of whatever proposal emerged from the discussions.

The ultimate resolution was that the group prepared a proposal to the Coordinating Committee recommending that external aid be requested for the creation of an aptitude testing center to be located within either one of the universities or the West African Examinations Council. Two separate budgets were prepared and appended -- it was up to the Coordinating Committee to decide which plan to accept.

Before the meeting of the Coordinating Committee, this proposal was also reviewed by the A.I.D. Mission. The conclusion was that U.S.A.I.D. would be pleased to entertain a request for support under either pattern, but that the paper-work would have to be completed before 30 June. A request received after this date could not be funded in time to maintain continuity from the date that the AIR team would complete its work under the regional project.

When the Coordinating Committee met, the project suffered another set-back, for the new proposal was also rejected. The reaction to the "Choose Plan A or Plan B" approach was that more planning was needed. The AID-AIR group was invited to participate in this further planning, but by now the A.I.D. funding deadline was past, and no country funds for this purpose could be provided.

If the idea was to be salvaged, therefore, new decisions were needed. And, during the summer of 1963, after the AIR Team had already closed shop and departed from Lagos, these decisions were made.

One key decision was made by the West African Examinations Council, which decided to abandon its passive role, and to go all out

for the creation of a WAEC aptitude testing center. The Council realized, as by now did all other agencies, that to the extent that an aptitude testing activity depended on A.I.D. assistance and therefore on a bilateral government agreement, no pattern outside the WAEC structure would be productive.¹ It had to be a WAEC center or nothing. Also, and perhaps even more significantly, they had come to the conclusion that the infusion of expertise into the organization that would result from the staffing of the new center would be beneficial to the entire WAEC program, and that obtaining this expertise justified an energetic promotion attempt. Throughout the summer, in Lagos, in the regional capitals, and in Washington, WAEC presented the case for aptitude testing, and won many new and influential friends in policy-making positions.

Another important decision was made by the A.I.D. Mission. The Mission had had an opportunity to observe first-hand the benefits of I-D testing within its own program, and remained convinced that this would contribute substantially to Nigeria's development plans. If there was a reasonable chance that the problems that had so far blocked a country project could be resolved with just a little more patience, the Mission was eager to keep the effort alive. The situation was re-evaluated, and on the basis of encouragement from the Federal Ministry of Education and the West African Examinations Council, it was decided to recommend the extension of the regional project for one additional year. This would provide the time for the detailed planning that had not been available in the spring, and hopefully lead to the acceptable formula that had so far proved elusive.

This solution was acceptable to the American Institutes for Research, and in October 1963 the AIR Lagos Office was re-opened, after

¹ An important consideration in the government view was the fact that expansion of WAEC was included in the Six-Year Development Plan, while funds for the creation of a new facility were not explicitly provided.

a hiatus of nearly five months. Work began on the rebuilding of the testing programs that had been disrupted, and on the prime objective of helping the West African Examinations Council develop an aptitude testing services center.

Now, rapid progress was made. Having decided to enter the field of aptitude testing, WAEC established a Provisional Aptitude Testing Board made up of the participants in the April meeting, and invited them to meet at WAEC expense on 6 December in Lagos. The purposes of this meeting were to establish the structure of a WAEC-based Aptitude Testing Unit, and to develop a proposal for external aid to this Unit for resubmittal to the Coordinating Committee. Again, representatives of the major organizations agreed to attend.

So as to provide for a more active university role in this Unit, it was also decided to propose to the meeting that all basic testing research should be conducted by the universities with funds that the Unit would make available on a sub-contract basis. Until the Unit could generate such funds from its own income a research grant would be requested from the Ford Foundation. Capital and staff development costs would as before be sought through an AID-GON project agreement.

After considerable discussion, the meeting evolved a concrete proposal that all parties felt they could support. This recommended

- 1) That a permanent aptitude testing facility should be established under the aegis of the West African Examinations Council to begin operations by 1 October 1964.

- 2) That this unit should be largely autonomous, operating under the guidance of a 23-member Governing Board, constituted as follows:

<u>Organization</u>	<u>Basis</u>	<u>Total Reps.</u>
Ministries of Education	One Each	5
Universities	One Each	5
Industry (via N.E.C.A.)	Five	5
WAEC	Four	4
Manpower Board	Secretary	1
Ministry of Labour	Representative	1
Aptitude Testing Unit	Director	1
Chairman of Gov. Board	Dr. Lambo	1

3) That, in addition to the contributions of WAEC and the income earned from testing fees, Government should help meet recurrent expenditures by annual contributions of

- a) 3,500 pounds per Regional Government, and
- b) 10,000 pounds by the Federal Government, providing 24,000 pounds per annum in all.

4) That technical assistance in the provision of equipment, training, and expert advisers be requested from the Agency for International Development; funds for research and educational activities from the Ford Foundation.

The proposal was submitted to the Coordinating Committee in time for review at its meeting of 19 December 1963. And on that date the plan was approved.

This cleared the highest of the hurdles toward the creation of an aptitude testing facility, but considerable work remained in developing an acceptable A.I.D. Project Agreement, in defining the internal structure of the Unit, in obtaining the release of the former participants, and in siting and equipping a suitable physical facility. The Project Agreement was signed on 26 June 1964, four days before the new deadline, and most

of the internal issues were resolved at the meeting of the Governing Board 6-7 July. On 1 September, the Nigerian Aptitude Testing Unit was housed, staffed, and open for business.

Organization and Staff. The Unit is organized into two professional Divisions supported by a variety of administrative sections. One Division is responsible for research and development, including the evaluation of ongoing programs; the other manages the actual testing operations, and conducts related training sessions. Field units are to be added when the testing volume exceeds the capacity that the central unit can manage.

The senior professional staff is beginning with a complement of three American specialists, three of the returned Nigerian participants, and a Nigerian Data Processing Supervisor trained by the AIR Team under this project. The administrative, secretarial and clerical staff, headed by a senior Administrative Officer, includes nearly twenty people, selected from hundreds of applicants by the relevant I-D tests. It is planned that the Americans will phase out, that additional Nigerian talent will be added, and that the Unit will be viable without further external assistance within a period of three years.

Program. The Unit is to provide all kinds of aptitude testing services, as required by educational, industrial, and governmental organizations. To help meet recurrent expenses, a fee is assessed for these services, but this fee has been set at a modest level to encourage the widest possible participation. For non-educational testing, the basic fee is about \$3.00 per examinee; for educational testing (which is subsidized by the Ministry contributions), the fee ranges from about \$0.35 to \$1.00, depending on the number of tests given.

At its inception, the Unit took over the testing program built up by the AIR Team, but has through its own efforts since then expanded this program at an astonishing pace. New programs have been or are being set up for the Law Schools and the Teacher Training Colleges; and the existing programs at the secondary and university levels have been greatly increased, as have services to industrial clients. Recent discussions with the military and civil service establishments further suggest that sizeable programs in these areas are also quite likely.

The Unit has also begun on its role as a resource for other African countries. During October, the Unit made possible a large-scale selection program in the Cameroons by providing materials and training examiners for the processing of 5000 applicants to a technical training institution. The efficiency and economy with which this operation was managed suggest that the international services of the Unit will also be greatly expanded.

At this time, it appears that the impact of the AID-AIR Project via the Nigerian Aptitude Testing Unit alone will exceed even the most optimistic expectations.

The Liberian Testing Center

History. Compared to the difficult birth of the Nigerian Unit, the establishment of the Liberian Testing Center presented virtually no problems at all. During June, July, and August 1962, AIR carried out a feasibility and standardization study in Liberia to adapt the tests for Liberian use. A sample of 3,000 people was tested, and excellent results were obtained. The Government decided on the basis of these results to create a national testing facility, and by the following year the Center came into being.

There were, of course, numerous administrative problems, but none of the basic issues and conflicts that nearly precluded a Nigeria-wide Unit ever arose. The only doubts that clouded the prospects were those of the Mission, who were not sure that assistance to aptitude testing would fit into their program. The support of the Government was steadfast and positive, and when the Mission eventually decided on a one-year trial project, the necessary arrangements were quickly completed.

Why the developments in Liberia proceeded so smoothly cannot be precisely determined, but it may be useful for future ventures to analyze some of the pertinent factors.

Many of these factors were no doubt based on the real differences between the Liberian and Nigerian settings. One is that Liberia is a much smaller country that needed a much smaller (and therefore much cheaper) testing operation. A second is that in Liberia there was not a host of powerful institutions and vested interests to be satisfied as a prerequisite to the Center's creation. A third may have been that in the American-oriented environment of Liberia institutionalizing aptitude tests was much less of a "big deal" than in a country emerging from British tradition. A fourth no doubt grew out of specific personality factors -- a Secretary of Education with a doctorate from the University of Chicago would be inclined to be sympathetic to this type of proposal.

But there may have been other than situational factors as well. One that seems extremely important is that in Liberia the entire project was discussed with government in advance, and the Department of Education participated most actively in the research, even though this was done as in Nigeria under a regional project requiring no host government funds.¹

¹ Such arrangements were also made in Nigeria before the project was begun, but since this was before independence, the agreements were with colonial officers who were subsequently replaced. This technicality caused considerable difficulty later when the history of Nigerian participation was reviewed.

Promoting such active involvement in even the exploratory stages should be a firm principle in future extensions to other African countries.

Also helpful was the fact that the AIR Team (having learned from the Nigerian experience) requested the establishment of an Advisory Committee before even the first test was given in the initial research studies. This Committee, representative of the major agencies that would use tests, played an important part in enabling these studies to be completed so quickly, and in building the program and clientele of the Testing Center.

Finally, it must also be noted that while the planning in Liberia was accomplished much more easily, the resulting plans did turn out to be much less effective. Within a year, the initial arrangements had to be revised substantially, and probably it is as true in this kind of activity as in others that planning labors just cannot be reduced to a completely painless level. But these developments are part of a separate project, and not within the scope of the present report.

Organization and Staff. The Liberia Testing Center is divided functionally into three activities: testing, analysis, and guidance; and a Liberian officer is in charge of each of these functions. Two of the officers are returned AID-AIR participants; the third had graduate training in the United States outside the scope of the project.

In charge of the day-to-day activities of the Center has been the AIR Project Director, who is the only contract technician assigned to the project.¹ Responsible for the Center at the policy level is the Director of Supervision and Evaluation of the Department of Education.

¹ Throughout most of the initial year, the Project Director was Dr. Paul P. Mok, assigned to the Center under a separate AID-AIR contract arrangement.

In Liberia, the Center is part of the Department of Education, but provides services to also non-education sectors.

Program. The educational testing activities of the Center encompass not only aptitude testing but also the conduct of the National Examinations, which are attainment tests given at the end of the sixth, ninth, and twelfth grades. These programs, including scholarship testing, account for the vast majority of the testing so far carried out in the educational sector -- a total of 11,000 people during the first year. Ongoing developments include a comprehensive system of guidance testing intended for use in the Liberia schools.

Commercial and industrial users include such large firms as the Firestone Plantations, United States Trading Company, Liberian Mining Company, IBM, Pan-American World Airways, and the Chase Manhattan Bank. Among governmental and institutional clients are the Tubman National Institute of Medical Arts, Department of Justice, Department of Public Works, Treasury Department, Police Academy, and Liberia Development Corporation. A new commercial school being established by the American business community also will select its students by means of I-D testing procedures.

The Liberia Testing Center still needs considerable inputs to grow into a professional and self-sufficient organization. But it is even now providing important services, and will exercise a considerable influence on Liberia's development if and when it attains its potential.

Institutions in Other Countries

In Ghana, plans for an institutional center were originally directed toward the University's Institute of Education to which the returning participants and an expatriate adviser were to be assigned.

These plans collapsed as the result of some apparent confusion in the routing of documents, and because of the entry of the West African Examinations Council into the aptitude testing field, they have not been resurrected. Instead, a number of the returned participants are being assigned to the WAEC headquarters office in Ghana, and it is hoped that a Ghana center parallel to the Nigerian Aptitude Testing Unit can be developed. The cross-fertilization that would naturally result between sister institutions within the same organization is particularly appealing.

On the basis of inquiries and comments, there seem to be ample opportunities for institutionalizing the I-D tests in other African countries. This might be done by installing the tests within existing institutions having the requisite professional capabilities, by expanding the international activities of the Nigerian Aptitude Testing Unit, or, where the potential warrants, by a full-scale country project. Whichever is done in a given location, the lessons in institution-building learned in West Africa will no doubt prove useful, and enhance the lasting value of the now completed regional project.

IV: EVALUATION

The time to assess the impact of this project most accurately will come in five or ten years, when we shall be able to determine how many of these ideas and programs have taken root and developed, and to what extent the long-range objectives have been attained. The crucial question of what will happen after external assistance and inputs have ended can not be answered as yet.

Still, it is during the course of a development program that the most useful appraisals are made. For even though they may be a less than perfect index of what the final verdict will tell, they provide the only available clues to needed adjustments or reorientation, and the only realistic basis for gauging the potential of similar or related efforts that may be proposed. After four years of research and development, it is not only reasonable but necessary to ask "What have we accomplished?" and "What have we learned?" and the very practical question of "Where are we now?"

Taking stock on the basis of the information and experience so far accumulated is the purpose of these closing remarks.

ACCOMPLISHMENTS

Remembering the situation as it was in 1959 and comparing the status then and now suggests that the project has made four major contributions:

1. Methodology. At the top of the list must be the methodological developments that have made possible African testing programs. The

project was the first to produce techniques that are accurate enough to warrant use in terms of statistical criteria, and that are also practical enough actually to be used in the light of local requirements and limitations.

The I-D tests represent an important contribution because they enable effective selection and guidance right now. But the principles underlying these tests are perhaps even more important in that they will surely lead to second- and third-generation instruments better than the present procedures, and in that they are no doubt generalizable throughout Africa and to other parts of the developing world. It may be that they will prove useful even in the United States in the testing of subcultures different from those for which standard American tests are intended.

To a psychologist, the knowledge that has been gained about the cultural components of standard aptitude tests and the guidelines that have been developed for adjusting tests to different cultures seem all-important.

2. Practical Applications. A second contribution derives from the widespread use that is already being made of I-D testing procedures. In many organizations, the employees or students now being selected are measurably better than those admitted before; and this, of course, was the basic project objective.

In enabling these improvements, the project has proved important not only to the established training institutions, but also to a number of pioneer ventures that were dependent on accurate tests. Thus, the availability of suitable I-D materials was vital in the implementation of the IBM Education Centre, which is notable as a major technical assistance effort on the part of the private sector; and has made possible also the intensive guidance services that are essential to the comprehensive

school programs of A.I.D. To the extent that the tests have contributed to the success of such key development projects, they have had indirect benefits that are also substantial.

3. Local Capabilities. The third contribution is the progress that has been made in developing a local capability for applying and building on the results so far attained. The institutions and professional talent now devoted to educational and vocational testing insure the continuity of the effort, and forecast rapid expansion.

4. Social Change. A less tangible but nevertheless vital contribution has been the change in attitudes about the nature of African ability that the project has helped to promote. It was important to show, for example, that the same range and variety of individual aptitude is found in the African setting as in the more technologically-oriented cultures; and that the abilities necessary for industrial expansion can be provided.

Real advantages will accrue also from the continuing effort to promote the basic philosophy on which testing is based. When such concepts as individual aptitude patterns and advancement through merit are fully accepted, the stage will have been set for still greater acceleration in the development of Africa's manpower resources.

LESSONS

Quite apart from these specific accomplishments, there are a number of conclusions that can be drawn about the manner in which they were achieved. The most significant of these are as follows:

1) Aptitude tests (and probably many of the other modern aids to education) meet an important need in an economy developing at the outermost limits of its resources. The introduction of such techniques can lead to sizeable gains.

2) In introducing techniques that are alien to the culture, however, there are two classes of problems that must first be resolved. One is the technical problem of adapting the methodology to fit local conditions. The second is the socio-politico-educational problem of "naturalizing" it from alien to indigenous status.

3) Of these two problems, the second poses the greater challenge. Even when the technical difficulties have been overcome and excellent results can be demonstrated, there is no guarantee that the finished product will be accepted.

4) It is necessary, therefore, to do most or all of the developmental research without widespread local support. The pattern of regional funding for developmental phases that was adopted for this project proved to be an excellent vehicle for accomplishing the needed research.

5) The regional pattern proved also to be a highly economical approach in producing generalizeable findings that it would have been wasteful to discover and rediscover in a number of separate locations.

6) The limitation of the regional project was that the early phases did little to pave the way for the institution-building that followed. This later step should have been planned from the beginning, and some preparatory activities should have been incorporated in even the preliminary phases. The planning should have been carried forward to ultimate rather than interim objectives.

7) In evaluating the feasibility of extending the work to other locations, the primary criterion should be the availability of supportive or potentially supportive local institutions. If there is no indigenous expertise, the provision of qualified participants should be an inflexible requirement for any substantial investment.

8) A second criterion for such expansions should be the support available from the management and technical personnel of the local A.I.D. Mission. Adequate support includes not only the programming aspects, but also sympathy based on convictions concerning the project objectives.

9) Where possible, replications or expansions of this research should further provide for close cooperation with other A.I.D. Contractors working on related projects. The potential impact of cooperative inter-Contractor activities has not been fully exploited.

FURTHER OPPORTUNITIES

The opportunities for capitalizing on this research are of two quite different kinds.

One is to insure that the I-D materials are utilized as fully as possible, so that the gains now being realized in Nigeria and Liberia may be multiplied by dozens of other locations. The materials should be made available not only throughout tropical Africa, as is now planned, but also to developing countries in other parts of the world. The sizeable investment that the Agency has in Latin America and the Far East, for example, suggest that the applicability of these findings should be at least checked to see if comparable benefits are available in also these cultures.

The second new opportunity is based on the fact that selection must be followed by training to produce the skilled manpower that is the ultimate goal. Through use of the I-D tests it is now possible to discover special talents in large segments of the population that will not receive appropriate training, and will therefore remain unproductive. Research on the development of high-density training techniques to be used in conjunction with the I-D tests would seem to be a follow-up activity of high pay-off potential. Such techniques could be used in evening schools, in industrial upgrading programs, and in similar applications to supplement the overtaxed educational facilities and to bring a share of the fruits of development to more of the African people.

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