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to the
AGENCY FOR INTERNATIONAL DEVELOPMENT
on the
AFRICAN MATHEMATICS PROGRAM
May 1, 1966 to September 30, 1966
under
AID Contract RES-21, Amendment 3

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PROGRESS REPORT

The following is a progress report to the Agency for International Development on the African Mathematics Program of Educational Services Incorporated for the period May 1, 1966 to September 30, 1966. The principal activities during the period under AID Contract PES/21, Amendment 3, consisted of 1) the holding of the 1966 Workshop to continue the preparation of mathematics texts for Tropical Africa, 2) organizing courses in Ghana, Federal Nigeria, and Sierra Leone to train teachers of trial classes, head teachers and ministry officials to use the Entebbe Mathematics Series, 3) arranging for completion of publication of the manuscripts written at the 1965 Workshop and for distribution of the Entebbe Mathematics Series to African schools using the material on an experimental basis, 4) collecting information on use of the texts, 5) initiating a study to consider the feasibility of undertaking a broader evaluation of the effect of the African Mathematics Program on teachers and pupils, 6) the holding at University College, Nairobi, of the first residential period of the ABC Institute, a two year program aimed at preparing senior African Teacher Training College tutors of mathematics, Ministry mathematics supervisors and African University mathematicians to undertake leadership in introducing modern mathematics into African primary and secondary schools and training colleges, and 7) visits in late Spring by Mr. Weinstein to West African countries to complete summer arrangements, and visits in July, August and September by Professor Martin, Mr. Aldrich and Mr. Bradley to nine of the ten participating African countries to discuss critical aspects of the African Education Program.

The 1966 Workshop

Meeting at Mombasa, Kenya, again this year, with Professor W. T. Martin and Mr. Christopher Modu as Co-Chairmen, the African Mathematics Workshop was held at

the Nyali Beach Hotel from July 3 to August 13, 1966. (A detailed report is contained in Appendix A.) As usual, a few participants remained for an extra two weeks to help to prepare the texts for publications.

Forty-seven mathematicians and teachers (see Participant List-Appendix B) cooperated in the writing of Primary Five, Secondary Five, Secondary C Two and C Three texts in geometry, and in the writing of tests for Secondary Four and Secondary C One (see Report-Appendix C). In addition the Primary tests for children who have completed Entebbe experimental classes in Primary Three were modified and revised on the basis of trial use in the United States and in the Mombasa area (see Report-Appendix D).

A meeting of the African Mathematics Program Steering Committee was held July 5 at the Workshop.

Planning Ahead

In accordance with discussions held at the April London Executive Committee meeting and the July 5 Steering Committee meeting, Professor Hartley Rogers of M.I.T. and Professor Donald Richmond of Williams prepared proposed outlines of a two year Additional Mathematics Course. It is planned to write the text at the 1967 Workshop. The Additional Mathematics Course normally taken in the two years prior to the O level School Certificate Examination, permits selected students to offer themselves for examination in an additional Mathematics subject. It had earlier been agreed that the writing of such a course is essential to the preparation of a complete secondary program. Further consideration will be given to the outline at the October 15 Steering Committee meeting and at the Spring 1967 Executive Meeting.

It is planned to hold the Mathematics Workshop in Mombasa again in 1967.

Courses for Ghana, Federal Nigeria and Sierra Leone

Earlier reports to AID (March 4, 1964, January 31, 1965, September 30, 1965, December 30, 1965 and May 31, 1966) described twenty-one courses held in the participating countries to train teachers and supervisors of experimental classes as well as participation and co-operation with an April 1966 Conference/Institute organized by the Harvard University Team at the Comprehensive School, Aiyetoro, Western Nigeria.

Requests for courses continue to be received. In the period covered by this report, three courses have been held under the auspices of the program:

Ghana (See Report-Appendix E I)

Site:	University of Ghana, Accra
Organizer:	Ministry of Education, Ghana
Director	Miss Lucy L. Addy, Ministry of Education
Lecturers:	Mr. T. Q. Armar, Headmaster, West Africa Secondary School, Accra Professor V. Haag, Franklin and Marshall College, Lancaster, Pennsylvania
Demonstrators:	Miss Salone Anna, X'borg Presbyterian Girls' Primary School, Accra Miss Laura Nutakor, South Labadi Road Estate Primary School, Accra
Participants:	Fifty Primary Four teachers and head teachers
Dates:	August 28 - September 10, 1966

Federal Nigeria (Detailed Report in Preparation)

Site:	Lagos
Organizer:	Federal Ministry of Education
Lecturer:	Dr. Grace Alele Williams, Faculty of Education, University of Lagos, Lagos
Participants:	One hundred Primary teachers and head teachers
Date:	September 1 to 16, 1966

Sierra Leone (See Report-Appendix E 2)

Site: Freetown Secondary School for Girls, Freetown

Organizer: Ministry of Education, Freetown

Director: Mr. F. E. Dyck Harding, Milton Margai Training College, Freetown, Sierra Leone

Lecturers: Mrs. M. Greene, Annie Walsh Memorial School, Freetown, Sierra Leone
Mr. Julius Jonah, Prince of Wales School, Freetown, Sierra Leone
Mr. J. E. Modupe Taylor-Pearce, Secondary Technical School, Freetown, Sierra Leone
Dr. John Simbo, Fourah Bay College, Freetown, Sierra Leone
Dr. Awadagin Williams, Fourah Bay College, Freetown, Sierra Leone

Participants: Thirty Primary teachers and head teachers

Dates: April 12 to 19, 1966

The Program has agreed to assist the following additional courses during the winter of 1966-67. In every case the Ministry of Education of the country concerned has agreed to contribute to the expenses of the course.

Midwest Nigeria

Dates: January 2 - 15, 1967

Participants: Seventy primary and secondary teachers, head teachers and inspectors

Lecturers: Professor Vincent Haag, Franklin and Marshall College
Dr. Grace Alele Williams, Faculty of Education, University of Lagos

Tanzania

1) Dates: December, 1966

Participants: Primary inspectors and tutors

Lecturers Dr. A. Beninati, AID Visiting Professor of Mathematics, Institute of Education, University College, Dar es Salaam
Mr. Michael Kinunda, Ministry of Education, Dar es Salaam
Mr. J. E. Phythian, Head, Maths Department, University College, Dar es Salaam

2) Dates: January 2 - 15, 1967

Participants: Secondary C teachers

Lecturer: Professor Paul Johnson, UCLA

Other participating countries are also planning Institutes to be held during the next eight months. In addition the Program's participation and co-operation are again being sought for an April/May 1967 follow-up to the Western Nigeria Ministry/ Harvard University Team Comprehensive School Conference at Aiyetoro.

Publication and Distribution of the Entebbe Mathematics Series

During this report period AID approved and ESI and Science Research Associates, Inc. (SRA), a subsidiary of International Business Machines Corporation, signed a subcontract providing for SRA to publish and distribute the Entebbe Mathematics Series texts being written or needed during Amendment # 3. The long initial delay in AID's agreeing to a cost-reimbursable subcontract delayed the entire publication process, so once again it was necessary to send some books by air to schools in Africa so that such schools would not discontinue their participation in the program for want of the next successive level of material. Publication of the manuscripts written at the 1965 Workshop was finally completed in August, 1966. During late August and September more than five hundred inspection sets of 1965 Workshop texts were distributed to interested officials.

As was noted in the May 31, 1966 Report, better organized trial use of the Entebbe Series has also continued during this report period as a result of 1) a Ministry appointing a national to supervise the program on a full time basis or 2) a Ministry seeking assistance from the Peace Corps to supervise the use of the materials, or 3) a Ministry seeking Peace Corps co-operation over several years in introducing the material into secondary school and teacher colleges. There have also been two instances where AID contract officers have assumed responsibility for supervision of the Entebbe experiment.

During the report period Eastern Nigeria requested and was shipped twenty class sets of Secondary One to be used by Peace Corps volunteers who will also train Nigerian counterpart secondary teachers. The Ministry in Northern Nigeria decided to introduce modern mathematics at the primary level, ordered and was shipped twenty class sets of Primary One. More recently the Northern Nigeria Ministry requested ten sets of materials for use in secondary schools. (Most of thirty sets of Secondary materials sent earlier to Northern Nigeria are in use in training colleges associated with the AID supported Northern Nigeria Teacher Education Project of the University of Wisconsin.) With the help of Ato Yohannes Menkir, Lecturer at Haile Selassie I University and a former Workshop participant, and of Mr. John Fitzgerald, expatriate reappointee to the Ethiopian Ministry, ten class sets of each of the secondary programs are about to go into trial use there. Uganda, with the assistance of Dr. Rowlan Anderson, USAID Math Appointee to the Institute of Education, Makerere College, decided to adopt Basic Concepts for use in primary training colleges and recently requested twenty class sets of Primary One for use in demonstration schools attached to such colleges. (Unfortunately Basic Concepts Volumes I and II are out-of-stock.) Meanwhile Ghana and Tanzania asked for and were shipped thirty class sets of the next successive level of primary materials, Primary Four.

At least three countries, Liberia, Northern Nigeria and Tanzania, would like to be able to acquire enough Entebbe Primary and/or Secondary materials so that the texts could be used much more widely than is possible under the ESI/AID contract.

Collecting Information on Use of the Series

Two principle methods have been used to secure information on trial use of the Entebbe Mathematics Series: 1) written reports completed by the teacher of a trial class and mailed to ESI as he finishes teaching a particular chapter and 2) oral reports presented by African participants at the first Plenary Session of each Workshop.

As another means of securing information about use of the Series, in April a Reporting Form was prepared and mailed to the Ministry in each of the participating country/region(s). Eight formal completed reports have been received (see copies--Appendix F-1, 2, 3, 4, 5, 6, 7, 8). (Unrest in Nigeria has made it difficult to secure formal replies from there.) On the whole the reports are very favorable and state 1) that the Entebbe Series is proving useful for introducing modern mathematics and 2) that the Ministries would like to see modern mathematics taught widely Detailed country-by-country information indicating estimated use at successive levels is contained in Appendix G.

The Program benefits also by securing information from U.S. mathematicians willing to spend a week or two observing trial classes on their way to the Workshop. On his way to Mombasa where he was to be chairman of the group writing C Two and C Three geometry, Dr. Ross Finney, then of Princeton, visited secondary classes in Tanzania for ten days to observe the problems involved in introducing the Secondary C course there. (See detailed report- Appendix H-1) Likewise, Professor Clarence Hardgrove of Northern Illinois University, Chairman of the Primary Writing Group, visited primary classes in the four participating West African countries (see detailed report-Appendix H-2).

Initiating Study of Feasibility of Broader Evaluation

Since the beginning of the African Mathematics Program, the Testing Group at each workshop has been preparing objective type tests designed to measure the student's achievement as he completes each successive level of text materials. However there is now a common desire on the part of AID and ESI to initiate a broader evaluation of the effect of the African Mathematics Program on teachers and pupils.

During the Spring of 1966 the experience of Professor Jerome Kagan of Harvard University was enlisted. Professor Kagan is also concerned with a similar evaluation of the School Mathematics Study Group Program. As an initial step in designing such an evaluation study, Miss Janet Levine of Kagan's staff visited schools and Entebbe classes in West and East Africa and the 1966 Workshop. Her report is contained in Appendix I. A meeting of the Sub-Committee on Evaluation, which is chaired by Professor Robert Dilworth of California Institute of Technology, is to be held October 16 to give further consideration to the steps necessary for and the feasibility of a broader evaluation of the Program.

The ABC Institute - A Related Program

In July 1966 at University College, Nairobi, there was held the first residential period of the ABC Institute. This Institute is a two year program that involves primary mathematics teacher trainers, mathematics supervisors in African Ministries and university mathematics lecturers from the ten participating countries and is intended to make available in each of these countries a small group of people knowledgeable about modern mathematics and capable of assuming leadership in mathematical education (see detailed report and list of participants-Appendix J).

Staff Meetings with Ministries, University Officials and AID Missions

During April and May, 1966, Mr. Stanley D. Weinstein of the Program met with ministry, university and AID mission officials in the four participating West African countries to complete arrangements for their participation in the African Education Program's summer activities and to begin to plan related activities for the Fall and Winter 1966-67.

Professor W. T. Martin, Chairman of the African Mathematics Program, and Mr. Hugh P. Bradley, Program Director, also met with officials in the participating countries

in East Africa during July. Typically the topics discussed included the use of the Entebbe Mathematics Series in each country, incountry teacher training institutes, the future development of mathematics education in the particular country, the ABC Institute Program, Primary Science education and the initiation of an African Social Studies Program. Similar visits were made by Mr. Bradley in Ethiopia (accompanied by Mr. James L. Aldrich, Deputy Director of ESI), Ghana, Liberia, and Nigeria during August and September. A detailed report of these visits is contained in Appendix L.

In conclusion, ESI wishes to express its thanks to the REPAS office of AID/W, to the Contract Officers of AID/W responsible for RES-21 and to the educational advisors of the AID missions in the participating countries for their cooperation in this joint effort to improve mathematics education in Tropical Africa.

Appendix A

African Mathematics Program

The 1966 Workshop

The fifth Workshop of the African Mathematics Program was held at the Nyali Beach Hotel, Mombasa, Kenya from July 4 to August 13, 1966. Forty-four mathematicians and teachers (25 Americans, 17 Africans, 1 West Indian, 1 Englishman) participated in this six week period and a smaller group remained for an extra two weeks to make the texts ready for publication. A list of participants is appended.

Workshop Program and Production

This year there were three main working groups:

(a) The Primary Group which prepared a Pupils Text and Teachers Guide for Primary Five of the African elementary schools.

(b) The Secondary Group, subdivided into a Secondary 5 writing group preparing a text and teacher guide for the Form 5 of the African secondary schools, and a Secondary C2 Geometry and C3 Geometry writing group which continued and completed the additional writing necessary for the C program being developed for the four year secondary course.

(c) The Testing Group which, on the basis of pretesting and trial use, revised and modified Secondary One and Primary Three tests and wrote new tests for Secondary Four and Secondary C1, while also doing some preparatory work for a new test for Primary Four.

With the completion of Secondary Five and Secondary C2 Geometry and Secondary C3 Geometry, the program has now finished two separate Secondary courses, one for a five year course and one for a four year course, which prepare students for the O-level School Certificate of the West African Examinations Council and the Cambridge Overseas Examinations Syndicate.

The Primary Three test, which was revised, and a Secondary One experimentation test are designed to compare the mathematical knowledge and ability of pupils following an Entebbe course with that of pupils following traditional courses.

Additional Tasks

Professor Gleason (Harvard University), Professor Richmond (Williams College), Professor Pettis (University of North Carolina), and Dr. Williams (University of Lagos) joined the Workshop at the conclusion of the first residential period of the ABC Institute in Nairobi. In addition to preparing correspondence assignments for the ABC Institute, all four contributed to the Workshop endeavors. Professor Gleason prepared a review of some mathematical topics included in the primary group and gave a detailed review of some of the secondary material. Professor Richmond prepared an outline of the Additional Mathematics course on Calculus. Professor Pettis did some critical reading of the Secondary C materials, and Dr. Williams was very active preparing materials and making arrangements for the development of the program in Nigeria in the fall and winter.

Professor Hartley Rogers (M.I.T.), who attended the Workshop for eleven days, prepared an outline for the non-calculus part of an Additional Mathematics course. The outlines of Professors Rogers and Richmond are now being used as a basis for discussion and planning for the 1967 Workshop.

Workshop Events

Opening: The Workshop opened with a plenary session at which participants gave reports on the use of the Entebbe material in their countries. These reports were most encouraging and set a good tone for the first day of the Workshop. Mr. Sabwa, Provincial Education Officer (PEO), in the opening speech welcomed the participants to Mombasa and publicly instructed his officers to co-operate with the Workshop.

Co-Operation: The Provincial Officer was most co-operative throughout the Workshop, arranging for school visits, organising lectures and setting up experimental classes in the Fahari School, Mombasa, to use the Entebbe materials. In addition, arrangements for home and classroom visits were made to aid the pilot study on evaluation.

Steering Committee: A meeting of the African Mathematics Program Steering Committee was held on July 5. (Minutes mailed to USAID/Washington on October 20, 1966).

Lectures: The Provincial Education Office asked the Workshop to provide lecturers for two meetings of mathematics teachers, planned for July-August 1966. Professors Wirzup and Johnson delivered the two lectures and later, on request, made available transcripts which were to be distributed to schools in the Coast Province.

Weekly Seminars: During the course of the Workshop, there was a series of seminars at which individual participants led discussions on topics of general mathematical interest. The seminar topics were:

"Are Circles Similar?" by Prof. Paul Johnson, UCLA.

"Symmetry from an Algebraic Point of View" by Prof. Donald Ostberg, Indiana University

"Logic, Achilles and the Tortoise" by Dr. K. Lopez-Escobar, M.I.T.

"Symmetry in Motion" by Dr. Awadagin Williams, Fourah Bay College, Sierra Leone

"Some Thoughts About Tossing A Coin" by Prof. Hartley Rogers, M.I.T.

"The Publishing of Mathematics and the Mathematics of Publishing" by Mr. Robert Fouch, Science Research Associates, Chicago

"Rules for Computing Functions" by Prof. Paul Young, Reed College

"Calculus Made Easy" by Prof. Donald Richmond, Williams College

"The Book I Am Not Going To Write About the Workshop", (a commentary on the African Education Program) by Dr. Joachim Weyl, Special Assistant to the President of the National Academy of Sciences.

Professor Andrew Gleason of Harvard University gave a talk on his philosophy of education.

Evaluation: Miss Janet Levine, under direction of Professor Jerome Kagan of Harvard University, attended the Workshop for more than 4 weeks, using it as a base from which she could make investigations and gather information on which to base a judgment of the requirements for a broad evaluation of the African Mathematics Program. In the course of her stay at the Workshop Miss Levine visited and taught in classrooms, met with teachers and social workers, and had close contact with the "Wanawake Maendeleo," the Kenya women's organisation.

Visitors: The Workshop was particulary glad to welcome Dr. Joachim Weyl, visiting as a USAID consultant and as a member of the Research Advisory Committee, and Dr. Clifford Block, USAID - Research and Analysis Division. Their interest in the work did much to encourage the

participants and to reinforce their dedication to the program. Other USAID visitors were Dr. Konvolinka, Education Adviser, Malawi; and Dr. Anderson, Makerere University College. Mr. Brian Young, Director, Nuffield Foundation; Dr. Geoffrey Matthews, Director, Nuffield Primary Mathematics Program; Mr. J.E. Phythian, Head, Mathematics Department, University College, Dar es Salaam and a member of the Steering Committee, also visited the Workshop. A full list of the names of visitors is included in the participant list.

Local Publicity: The Workshop received mention in the local daily newspapers and in the East African Reporter, a national weekly magazine. This publicity, as well as that arising from the Nairobi ABC Institute, was generally favorable, and is best summarized in the enclosed article from the East African Reporter.

Conclusion

Towards the end of the Workshop Professor Martin, Chairman of the African Mathematics Program, and Mr. Hugh P. Bradley, Program Director, met with participants in country groups and discussed ways whereby the experiemental use of the Entebbe materials could be extended and the supervision improved.

It was clear in these discussions that the participants were enthusiastic about the work being undertaken and that much satisfaction had been obtained by their participation in the Workshop.

In general, the arrangements for the Workshop proved to be very satisfactory indeed. The earlier organisation, the arrangement of work during the period, the level and quantity of work produced, and the very happy co-operation and community of interest of the participants all combined to make 1966 one of the most successful and pleasant of Workshops.

EDUCATION

MODERN MATHS

New look at Nyali

An odd query received recently in the office of *Reporter* asked us where the American professors went in the summertime. In finding out we discovered that the answer to where the American mathematics professors go is simple — they come to Mombasa to do arithmetic.

In fact, 16 of them are currently hard at work on their arithmetic in Mombasa, supported by 30 other top educators from African countries and a dozen-strong secretariat. Normally the professors busy themselves with higher mathematics. This year they are doing Standard 5, primary and secondary work at their Mombasa workshop.

Every year they come to East Africa for their six-week vacation — and do a vital job for African education. Backed with funds from A.I.D and the Ford and Sloane Foundations they nestle on the sands at Nyali beach, stay at the Nyali Beach Hotel and in six weeks of hard labour work out a couple of new text books designed to teach Africans mathematics the modern way.

They also produce teaching aids for teachers, evaluate the results derived from the text books in the 800 classes in ten African countries in which they are in use, and generally mastermind reforms in mathematics teaching at the lower levels.

It all began in 1960, when the late Rev. Solomon B. Caulker, Vice-Principal of Fourah Bay College, in Freetown, Sierra Leone, discussed at a conference in Israel the possibility of applying the methods used in the development of a new physical science study committee's high school physics course, which is now being taught to 50 per cent of all high school students studying physics in the United States, to the development of improved curricula for African schools.

Mr. Caulker was killed in an air crash on his way home from the conference, but his idea was pursued by Dr. Jerrold R. Zacharias, Vice-President for Academic Affairs of Educational Services Inc., a non-profit-making organisation concerned with research in curriculum reform at all levels of education, from kindergarten to university level.

Kampala beginnings. Vacationing professors were hired, and the first African Summer Workshop was held in Kampala, in the summer of 1962. Its task was to produce modern mathematics textbooks for African five-year-olds in Primary Standard 1 and for Secondary school Standard 1.

They met again in Kampala the next year for Standard 2 work, and again in 1964, for Standard 3 work. Later, the venue was changed to Nyali, and ever since, the professors have been working through the grades.

And it will go on. Said the workshop chairman, Professor William Martin, who is head of mathematics at the Massachusetts Institute of Technology, "I don't think we will complete the basic writing until 1969, and then the feed backs and testing courses will take us over at least another two summer vacations."

Some of the professors have brought their wives with them for their working holiday. Two of them are combining their vacation tasks with belated honeymoons. One or two have even brought their children and turned them loose on the Nyali sands.

"But don't go away with the impression that the sponsors are not getting their pound of flesh", says Professor Martin. The educators are personally responsible for all travel and expenses of their wives and children.

Tight schedule. They also work. The working day begins at about 7 a.m., with mathematical discussions over breakfast. There are daily working sessions from 8 a.m. to 12.30 p.m. and from 2 p.m. to 4.30 p.m. and 6.30 p.m. to 8 p.m., after which on most evenings they meet for more general discussions. They are allotted 30 minutes a day, at lunchtime, for a dip in the Indian Ocean. They work a six-day week. Once a week they have an outing to Mombasa — the bus leaves Nyali at 4.30 p.m. and returns 90 minutes later.

Once during the six weeks they take a rest. They take a bus to the Tsavo National Park to gawk at elephants. They allow themselves one-and-a-half days for the trip, and even then they take their homework along with them.

"They are really dedicated", says Professor Martin's wife, Lucy: "The hotel ran a dance the other night. There were the locals enjoying themselves, but where were the professors? — They were spread all around here working out problems in trigonometry."

A change . . . "Before we started these workshops", said Professor Martin, "my wife and I used to take the kids for a month's vacation in the United States. This is such a contrast from higher mathematics, I go home a new man — absolutely fit. It has become so that I don't think I could last out the winter without doing this in the summer."

The wives enjoy Nyali too, and every year come back for more. They become involved in the work. They meet local school teachers who try out the workshops' theories on their pupils, and they find lots to keep them occupied.

The output of the workshops is vital to Africa's educational system. So far, the modern mathematics text books are being used in Kenya, Uganda, Tanzania, Ethiopia, Zambia, Ghana, Sierra Leone, Nigeria, Liberia and Malawi.

Altogether, since the programme started, the workshops have turned out 51 volumes of textual materials and some 650 teachers and teacher-educators have been introduced to these materials at institutes, and in courses. In addition, this year, in the University College, Nairobi, a two-year institute, known as the ABC Institute, has begun. It will continue through to about Easter, 1968, and is concerning itself with the mathematical education of the senior mathematics tutors of the ten participating countries.

Do-it-yourself. By the summer of 1968 each of these countries should have a small cadre of people who are knowledgeable about modern mathematics, capable of making adaptations of the materials to suit local conditions and ready with suitable material to undertake, in their own countries, the mathematical re-education of their fellow tutors in smaller colleges. These, in turn, will give suitable training to the teachers in the schools or about to enter the schools.

In 1967 the West African Examination Council will set a School Certificate Examination on the work of the Entebbe Mathematics Series, and the Cambridge Overseas Examination Syndicate has stated that when pupils present themselves, a suitable examination will also be offered in East and Central Africa.

The workshops' textbooks have also aroused considerable interest in other countries. Britain and the West Indies have already expressed a desire to try the books, and similar interest has been indicated in the United States, South America and Pakistan. Bechuanaland, Basutoland and Swaziland have asked to be supplied with books.

As Professor Martin summed it up: "Here we have for the first time American professors and teachers of mathematics, British officials, professors and teachers of mathematics, African Government officials, lecturers and teachers of mathematics — people from different nationalities, cultures and backgrounds working together harmoniously for the good of Africa and the progress of mankind."

STUDENTS' CONFERENCE

"Responsibility in Society"

More than 200 student leaders from more than 70 countries will assemble in Nairobi at the end of next week for the 12th International Student Conference — the largest student assembly ever held in Kenya and the most representative student event ever held on African soil.

The conference, at the University College, will have as its theme, "Students and University: Responsibility in Society", and will debate a wide range of political situations, including motions condemning racism and oppression in many parts of the world as well as matters of particular interest to students.

The organisers claim that the Nairobi conference will mark a significant step in the development of the I.S.C., which is the world's major student organisation.

In 1964, the I.S.C. Charter, a document embodying the fundamental beliefs and objects of I.S.C. members, was adopted as a basis for future action, the ideals of members being "a free university in a free society and world peace". Since the adoption of the Charter the I.S.C. Secretariat has condemned a military coup in Brazil, foreign intervention in the Dominican Republic, the die-

RESEARCH

PLANT HEALTH

International conference

"Disease does not care for political boundaries", said Kenya's Minister for Health, Mr. J. D. Otiende, when he opened the Inter-African Phyto-Sanitary Commission conference held in Nairobi last week. Members were meeting to discuss the control of transportation of plant materials.

The Commission is now a body of the O.A.U.'s Scientific and Technological Research Commission, but when it began in 1954 only countries South of the Sahara were admitted. This meeting in Nairobi was the first in which all countries belonging to the O.A.U. were concerned. Twenty-four of the 36 member States sent delegates to the conference, the largest to be held so far. Kenya, Uganda and Tanzania as well as E.A.C.S.O., the hosts, sent delegates.

Experts from such international bodies as the Food and Agricultural Organisation of the U.N. and the International Seed Testing Association also attended.

Mr. A. O. Odelola, the executive secretary for the S.T.R.C., told the Commission that members should "drastically improve" its whole machinery if they were to meet effectively the work for which the Commission was created. Africa wanted quick solutions to the many problems confronting agriculture and forestry.

The work is vitally important for African countries which depend on the land for their economy. "Because of our relatively late development, importations of plant material to Africa were relatively small", said Mr. Otiende. "Perhaps this explains why the continent is still free from some of the worst pests and diseases." He added, however, that expanding

Precautions vital. W
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Appendix B

1966 AFRICAN MATHEMATICS WORKSHOP

List of Participants

Co-Chairmen: Professor William Ted Martin, M.I.T., Cambridge, Massachusetts

Mr. Christopher Modu, West African Examination Countil, P.M.B. 1022, Yaba, Lagos, Nigeria

Dr. D. K. Abbiw-Jackson, College of Science and Technology, Kumasi, Ghana
Dr. Iya Abubakar, Ahmadu Bello University, Zaria, Nigeria
Miss Lucy Addy, Ministry of Education, P. O. Box 45, Accra, Ghana
Mrs. C. F. Adegoke, Abinding School, University of Ibadan, Ibadan, Nigeria
Mr. T. A. Agbaje, Ibadan Grammar School, Ibadan, Nigeria
*Professor Albert Beninati, University College, Dar es Salaam, Tanzania
Mr. Hugh P. Bradley, Program Director, African Education Program, E.S.I.
**Mr. Desmond Broomes, Institute of Education, Bridgetown, Barbados, West Indies
Professor Robert Dilworth, California Institute of Technology, Pasadena, California
Miss Donna Doyle, Educational Services Incorporated, Newton, Massachusetts
Professor George Feeman, Williams College, Williamstown, Massachusetts
Professor Ross Finney, University of Illinois, Urbana, Illinois
Professor Robert Fisher, Ohio State University, Columbus, Ohio
Professor Vincent Haag, Franklin and Marshall College, Lancaster, Pennsylvania
Professor Clarence Hardgrove, Northern Illinois University, De Kalb, Illinois
Mr. F. E. Dyck Harding, Milton Margai Training College, Freetown, Sierra Leone
Professor Shirley Hill, University of Missouri, Kansas City, Missouri
Professor William Houston, Antioch College, Yellow Springs, Ohio
Mr. Isaac Hunja, Kagumo School, Kiganjo, Kenya
Professor Paul Johnson, University of California, Los Angeles, California
Mr. Julius Jonah, Prince of Wales School, Freetown, Sierra Leone
Mr. M. Jones, Christ's Hospital, Sussex, England
Mr. H. Kanina, Ministry of Education, Nairobi, Kenya
Mr. Frank Kazembe, Ministry of Education and Social Dev., Private Bag, Limbe, Malawi
Mr. Michael Kinunda, Ministry of Education, Dar es Salaam, Tanzania
Professor Peter Lappan, Michigan State University, East Lansing, Michigan
Miss Janet Levine, Harvard University, Cambridge, Massachusetts
Dr. E. G. K. Lopez-Escobar, M.I.T., Cambridge, Massachusetts
Mr. Ransom Lynch, Phillips Academy, Exeter, New Hampshire
Mr. Wilson Mwaringa, Education Department, P. O. Box 7381, Mombasa, Kenya
**Mr. John Norris, Department of Education, Monrovia, Liberia
Mr. Japhet Nzioki, Mathematics Centre, Ministry of Education, P. O. Box 5881, Nairobi, Kenya
Mr. Robert L. N. Offurum, King's College, Lagos, Nigeria
Mr. P. A. Oguntunde, Comprehensive High School, Aiyetoro, West Nigeria
Mr. N. O. Oji, Government College, Owerri, East Nigeria
Professor Donald Ostberg, Indiana University, Bloomington, Indiana
Professor Alfred Putnam, The University of Chicago, Chicago, Illinois
Professor Hartley Rogers, M.I.T., Cambridge, Massachusetts

* Stipend not paid under AID contract
** Expenses and Stipend not paid under AID contract

Professor Merrill Shanks, Purdue University, Lafayette, Indiana
Mr. Henry Swain, New Trier Township High School, Winnetka, Illinois
*Mr. Spencer Swinton, Government Teachers College, Dar es Salaam, Tanzania
Mr. J. E. Modupe Taylor-Pearce, Secondary Technical School, Freetown, Sierra Leone
Dr. Onyerisara Ukeje, Institute of Education, University of Nigeria, Nsukka, Nigeria
Professor Paul White, University of Southern California, Los Angeles, California
Dr. Awadagin Williams, Fourah Bay College, Freetown, Sierra Leone
Professor Izaac Wirszup, The University of Chicago, Chicago, Illinois
Professor Paul Young, Reed College, Portland, Oregon

Visitors

Mr. James Aldrich, Educational Services Incorporated, Newton, Massachusetts
Miss Shushila Bakhda, Coast Teacher Training College, Kenya
Dr. Clifford Block, US AID, Washington, D. C.
Professor A. Gleason, Harvard University, Cambridge, Massachusetts
Professor J. Goldstein, Brandeis University, Waltham, Massachusetts
Mr. Mathenge, Provincial Commissioner, Coast Province, Kenya
Dr. Geoffrey Matthews, Nuffield Mathematics Project, London, England
Mrs. M. Neville, US AID, Zambia
Mr. J. E. Phythian, University College, Dar es Salaam, Tanzania
Mr. Sabwa, Provincial Education Officer, Coast Province, Kenya
Dr. J. Weyl, Assistant to the President, National Academy of Sciences, Washington, D. C.
Mr. B. Young, Nuffield Foundation, London, England
(and several officers of the Provincial Education Office, Coast Province, Kenya)

Staff

Mrs. Theresa Bradley, Administrator
Miss Gillian Hodge, Queen Elizabeth College, University of London, England, Office Manager
Miss Florence Steinberg, Educational Services Incorporated, Newton, Massachusetts, Assistant Administrator
Mr. Michael Akanji, University of Ibadan, Ibadan, Nigeria
Miss Annette Harrison, Lee College, Baytown, Texas
Miss Parin Kara, Mombasa, Kenya
Miss Patricia MacNeille, Educational Services Incorporated, Newton, Massachusetts
Mr. B. Robinson, Mombasa, Kenya
Mr. Neil Walker, Mombasa, Kenya

* Stipend not paid under AID contract

Appendix C

REPORT ON SECONDARY TESTING, AUGUST 1966

GENERAL

From the beginning of the Entebbe Secondary program, the Testing Group has addressed itself to two main goals: 1) the construction of test materials to aid in the teaching and evaluation of the Entebbe Secondary program, and 2) the preparation of model materials which would help the examination authorities to design appropriate School Certificate examinations to test students who have studied the Entebbe Series.

The following is a list of test materials to aid in the teaching and evaluation prepared to date:

2 forms of a Secondary One test,
2 forms of a Secondary C One test,
1 form of a Secondary One Experimental test,
4 forms of a Secondary Two test,
3 forms of a Secondary Three test, and
4 forms of a Secondary Four test.

Each form consists of 40 questions in a 5-choice multiple choice format.

Of these tests, only the Secondary One tests have been adequately pretested. The others will be pretested and revised as soon as a sufficient number of classes at the appropriate levels become available for testing. All but one of these tests are end-of-year tests designed exclusively to measure progress within the Entebbe program. The Secondary One Experimental test is neither in language nor content based on the Entebbe program. This test should be appropriate for almost all Secondary One classes using English as the medium of instruction. It is designed for use in studies comparing the Entebbe program with other programs.

Materials to be developed in the future will include, among others, a test for Secondary C Two and perhaps a test for Secondary Five, as well as Experimental tests appropriate for other levels.

To help prepare the way for the examination authorities to give examinations based on the Entebbe materials, a 5-year Syllabus, together with a specimen School Certificate Examination, has been presented to and accepted by the West African Examinations Council. The syllabus and specimen examination have also been sent to the Cambridge Examinations Syndicate. The Syndicate has written that O level examinations suitable to the Entebbe materials will be offered in East and Central Africa when needed.

THE 1966 WORKSHOP

The most urgent task performed by the Testing Group at the Workshop was the preparation of the specimen School Certificate Examination based on the Entebbe texts. A more adequate discussion of the importance of this task appears below in the section titled, "SCHOOL CERTIFICATE EXAMINATION."

In addition, the results of past testing activities were reviewed, and several new materials were produced. New tests based on the Secondary Four

and the Secondary C One texts were produced. The Secondary Four tests consist of entirely new items to be pretested, with the ultimate aim of having 2 pretested parallel forms of a test appropriate to Secondary Four. The Secondary C One tests consist mostly of revised versions of questions which have appeared in the Secondary One tests. Although these will be pretested this fall, it is hoped that no further revision of these tests will be necessary.

(Also, as mentioned in the report on Primary testing, Appendix D, some attention was devoted to tests for Primary III and Primary IV).

SECONDARY ONE TEST RESULTS 1965-66

Secondary One Test No. 1A was administered this past year to 617 pupils in 15 schools spread over 5 countries - Malawi, Nigeria, Sierra Leone, Tanzania, and Uganda. The average score was 15.0 out of a possible score of 40. This compares with an average score of 19.3 in the previous year. However, the classes tested in the two years differed considerably from one another. First, the previous year's test population was predominantly from the West African countries. Secondly, several of the classes in this year's test population were in the final year of primary school - whereas all of the previous year's test population were secondary school pupils who had survived the selection process which takes place at the end of primary school. In fact, only two schools - King's College, Budo, Uganda, and King's College, Lagos, Nigeria - had classes taking the test both years. (See the section titled PROBLEMS).

In this sample, there is evidence that the more novel aspects of the Entebbe program, such as dealing with numbers expressed in bases other than ten, were well received and adequately taught in most schools. However, other ideas, such as that of the number line, were not sufficiently covered in several of the classes tested. All questions relating to Geometry proved unexpectedly difficult for almost all the classes tested.

As is to be expected with such a low average score, some of the schools performed very poorly on almost all of the ideas - indicating that they were not appropriate classes for this test. However, the location of these classes did not follow any obvious geographical pattern.

For the first time, an item analysis was made for each class, and the results of this analysis were sent to the teachers. It is hoped that each teacher will use this analysis to identify those areas in which his class did poorly and to make the appropriate adjustments in his teaching.

A list of schools participating in the use of Secondary One Test No. 1A is given in Chart A of this report. A brief statistical summary of the test results, both by classes and in total, is given in Chart B. In addition, four of the test questions, together with selections from the item analysis, are given in Chart C. These questions were selected for their diversity of content, together with points of interest in the item analysis. Attention is called to the fact that the ranking of schools by the results of individual questions would be considerably different from the ranking by overall test results. These analyses should indicate some of the difficulties encountered in trying to interpret the results of the test.

In addition to the use of the regular Secondary One test, an attempt was made to use the Secondary One Experimental test to compare Entebbe classes and

non-Entebbe classes in West Africa. Complete data from this experiment is not yet available. However, the data presently available indicates that the classes participating were too varied in ability to make the totals meaningful. When this same experiment is tried in Tanzania and Liberia this fall, closer attention will be paid to selecting groups of more equal abilities. (See the next section).

PLANS FOR THE FUTURE

Several specific tasks are planned for the 1967 Workshop. A model School Certificate Examination will be prepared at the request of the West African Examinations Council. (See the section titled SCHOOL CERTIFICATE EXAMINATION). A test for Secondary C Two, and perhaps a test for Secondary Five are to be constructed. The tests for Secondary Two are to be revised in accordance with the results of the pretesting to be done this year, and the results of the Secondary C One testing will be examined and any needed modifications will be made.

The use of the Secondary One tests will be continued this year. According to present projections, these will be taken by 900 pupils in 5 countries. In November the Secondary C One tests are to be administered to 1200 pupils in Tanzania.

In addition, the Secondary One Experimental Test will be used in Tanzania and Liberia to study the effects of the Entebbe program. In Tanzania, groups of 10 classes each from the Entebbe program, the SMP program, and a "traditional" program will be compared. These groups will be selected by the Tanzania Ministry of Education and will be matched as evenly as possible in ability and background. In Liberia, the test will be administered to 10 Entebbe classes and 10 traditional classes, where the traditional classes will come from the same schools as the Entebbe classes. The results, taken on the basis of total score and item-by-item, should give some indication of the relative effectiveness of the Entebbe program.

Another attempt will be made to pretest the Secondary Two tests. Some Secondary Two tests were distributed for use this past year, but an insufficient number of classes participated. (See the following section).

It is hoped that there will be sufficient numbers of Secondary III classes available so that the Secondary Three tests can be pretested in the spring and fall of 1967. The tests for Secondary Four will be pretested as soon as a sufficient number of classes using the Secondary Four books are ready to be tested.

PROBLEMS

In any program which hopes to administer tests across an entire continent, a certain number of difficulties are bound to occur. Some of these are of a local or temporary nature and can be dismissed as merely cases of bad luck. However, over the years certain problems of administering the Entebbe tests have recurred which merit inclusion in this report.

One major problem has been obtaining sufficient information from the participating countries about classes which are appropriate for the tests. Too frequently, classes chosen for testing have either not completed a sufficient portion of the material or are using the material part time.

The solution to this problem lies in maintaining close communications with reliable persons in each country. Progress has been made in this direction, but there is still room for considerable improvement in communications. However, until such time as very large numbers of classes use the Entebbe materials full time and Ministries of Education press vigorously for a widespread use of tests, delays must be expected in the Entebbe testing program.

A second problem - one which has far-reaching implications for any attempt to make an honest evaluation of any program - is the great disparity in the relative abilities of different classes and different schools. Since there is a high turnover in teaching personnel at the Secondary level in all of the countries under consideration, the relative quality of a school can shift drastically in a very short time (say 2 or 3 years). Thus a small sample of classes or individuals must be very carefully chosen if it is to be representative of African schools as a whole - and it is questionable if such a sample is even possible. At this point, the number of schools using Entebbe secondary materials is so relatively small and varied in ability and background that there seems little hope that a small sample of these could be representative of the entire program. This problem, combined with the problem of communications mentioned before, makes the drawing of broad conclusions based on results of the tests that much more difficult. In the future, more attention must be paid to breakdowns of data by region, country and even school, rather than on an Africa-wide basis.

A related problem is the lack of a backlog of test data with which to make comparative judgments about present test results. In most African countries under consideration, the only standard examinations occur at the end of primary and at the end of secondary schools. These are brand new tests each year, with little or no attempt to relate the results to those of previous years. In most cases, the tests at the end of primary school are designed only to identify the top 10% or so of the pupils, and only these are allowed to go to secondary school.

Fortunately, several countries are beginning to show an interest in improving examinations and in doing a detailed analysis of examination results. As this interest increases and is acted upon, more and more data will become available. The administration of the same test in different years - such as the Entebbe program plans to do - would also help to increase the supply of test data available, and this would help make judgments based on test results more reliable.

SCHOOL CERTIFICATE EXAMINATION

One of the main factors that has held back the use of the Entebbe Secondary texts has been the lack of assurance to headmasters, teachers, and pupils that an appropriate School Certificate Examination in Mathematics would be available to pupils studying the Entebbe program. In fact, the relatively small number of Entebbe classes beyond the Secondary One level has been due in a large part to this lack of a clear public commitment by the examination authorities to supply an appropriate examination.

During the 1964 Workshop, a 5-year syllabus was prepared and submitted to the West African Examinations Council and the Cambridge Examinations Syndicate. This Syllabus was modified both in 1965 and 1966 to reflect modifications in the plans for writing the final years of the Entebbe Secondary texts. School Certificate Examinations are to be based on this Syllabus.

The West African Examinations Council requested the 1966 Workshop to supply a specimen School Certificate Examination based on the Entebbe Syllabus. This specimen examination, as written by the Testing Group, consists of two 2½ hour papers. Paper I consists of 60 short answer questions, while Paper II consists of longer questions. Paper II has two sections: Section I has 5 questions allowing no choice, and Section II has 7 questions of which the pupils may work any 4.

The specimen examination will be distributed by the West African Examinations Council to all the schools in Nigeria, Ghana, and Sierra Leone. With this, the Council will be reinforcing its earlier puplic commitment to offer an examination appropriate for Entebbe pupils.

The Cambridge Examinations Syndicate, which administers the School Certificate Examination in other African countries, has a policy of not making public commitments to issue an examination until such time as there are actually pupils in need of such an examination. However, the Syndicate has given repeated assurances that an examination will be made available as early as 1968 if needed. A representative of the Cambridge Syndicate took part in the 1966 Workshop and was a prime mover in the preparation of the specimen examination. (There was also a representative of Cambridge at the 1964 Workshop). The specimen examination will be made available to Cambridge for their information. In addition, copies of the specimen examination will be sent to all interested parties outside the jurisdiction of the West African Examinations Council.

As there will be some classes in Nigeria needing a School Certificate Examination based on the Entebbe program in the fall of 1967, the West African Examinations Council has requested the 1967 Workshop to prepare a model School Certificate Examination.

CHART A

LIST OF SCHOOLS PARTICIPATING IN SECONDARY TESTING PROGRAM, 1965-66

MALAWI

Blantyre Secondary School
Henry Henderson Institute, Blantyre

NIGERIA

Ibadan Boys High School, Ibadan
King's College, Lagos

SIERRA LEONE

Government Secondary School, Kenema

TANZANIA

Buhangita Boys School, Shinyanga
Buhangya Girl's School
Bumangi School
Kigurunyembe School, Morogoro
Moremba School
St. Joseph's Convent, Dar es Salaam
Temeke Primary School, Dar es Salaam
Uhuru Street Primary School, Dar es Salaam
Wailesi Primary School, Dar es Salaam

UGANDA

King's College, Budo

CHART B

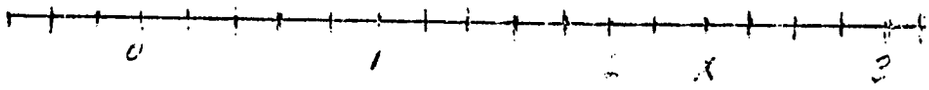
STATISTICS BY SCHOOLS

Rank (by mean score)	1st. Quart.	Median	3rd Quart.	Mean	S.D.
1	23	24	26	23.52	3.93
2	17	21	24	20.53	5.20
3	13	17	22	17.46	5.92
4	15	17	21	17.29	4.53
5	13	15	20.5	17.03	5.95
6	13	16	22	16.77	6.10
7	12	16	20	16.17	5.28
8	12	15	20.5	16.00	6.44
9	11	13.5	16	13.68	4.84
10	9	12	16	12.81	4.08
11	8	12.5	14	12.28	5.04
12	10	11.5	15	12.03	3.62
13	8	11	15	11.71	5.07
14	8	11	14	11.36	4.21
15	9	11	14	11.35	4.24
Total of all schools	10	14	19	15.00	6.05

CHART C

SELECTED QUESTIONS AND ITEM ANALYSIS DATA

Question No. 14.



The coordinate of the point labelled x on the number line above is

(A) $\frac{5}{12}$ (B) $\frac{2}{5}$ (C) $\frac{7}{5}$ (D) $\frac{12}{5}$ (E) $\frac{22}{5}$

****

Number of responses to:

A: 26 B: 155 C: 53 D: 316 E: 10

55 pupils did not respond to this item, but responded to some later item. 51% of the pupils responded correctly.

****

Rank of School	Per cent responding to No. 14 correctly
1	66%
2	60%
3	73%
4	63%
5	47%
6	65%
7	20%
8	43%
9	66%
10	63%
11	44%
12	50%
13	50%
14	38%
15	44%

Question No. 17.

A point Q is 25 miles due south of point P. Q is 13 miles due south of point O. How many miles is P from O?

(A) 12 (B) 13 (C) 19 (D) 25 (E) 38

* * * * * * * * * *

Number of responses to:

A: 276 B: 35 C: 13 D: 21 E: 212

57 pupils did not respond to this item, but responded to some later item. 45% of the pupils responded correctly.

* * * * * * * * * *

Rank of School	Per cent responding to No. 17 correctly
1	69%
2	64%
3	27%
4	47%
5	42%
6	42%
7	38%
8	47%
9	53%
10	42%
11	59%
12	33%
13	46%
14	38%
15	33%

Question No. 18

What is the product of $(32)_{five}$ and $(3)_{five}$ expressed as base five?

(A) $(51)_{five}$ (B) $(96)_{five}$ (C) $(101)_{five}$ (D) $(146)_{five}$

(E) $(201)_{five}$

* * * * * * * * * *

Number of responses to:

A: 41 B: 111 C: 114 D: 28 E: 227

93 pupils did not respond to this item, but responded to some later item. 37%of the pupils responded correctly.

* * * * * * * * * *

Rank of School	Per cent responding to No. 18 correctly
1	59%
2	27%
3	46%
4	61%
5	64%
6	45%
7	48%
8	37%
9	26%
10	28%
11	25%
12	37%
13	12%
14	21%
15	49%

Question No. 26.

What is the least common multiple of 44 and 55?

(A) 99 (B) 110 (C) 220 (D) 440 (E) 2420

* * * * * * * * * *

Number of responses to:

A: 52 B: 57 C: 237 D: 62 E: 147

57 pupils did not respond to this item, but responded to some later item. 39% of the pupils responded correctly.

* * * * * * * * * *

Rank of School	Per cent responding to No. 26 correctly
1	69%
2	60%
3	62%
4	11%
5	42%
6	29%
7	62%
8	57%
9	37%
10	40%
11	22%
12	40%
13	29%
14	14%
15	14%

Notes on item analysis:

1. By rank of school is meant its rank by mean score on this test.

2. All percentages of correct responses are based on the total of those responding to the question plus the total who did not respond to the question but did respond to some later question. For example, two of the original 617 pupils did not respond to No. 17 or to any later question, so that the per cent responding correctly to No. 17 is based on 615 pupils.

3. The information given here is merely a selection of, and not the complete, item analysis done.

Appendix D

REPORT ON PRIMARY TESTING, AUGUST 1966

During the 1965 Summer Workshop, the Testing Group prepared a collection of evaluative sequences which, it was hoped, would be appropriate for pupils finishing Primary III. Some of these sequences were designed to test arithmetical skills and basic mathematical knowledge, while others were designed to test the ability to do reasoning in a mathematical context. It had been planned to try out the sequences on an "in-depth" basis with the first African classes finishing Primary III during the fall and winter months. Unfortunately, the Primary III textbooks were late in arriving in Africa. As a result, the first African classes available for in-depth pretesting will be finishing Primary III during the fall of 1966.

In order to get some preliminary information on the suitability of the sequences they were given to some beginning Primary IV pupils in the United States during 1965-66. All of these pupils were in modern mathematics classes. On the basis of these preliminary results, considerable modification was made in the organization and content of the sequences.

Although there were no Primary III classes in Kenya using Entebbe materials, the 1966 Workshop did have access to some Primary III classes using traditional texts and taught in English. In order to test the suitability of the language used, several of the sequences were given to selected students from these classes by Professor Shirley Hill. As expected, some of the mathematical ideas covered were outside the training of these pupils. However, it became apparent that the language of these instructions was not clear to the pupils. Furthermore, it appeared that the format of the instructions was not a natural one for the African test administrator. Thus the language of these sequences was completely revised during the latter part of the Workshop.

According to present plans, approximately 50 pupils in Ghana and 50 pupils in Malawi will be given the revised sequences on an in-depth basis this fall. Miss Lucy Addy will administer the sequences in Ghana, and Mr. Frank Kazembe will administer the sequences in Malawi. If the in-depth studies indicate that the sequences are appropriate for use in evaluating the Primary program, the sequences will be combined into tests which will be pretested on a larger scale during the spring months in Ghana, Malawi, and possibly Nigeria.

In addition to the work on the Primary III sequences, the Testing Group began preparing questions for an end-of-year evaluation examination for Primary IV. Since the final form for this examination will depend upon the results of the in-depth testing for Primary III, the actual construction of this test will be a task for the 1967 Testing Group.

Appendix E-1

Report of the

Fourth Annual Accra Seminar in Mathematics

Conducted at the University of Ghana from August 29 to September 10, 1966, for 18 head teachers and 32 primary teachers from primary schools in Accra, under the auspices of the Ghana Ministry of Education and Educational Services Incorporated.

Objective of the Seminar: To prepare the participants to teach the Entebbe Primary Four Programme to pupils moving up from Entebbe Primary Three in the coming school term.

Programme:

29 lectures on the mathematics in Entebbe Primary Four;
19 tutorial sessions for each of five groups;
2 demonstration lessons with a Primary Three class;
2 plenary sessions;
3 film shows (strictly for entertainment).

Daily Schedule:

8:00 - 9:00 Lecture
8:10 - 10:00 Lecture
10:00 - 10:30 Coffee
10:30 - 12:00 Tutorial groups
2:30 - 3:30 Lecture
2:30 - 3:30 Demonstration lessons on Sept. 1 and Sept. 6
3:40 - 4:30 Tutorial groups
(On Saturdays, one lecture and one tutorial session)

Staff:

Director - Miss Lucy L. Addy, Ministry of Education
Demonstrators - Miss Laura Nutakor, South Labadi Rd. Estate Primary School, Accra
Mrs. Salone Annan, K'borg Presbyterian Girls' Primary School, Accra
Tutors - Miss Deborah Beaman, Peace Corps teacher in Kadjebi Secondary School, Kadjebi, Ghana
Miss Joan Curtin, Peace Corps teacher in Ofori Pannin Secondary School, New Tafo, Ghana
Miss Judith Harle, Peace Corps teacher in St. Louis Secondary School, Kumasi, Ghana
Mr. John Kennedy, Peace Corps teacher in Peki Secondary School, Peki, Ghana
Miss Ellen LaRue, Peace Corps teacher in OLA Secondary School, Ho, Ghana
Official Guests - Mr. J. W. L. Mills, Chief Education Officer
Mr. J. L. Anang, Deputy Chief Education Officer
Mr. I. N. Atiase, Deputy Chief Education Officer

Official guests: - Mr. A. K. Kitcher, Principal Education Officer
Miss Addison, Regional Education Officer
Mr. Thompson, District Education Officer
Mr. E. F. Laing, General Manager of Anglican Schools
Mr. Nortey, General Manager of Roman Catholic Schools

Lecturers - Mr. T. Q. Armar, Headmaster, West Africa Secondary School, Accra
Mr. V. Haag, Franklin and Marshall College, U.S.A.

Accommodations: All participants and tutors lived and had their meals in the beautiful Mensah Sarbah Hall. All lectures, tutorials and demonstrations were held in the lecture halls and seminar rooms of Mensah Sarbah. The rooms, the meals and the working accommodations were quite satisfactory, and no complaints were heard on any count. Pupils from the South Labadi Rd. Estate Primary School were transported by bus to Mensah Sarbah for the two demonstration lessons.

Materials: Each participant received at least a month before the seminar a copy of Entebbe Primary Four Teachers' Guide and Pupil Book. In addition, copies of the Teachers' Handbook and Basic Concepts, Volumes I, II, III were available for supplementary reading. The teachers were also given sets of supplies with which to make apparatus and teaching aids.

Scope of Lectures: All the lectures pertained directly to the mathematical content of Entebbe Primary Four. Of these, 16 were devoted to topics in the arithmetic of whole numbers, fractions and integers (Units 1,2, 4,5,7,8,9,10,12,13,14,16,17,18,21), 10 lecture dealt with geometry (Units 3,6,11,15,19), and 2 lectures touched on elementary statistics (Unit 20). Mr. Armar gave one lecture in which basic concepts were summarized.

Role of Tutorials: The participants were separated into five groups of ten, with the head teachers distributed about equally among the groups. In each group one head teacher was designated as leader and a Peace Corpsman served as tutor. Each day the tutorial groups met twice, a total of at least 2 1/2 hours, to discuss ideas raised in the preceding lectures, to solve the problems in the Primary Four Pupil Book, to make teaching apparatus for the coming term, and to plan typical lessons.

After the first day of the seminar the participants became at ease and talked and questioned freely in their tutorial sessions. Their extremely cooperative and searching spirit made the tutorial sessions the most valuable part of the seminar. In each group a genuine educational experience took place; the teachers taught each other the content of the Primary Four course by asking questions of each other, carrying on demonstrations of the ideas using concrete teaching aids, and finding their own areas of misunderstandings or lack of information. In this process the leaders played a prominent

Role of Tutorials:
role; they patiently guided the discussions and the questioning. With wisdom beyond their years the Peace Corps tutors allowed the leaders to control the direction of the discussion; the tutors acted as resource personnel, filling in where the discussions bogged down on a point of mathematics. Together they achieved an efficient working arrangement that was a pleasure to all.

Reaction of Participants: Any appraisal of the reaction to the seminar must be colored by the high morale and enthusiasm shown at all times by the participants. Never has the writer experienced anything like it. Due to the arrangements made by Miss Addy the teachers were so comfortable, so well fed, and so pleased with the Primary Four materials that many of them considered the seminar as a two-week working party. It is difficult to see through this euphoria and detect the actual reactions.

A good guess would be that the teachers were relieved to find that their reading was restricted to the Primary Four Text and the Handbook. They found that their attention could be concentrated on the actual materials they were preparing to teach. There was no need to make a transfer from a general mathematical discussion to the specific content of the Primary Four course. Thus, they were able to read the materials in detail, unit by unit, and listen to talks directed to each topic. In fact, the lecturer many times taught the activities of Primary Four to the teachers just as suggested in the Guide. Then in the tutorials the teachers repeated the lessons to pick out and master the fine points.

In spite of high morale and hard work, a few of the teachers showed only a marginal amount of understanding of the ideas. They were identified and will be helped during the school term by their head teachers (who showed the best understanding), and by Miss Addy. The majority of the teachers should do quite well.

There is no doubt that the participants came to the seminar with healthy attitudes about the Entebbe program. There was not the usual battle of winning them over to a new way of thinking about teaching mathematics. This is no doubt a result of the on-going nature of the Entebbe Primary experiment in Ghana, with each year a new teacher in each participating school being brought into the project. Each year the morale improves, and each year a new teacher is indoctrinated into the spirit of the project. By the end of the seminar, in the closing plenary session, the spokesmen for the group drew prolonged cheers when they pictured the experiment as the wave of the future of mathematics in Ghana.

Reaction of Ministry: The enthusiasm of the participants was not missed by the ministry representatives who visited various sessions of the seminar. In particular, Deputy Chief Anang, in his remarks at the opening session, and Chief Education Officer Mills, in his speech at the closing session, made statements that showed sympathy for the philosophy and content of the Entebbe program and implied a guarantee that the experiment will be carried to completion.

In a conference on September 10, attended by Mr. Mills, Mr. Armar, Miss Addy, Mr. Kline (Head of the Peace Corps in Ghana) and Mr. Haag, preliminary arrangements were made for the Entebbe books to be used in a few selected training colleges where Peace Corps volunteers will be assigned after their training by E. S. I.

Evaluation and Recommendations:

1. The choice of materials for the seminar was a happy one. In any future seminar designed to give inservice training to teachers using the Entebbe materials, I would always use the Entebbe Primary books themselves as the training materials. This was more satisfactory for the purpose than using the Basic Concepts volumes, since the Primary texts contain enough background mathematical information and are not as rambling and wordy as the Basic Concepts.
2. The balance between lecture-discussions and tutorials was about right. I would continue on the same basis.
3. The two demonstration classes were effective because each was taught by a participant and each showed that children really can learn and enjoy learning in the language and style of the Entebbe program. Part of the impact of the teaching lessons was also due to the timing of the lessons to fit the topics being discussed in the lectures. I would recommend that whenever possible, demonstrations be given by participants and not more than two or three be given.
4. About one-third of the participants had been to previous seminars, and the rest were experiencing the Entebbe approach for the first time. This seemed to be a good arrangement, for it gave stability and continuity to the enterprise from the very first day of the seminar and it created a healthy helper-learner situation. (Indeed, on the first day the lecturer needed to caution the veterans to forego answering questions and allow the newcomers to make the responses; thereafter, the helper-learner attitude prevailed.)
5. It appears that during the past four years the seminars at Accra have evolved to a point where I would recommend no changes for the future, except to improve the calibre of the lectures.

V. Haag
Dept. of Mathematics
Franklin & Marshall College
Lancaster, Pa.

Fourth Annual Accra Seminar in Mathematics

Roster of Participants

Group 1

Group leader: Mr. J.A. Tagoe*
Tutor: Miss Ellen LaRue

Mr. J. O. Wilson*
Mr. S. S. Odonkor*
Mrs. Catherine Hagan*
Mrs. Victoria N. Nortey
Mrs. C. A. Blagogee
Mrs. Marian Fergusson
Mrs. G. Asihene
Mrs. R.W. Adofey
Mrs. E.V. Bruce-Amartey

Group 2

Group leader: Mrs. Salome Annan*
Tutor: Mr. John Kennedy

Mr. E.K. Lamptey*
Mr. J.O. Barnor*
Mr. I.N. Borlabi*
Mrs. Comfort Labi
Mrs. Norah S. Torkornoo
Mr. H.A. Tagoe
Mr. F. T. Quarcoo
Miss V. Adjei
Mrs. Philomena Owusu-Ansah

Group 3

Group leader: Mr. G.Q.F. Ashong*
Tutor: Miss Judith Harle

Mrs. Augustine Sackeyfio*
Mr. A.E.M. Laate*
Mr. J.Q. Ayetley*
Miss Juliana Boye
Mr. E.B. Dankwa
Mrs. E. Bradful
Mrs. Cecilia Bobson
Miss Eunice Tackie
Miss Mercy Aborhey

Group 4

Group leader: Mr. E.W.L. Jones*
Tutor: Miss Deborah Beaman

Mr. A.K. Nuworkpor*
Mr. C.J. Botwe*
Miss Justina Simpiny
Mr. M.N. Palm
Miss Esther Tetteh
Miss Florence Padi
Miss Beatrice Onoky
Mrs. Wilhemina Agbenu
Miss Laura Nutakor

Group 5

Group leader: Mrs. Theodosia Ako Adjei*
Tutor: Miss Joan Curtin

Mr. R.B. Aryee*
Mrs. Diana Tetteh
Mr. E.S.K. Obilie*
Mrs. Julia Amanoo
Mrs. Essie Arthus
Mr. Fynn
Mr. Anuah
Mrs. J.O. Agyemfra
Mrs. Agnes Arthus

* Head teachers

Appendix E-2

Report of the

Entebbe Mathematics Easter Course (April 12 - 19, 1966)

at the Freetown Secondary School for Girls

The course started with a formal opening ceremony which was presided over by Mr. Edmund Cole, Principal Education Officer, Ministry of Education. He was deputising for Mr. V. O. Young, Chairman of the Board of Teacher Training. Mr. Young was unable to attend because of an urgent meeting called by the Office of the Prime Minister.

Among those present at this ceremony were Mrs. E. Hyde, Miss S. Leopold and Miss M. Stuart, all of the Ministry of Education, and some thirty Primary School Teachers (including Head Teachers). A few schools apparently did not receive their invitations to the course.

Mr. Taylor-Pearce introduced the Chairman. The Chairman in his opening speech welcomed everyone and urged teachers to take an interest in the programme, so that it will spread to all the schools. He was glad that such a course had been organised and assured all that the Ministry is taking a keen interest in the programme. He wished all success and hoped that something similar will be extended to the Provinces and be held regularly.

Mr. D. Harding gave a brief history of the Entebbe Mathematics, and Mr. Julius Jonah gave a review of the Entebbe Mathematics Programme in Sierra Leone. Coffee break followed this review after which teachers who were using Entebbe Materials gave individual progress reports. Mr. Harding in the chair invited questions and comments after each report.

The teachers were then divided into two groups:

(a) those who have been teaching the Entebbe Materials and had at one time or the other attended a similar course,
(b) those who have had no previous experience with the materials.

Dr. Simbo and Mr. Jonah were in charge of the first group. The texts used with this group at the course were:

(i) Teachers Handbook Primary I - III
(ii) Basic Concepts Volumes I and III

The work each day was shared between Dr. Simbo and Mr. Jonah as shown in the time table below:

9 a.m.	10:30 a.m.	Lecture on Arithmetic by Mr. Jonah
11 a.m.	12:30 p.m.	Lecture on Geometry by Dr. Simbo
1:30	2:30	Discussion with half of the group (sub group A) on Teaching Methods and teachers difficulties on topic of Mornings Lecture led by Mr. Jonah
1:30	2:30	Similar discussion as above with the other half of the group (sub group B) led by Dr. Simbo.
2:30	3:30	Similar discussion as above but with sub group B led by Mr. Jonah.
2:30	3:30	Similar discussion with sub group A led by Dr. Simbo

Homework assignments were set each day on the topic of the day's lecture. These assignments were discussed during the afternoon sessions.

The Outline below was used as a basis of Mr. Jonah's lectures:

1. Revision and extension of whole numbers
2. Revision and extension of Techniques of Addition of whole numbers
3. Properties of Addition of whole numbers
4. Revision and extension of Techniques of Subtraction
5. Revision of meaning of Multiplication
6. Revision and extension of Techniques of Multiplication of whole numbers
7. Properties of Multiplication of whole numbers
8. Set s of numbers: Factors, Multiples.
9. Revision of Meaning of division of whole numbers
10. Introduction to techniques of division of whole numbers
11. Revision of fractions
12. Introduction and techniques of Addition and Substraction of Fractions
13. Applications

In Geometry, Dr. Simbo dealt with Plane Figures and Symmetry.

The teachers showed considerable interest and appreciation and were very keen on an early follow up to the course.

Mr. Harding and Mr. Taylor-Pearce were in charge of the second group. Mrs. M. Greene gave demonstration lessons to the second group and also organized classes in apparatus making.

The Demonstration lessons were held each day at 2·00 p.m. Fifteen girls from F.S.S.G. Infants, drawn from the Nursery and Class I formed the class. The participants in the second group watched Mrs. Greene teach the children for 30 minutes. After each class, the lesson was criticised and discussed. It was an open discussion

Since it was a short course and they were all children who had never used the material, we only dealt with the first two units of Primary I Volume I. By the end of the course, the pupils were able to describe sets, compare sets and name the members of a set. They were so keen that some of them brought materials to form sets. In the last two lessons some time was left for them to draw empty set and sets with other members. They all came regularly and thoroughly enjoyed themselves. On the last day they were treated to sweets, biscuits and minerals.

This second group also had sessions of apparatus making with Mrs. Greene.

On the final day a plenary session, presided over by Mr. Harding, was held and the teachers had the opportunity of giving their views and impressions of the course. This was followed by a vote of thanks by the Chairman to all those who had helped in the arrangements and in the running of the course.

This final session was preceded by two group photographs, one of which included the demonstration class.

Report compiled by F. B. Harding and
Mrs. M. Greene

Participants
Entebbe Mathematics Course, Freetown Secondary School for Girls
April 12 - 19, 1966

Group (a)

1.	Miss R. H. Coker	Freetown Secondary School for Girls
2.	Miss A. Thomas	Tower Hill Municipal School
3.	Mrs. N. E. Thomas	Njala Practising School
4.	Miss M. A. Forsythe	Tower Hill Municipal School
5.	Miss H. Roberts	Buxton Infants
6.	Mrs. R. L. Elliott	Tower Hill Municipal School
7.	Mrs. O. Benjamin	Tower Hill Municipal School
8.	Miss S. Thomas	Tower Hill Municipal School
9.	Mrs. M. E. Coker	Syke Street Municipal School
10.	Miss O. Taylor	Tower Hill Municipal School

Group (b)

1.	Mrs. Victoria King	Freetown Secondary School for Girls Primary
2.	Mrs. Janet Bernard-Jones	International School
3.	Mrs. O. V. M. Bailor	Njala U.C. Exper. School
4.	Mr. J. F. Sao-Ngagba	Njala U.C. Exper. School
5.	Mr. A. B. Sesay (Headmaster)	Govt. Practising School Magbwaka
6.	Mrs. F. Kemokai	F.S.S.G. Primary
7.	Miss H. Wright	F.S.S.G. Primary
8.	Miss M. A. Forsythe	Tower Hill Municipal School
9.	Miss L. Johnson	Tower Hill Municipal School
10.	Miss A. M. Williams	Tower Hill Municipal School
11.	Miss J. L. Randall	Women Teachers College Port Lokkoh
12.	Mrs. V. C. Agbage	Buxton Infants School
13.	Mrs. Elizabeth Hyde	Ministry of Education
14.	Mr. R. E. Mondel	Teacher Training College Magbwaka
15.	Mr. B. A. Koroma	Govt. Practising School Magbwaka
16.	Mrs. L. Harding	F. B. C. School
17.	Mr. P. Hazeley (Headmaster)	Syke Street Municipal School

Entebbe Mathematics--Primary II Volume II

Tower Hill Municipal School Class IIIA 40 pupils

On the whole the children find the course very interesting. They take pleasure in their work. But individually, the children vary in their absorption of the various aims that the course is designed to impart. A few of them are beaten by exercises in which computations horizontally are involved as in pages 151 and 144 The same exercises arranged vertically as in pages 130 and 145 present very little difficulty to the same children. If the intention of the compilers is to get the children to be familiar with both arrangements of figures for computation, I should say that this aim is not altogether defeated. Many of the children in the class enjoy doing both methods and in our Free Activity, some attempt not only figures involving tens and ones, but thousands, hundreds, tens and ones.

To make up for class III standard, I sometimes include word problems in the figures given for addition. Children do these for Home-Work.

A positive gain to the children is the section where children insert mathematical symbols for "Greater than," "Less than" and "Not equal to." The dexterous introduction of Algebraic simple equations in Unit Five is marvelous. I commend it strongly because many of the children enjoy it. Also to be commended is the simple Geometry introduced in Units Five and Eleven. In attempting this section of our work we used oranges, strips of paper, bottle tops and the children themselves as teaching aids in discovering the meaning of the fractions suggested in the book.

We however had some difficulty in folding our strips of paper to show one-third. The greater difficulty was in the drawing of the figures for showing fractions in our individual classwork book, as we are not supposed to work in our Pupil textbook. Children found it difficult to give accurate representation of the figures. The teacher had to draw for many of them.

I do feel that teachers will find the Teacher's Guide very helpful. I personally like it and the hints and direction it gives.

O. Benjamin
Class Teacher
Class IIIA

Appendix F

African Mathematics Program

Reporting Form

April 1966

Number of classes currently using Entebbe Mathematics Series materials:-

Primary 1	[illegible]	Secondary 1	1	Basic Concepts Vol. 1	--
Primary 2	[illegible]	Secondary 2	1	Basic Concepts Vol. 2	--
Primary 3	14	Secondary 3	--	Basic Concepts Vol. 3	--
Primary 4	--	Secondary 4	--	Basic Concepts Vol. 4	--
		Secondary C-1	--		

2. a) Reports from teachers indicate the following opinions:-

	Too easy	Suitable	Too Difficult
Primary 1 materials are		✓	
Primary 2 " "		✓	
Primary 3 " "		✓	
Primary 4 " "			
Secondary 1 " "		✓	
Secondary 2 " "		✓	
Secondary 3 " "			
Secondary 4 " "			
Secondary C-1 " "			
Basic Concepts, Vol. 1 is			
Basic Concepts, Vol. 2 is			
Basic Concepts, Vol. 3 is			
Basic Concepts, Vol. 4 is			

b) Reports from teachers indicate the Entebbe Mathematics Series is

✓ better than
____ as good as traditional texts.
____ not so good as

3. a) We think that if teachers were suitably trained, "modern" mathematics should be taught in ____ some ✓ all of our primary schools, ____ some ____ all of our secondary schools.
____ none ____ none

b) We would like the Basic Concepts books to be used in ✓ some ____ all of our training colleges.
____ none

4. a) The Entebbe Primary materials can be used in our schools
____ without any adaptation
✓ with minor adaptation
____ with major adaptation

b) The Entebbe Secondary materials can be used in our schools
____ without any adaptation
✓ with minor adaptation
____ with major adaptation

c) The Entebbe Basic Concepts books can be used in our training colleges
____ without any adaptation
____ with minor adaptation
____ with major adaptation

5. We ✓ need ____ do not need Modern Mathematics Text material for the Additional Mathematics course beginning in Form 3 (or 4).

6. The following kinds of assistance would speed the widespread use of Modern Mathematics in our schools and colleges: _____

Name: ..... Official Position .....

Address: .....

..... Date .....

RETURN AIR MAIL TO:

MR. HUGH P. BRADLEY
AFRICAN MATHEMATICS PROGRAM
EDUCATIONAL SERVICES INCORPORATED
55 CHAPEL STREET
NEWTON, MASSACHUSETTS 02158

3622-66

African Mathematics Program

Reporting Form

April 1966

Number of classes currently using Entebbe Mathematics Series materials:-

Primary 1 _____	Secondary 1 _____	Basic Concepts Vol. 1 _____
Primary 2 62	Secondary 2 _____	Basic Concepts Vol. 2 _____
Primary 3 _____	Secondary 3 _____	Basic Concepts Vol. 3 _____
Primary 4 _____	Secondary 4 _____	Basic Concepts Vol. 4 _____
	Secondary C-1 _____	

2. a) Reports from teachers indicate the following opinions:-

	Too easy	Suitable	Too Difficult
Primary 1 materials are			
Primary 2 " "			Difficult
Primary 3 " "			
Primary 4 " "			
Secondary 1 " "			
Secondary 2 " "			
Secondary 3 " "			
Secondary 4 " "			
Secondary C-1 " "			
Basic Concepts, Vol. 1 is			
Basic Concepts, Vol. 2 is			
Basic Concepts, Vol. 3 is			
Basic Concepts, Vol. 4 is			

b) Reports from teachers indicate the Entebbe Mathematics Series is

✓ better than
_____ as good as traditional texts.
_____ not so good as

3. a) We think that if teachers were suitably trained, "modern" mathematics should be taught in
   ✓ some / all / none of our primary schools,
   ✓ some / all / none of our secondary schools.

   b) We would like the Basic Concepts books to be used in
   ✓ some / all / none of our training colleges.

4. a) The Entebbe Primary materials can be used in our schools
   ____ without any adaptation
   ____ with minor adaptation
   ✓ with major adaptation

   b) The Entebbe Secondary materials can be used in our schools
   ____ without any adaptation
   ____ with minor adaptation
   ____ with major adaptation

   c) The Entebbe Basic Concepts books can be used in our training colleges
   ____ without any adaptation
   ✓ with minor adaptation
   ____ with major adaptation

5. We ✓ need Sample copies only / ____ do not need Modern Mathematics Text material for the Additional Mathematics course beginning in Form 3 (or 4).

6. The following kinds of assistance would speed the widespread use of Modern Mathematics in our schools and colleges: _____

Name: G. P. Chuck ..... Official Position [illegible]

Address: Curriculum Development Centre, P.O. Box 30231 Nairobi

..... Date 5/4/66

RETURN AIR MAIL TO:

MR. HUGH P. BRADLEY
AFRICAN MATHEMATICS PROGRAM
EDUCATIONAL SERVICES INCORPORATED
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3622-66

African Mathematics Program

Reporting Form

April 1966

Number of classes currently using Entebbe Mathematics Series materials:-

Primary 1	9 14	Secondary 1	7 9	Basic Concepts Vol. 1	3
Primary 2	12	Secondary 2	9	Basic Concepts Vol. 2	3
Primary 3	5	Secondary 3	2	Basic Concepts Vol. 3	3
Primary 4	-	Secondary 4	-	Basic Concepts Vol. 4	-
		Secondary C-1	-		

2. a) Reports from teachers indicate the following opinions:-

	Too easy	Suitable	Too Difficult
Primary 1 materials are		X	
Primary 2 " "		X	
Primary 3 " "		X	
Primary 4 " "		–	
Secondary 1 " "		X	
Secondary 2 " "		X	
Secondary 3 " "		X	
Secondary 4 " "		–	
Secondary C-1 " "		–	
Basic Concepts, Vol. 1 is		X	
Basic Concepts, Vol. 2 is		X	
Basic Concepts, Vol. 3 is		X	
Basic Concepts, Vol. 4 is		–	

b) Reports from teachers indicate the Entebbe Mathematics Series is

X better than
____ as good as traditional texts.
____ not so good as

3. a) We think that if teachers were suitably trained, "modern" mathematics should be taught in ___ some / X all / ___ none of our primary schools, ___ some / X all / ___ none of our secondary schools.

b) We would like the Basic Concepts books to be used in ___ some / X all / ___ none of our training colleges.

4. a) The Entebbe Primary materials can be used in our schools
___ without any adaptation
X with minor adaptation
___ with major adaptation

b) The Entebbe Secondary materials can be used in our schools
X without any adaptation (very minor)
X with minor adaptation
___ with major adaptation

c) The Entebbe Basic Concepts books can be used in our training colleges
X without any adaptation
___ with minor adaptation
___ with major adaptation

5. We X need / ___ do not need Modern Mathematics Text material for the Additional Mathematics course beginning in Form 3 (or 4).

6. The following kinds of assistance would speed the widespread use of Modern Mathematics in our schools and colleges: Films involving teaching methods, demonstration classes as well as additional content. Other material dealing with class presentation, short projects and supplementary exercises to help teachers in both understanding the subject and also presenting it better.

Name: [illegible] Official Position Director of Textbook Research

Address: Department of Education, Monrovia, Liberia

Date May 6, 1966

RETURN AIR MAIL TO:

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AFRICAN MATHEMATICS PROGRAM
EDUCATIONAL SERVICES INCORPORATED
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African Mathematics Program

Reporting Form

April 1966

Number of classes currently using Entebbe Mathematics Series materials:-

Primary 1	11	Secondary 1		Basic Concepts Vol. 1	11
Primary 2	6	Secondary 2		Basic Concepts Vol. 2	6
Primary 3	5	Secondary 3	3	Basic Concepts Vol. 3	3
Primary 4		Secondary 4		Basic Concepts Vol. 4	
		Secondary C-1			

2. a) Reports from teachers indicate the following opinions:-

		Too easy	Suitable	Too Difficult
Primary 1 materials are			✓	
Primary 2 " "			✓	
Primary 3 " "			✓	
Primary 4 " "				
Secondary 1 " "			✓	
Secondary 2 " "			✓	
Secondary 3 " "	[illegible]			
Secondary 4 " "				
Secondary C-1 " "				
Basic Concepts, Vol. 1 is				
Basic Concepts, Vol. 2 is				
Basic Concepts, Vol. 3 is				
Basic Concepts, Vol. 4 is				

b) Reports from teachers indicate the Entebbe Mathematics Series is

✓ better than
____ as good as traditional texts.
____ not so good as

3. a) We think that if teachers were suitably trained, "modern" mathematics should be taught in ____ some / ✓ all of our primary schools, ✓ some / ____ all of our secondary schools.
____ none / ____ none

b) We would like the Basic Concepts books to be used in ____ some / ✓ all of our training colleges. ____ none

4. a) The Entebbe Primary materials can be used in our schools
____ without any adaptation
✓ with minor adaptation
____ with major adaptation

b) The Entebbe Secondary materials can be used in our schools
____ without any adaptation
✓ with minor adaptation
____ with major adaptation

c) The Entebbe Basic Concepts books can be used in our training colleges
____ without any adaptation
✓ with minor adaptation
____ with major adaptation

5. We ____ need / ____ do not need Modern Mathematics Text material for the Additional Mathematics course beginning in Form 3 (or 4).

6. The following kinds of assistance would speed the widespread use of Modern Mathematics in our schools and colleges: [illegible]

Name: [illegible] Official Position [illegible]

Address: [illegible]

[illegible] Date [illegible]

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3622-66

African Mathematics Program

Reporting Form

April 1966

Number of classes currently using Entebbe Mathematics Series materials:-

Primary 1 ___1___	Secondary 1 ___4___	Basic Concepts Vol. 1 _____
Primary 2 _____	Secondary 2 _____	Basic Concepts Vol. 2 _____
Primary 3 _____	Secondary 3 _____	Basic Concepts Vol. 3 _____
Primary 4 _____	Secondary 4 _____	Basic Concepts Vol. 4 _____
	Secondary C-1 _____	

2. a) Reports from teachers indicate the following opinions:-

	Too easy	Suitable	Too Difficult
Primary 1 materials are			
Primary 2 " "			
Primary 3 " "			
Primary 4 " "			
Secondary 1 " "			
Secondary 2 " "			
Secondary 3 " "			
Secondary 4 " "			
Secondary C-1 " "			
Basic Concepts, Vol. 1 is			
Basic Concepts, Vol. 2 is			
Basic Concepts, Vol. 3 is			
Basic Concepts, Vol. 4 is			

b) Reports from teachers indicate the Entebbe Mathematics Series is

___1___ better than
_____ as good as traditional texts.
_____ not so good as

-1- 3 classes are in the Pilot Schools that are [illegible] [illegible]

3. a) We think that if teachers were suitably trained, "modern" mathematics should be taught in _____ some / _____ all of our primary schools, _____ some / _____ all of our secondary schools. _____ none / _____ none

b) We would like the Basic Concepts books to be used in _____ some / _____ all of our training colleges. _____ none

4. a) The Entebbe Primary materials can be used in our schools
_____ without any adaptation
_____ with minor adaptation
_____ with major adaptation

b) The Entebbe Secondary materials can be used in our schools
_____ without any adaptation
_____ with minor adaptation
_____ with major adaptation

c) The Entebbe Basic Concepts books can be used in our training colleges
_____ without any adaptation
_____ with minor adaptation
_____ with major adaptation

5. We _____ need / _____ do not need Modern Mathematics Text material for the Additional Mathematics course beginning in Form 3 (or 4).

6. The following kinds of assistance would speed the widespread use of Modern Mathematics in our schools and colleges: _____

Name: ..... Official Position .....

Address: .....

..... Date.....

RETURN AIR MAIL TO:

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EDUCATIONAL SERVICES INCORPORATED
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3622-66

African Mathematics Program

Reporting Form

April 1966

Number of classes currently using Entebbe Mathematics Series materials:-

Primary 1	29	Secondary 1		Basic Concepts Vol. 1	* SEE NOTE
Primary 2	29	Secondary 2		Basic Concepts Vol. 2	
Primary 3	17	Secondary 3		Basic Concepts Vol. 3	
Primary 4	—	Secondary 4		Basic Concepts Vol. 4	
		Secondary C-1	29		

2. a) Reports from teachers indicate the following opinions:-

	Too easy	Suitable	Too Difficult
Primary 1 materials are		✓	
Primary 2 " "		✓	
Primary 3 " "		✓	
Primary 4 " "			
Secondary 1 " "			
Secondary 2 " "			
Secondary 3 " "			
Secondary 4 " "			
Secondary C-1 " "	TOO EARLY TO TELL		
Basic Concepts, Vol. 1 is		✓	
Basic Concepts, Vol. 2 is		✓	
Basic Concepts, Vol. 3 is		✓	
Basic Concepts, Vol. 4 is			

b) Reports from teachers indicate the Entebbe Mathematics Series is

✓ better than
____ as good as traditional texts.
____ not so good as

NOTE THE BASIC CONCEPTS books VOLS. I, II, and III are in use in all GRADE A T.C.'S and also being used by P.S.I.'S conducting in-service courses for PRIMARY TEACHERS.

3. a) We think that if teachers were suitably trained, "modern" mathematics should be taught in ___ some ✓ all of our primary schools, ___ some ✓ all of our secondary schools.
___ none ___ none

b) We would like the Basic Concepts books to be used in ___ some ✓ all of our training colleges. ___ none

4. a) The Entebbe Primary materials can be used in our schools
___ without any adaptation
___ with minor adaptation
✓ with major adaptation *

* MUST BE TRANSLATED INTO SWAHILI - ALSO COST OF BOOK MUST BE REDUCED.

b) The Entebbe Secondary materials can be used in our schools
___ without any adaptation
___ with minor adaptation
___ with major adaptation

TOO EARLY TO TELL

c) The Entebbe Basic Concepts books can be used in our training colleges
✓ without any adaptation
✓ with minor adaptation
___ with major adaptation

5. We ✓ need ___ do not need Modern Mathematics Text material for the Additional Mathematics course beginning in Form 3 (or 4).

6. The following kinds of assistance would speed the widespread use of Modern Mathematics in our schools and colleges: IN ADDITION TO THE BOOKS THE MOST EFFECTIVE AID FOR INTRODUCING THE NEW MATHEMATICS IS TO CONDUCT INSTITUTES IN NEW MATHEMATICS FOR THE TEACHERS. WE MUST HAVE ANNUAL INSTITUTES FOR SECONDARY SCHOOL TEACHERS. WE NEED AN INSTITUTE FOR T.C. TUTORS, ALSO MUCH CAN BE DONE FOR P.S.I'S CONDUCTING IN-SERVICE COURSES. A MOST SERIOUS SHORTAGE EXISTS IN SUITABLE REFERENCE BOOKS IN THE NEW MATHEMATICS.

Name: Michael J. Kinunda Official Position Senior Maths Inspector

Address: Ministry of Education P.O. Box 9121
Dar es Salaam Tanzania East Africa Date 6/5/1966

RETURN AIR MAIL TO:

MR. HUGH P. BRADLEY
AFRICAN MATHEMATICS PROGRAM
EDUCATIONAL SERVICES INCORPORATED
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151

African Mathematics Program

Reporting Form

April 1966

Number of classes currently using Entebbe Mathematics Series materials:-

Primary 1 ___	Secondary 1 ___	Basic Concepts Vol. 1 ___
Primary 2 ___	Secondary 2 ___	Basic Concepts Vol. 2 ___
Primary 3 ___	Secondary 3 ___	Basic Concepts Vol. 3 ___
Primary 4 ___	Secondary 4 ___	Basic Concepts Vol. 4 ___
	Secondary C-1 ___	

2. a) Reports from teachers indicate the following opinions:-

	Too easy	Suitable	Too Difficult
Primary 1 materials are		✓	
Primary 2 " "		✓	
Primary 3 " "		✓	
Primary 4 " "			
Secondary 1 " "			
Secondary 2 " "			
Secondary 3 " "			
Secondary 4 " "			
Secondary C-1 " "		✓	
Basic Concepts, Vol. 1 is		✓	
Basic Concepts, Vol. 2 is			
Basic Concepts, Vol. 3 is			
Basic Concepts, Vol. 4 is			

b) Reports from teachers indicate the Entebbe Mathematics Series is

___✓___ better than
___ as good as traditional texts.
___ not so good as

3. a) We think that if teachers were suitably trained, "modern" mathematics should be taught in ____ some / ✓ all of our primary schools, ____ none; ____ some / ____ all of our secondary schools. ____ none

b) We would like the Basic Concepts books to be used in ____ some / ✓ all of our training colleges. ____ none

4. a) The Entebbe Primary materials can be used in our schools
____ without any adaptation
✓ with minor adaptation
____ with major adaptation

b) The Entebbe Secondary materials can be used in our schools
____ without any adaptation
____ with minor adaptation
____ with major adaptation

c) The Entebbe Basic Concepts books can be used in our training colleges
____ without any adaptation
✓ with minor adaptation
____ with major adaptation

5. We ____ need / ____ do not need Modern Mathematics Text material for the Additional Mathematics course beginning in Form 3 (or 4).

6. The following kinds of assistance would speed the widespread use of Modern Mathematics in our schools and colleges: _____

Name: ..... Official Position .....

Address: .....

..... Zanzibar ..... Date .....

RETURN AIR MAIL TO:

MR. HUGH P. BRADLEY
AFRICAN MATHEMATICS PROGRAM
EDUCATIONAL SERVICES INCORPORATED
55 CHAPEL STREET
NEWTON, MASSACHUSETTS 02158

3622-66

African Mathematics Program

Reporting Form

April 1966

Number of classes currently using Entebbe Mathematics Series materials:-

Primary 1	26	Secondary 1	※ See below	Basic Concepts Vol. 1	10
Primary 2	16	Secondary 2		Basic Concepts Vol. 2	10
Primary 3	2	Secondary 3		Basic Concepts Vol. 3	10
Primary 4	1	Secondary 4		Basic Concepts Vol. 4	
		Secondary C-1			

2. a) Reports from teachers indicate the following opinions:-

		Too easy	Suitable	Too Difficult
Primary 1 materials are				
Primary 2 " "				
Primary 3 " "				
Primary 4 " "				
Secondary 1 " "	Too easy and often unrelated to real and practical situations.			
Secondary 2 " "				
Secondary 3 " "				
Secondary 4 " "				
Secondary C-1 " "				
Basic Concepts, Vol. 1 is	Each of these is suitable in itself. Topics have to be [illegible] for teaching in any one class. Vol. I is voluminous and [illegible] the time is too short. Also, and most important, the vocabulary used is out of reach of the pupils. This must be tied in with English.			
Basic Concepts, Vol. 2 is				
Basic Concepts, Vol. 3 is				
Basic Concepts, Vol. 4 is				

b) Reports from teachers indicate the Entebbe Mathematics Series is

____ better than
✓ as good as traditional texts.
✓ not so good as traditional texts. It lacks as yet the validity which experience and use give.

※ This was tried in one school and was abandoned after seven months.

- 2 - This is vital. The question should be further answered till condition is satisfied.

3. a) We think that if teachers were suitably trained, "modern" mathematics should be taught in ____ some ____ all of our primary schools, ____ some ____ all of our secondary schools.
____ none ____ none

b) We would like the Basic Concepts books to be used in ____ some ____ all of our training colleges, except as reference material in a college library. ✓ none

4. a) The Entebbe Primary materials can be used in our schools
____ without any adaptation
____ with minor adaptation
✓ with major adaptation

b) The Entebbe Secondary materials can be used in our schools
____ without any adaptation
____ with minor adaptation
✓ with major adaptation

c) The Entebbe Basic Concepts books can be used in our training colleges
____ without any adaptation
____ with minor adaptation
✓ with major adaptation

5. We ____ need ✓ do not need Modern Mathematics Text material for the Additional Mathematics course beginning in Form 3 (or 4).

6. The following kinds of assistance would speed the widespread use of Modern Mathematics in our schools and colleges: _____

NOTE: (i) The policy for all schools in the country must be the same.
(ii) Teachers must be trained before a text is needed.
(iii) It is among these children in Primary schools. We must settle the policy for the country as a whole and then [illegible] in line with that policy.

Name: Kumbon Official Position Chief Inspector for Pre-primary Ed.

Address: Ministry of Education
P.O. Box RW. 93, Lusaka, Zambia Date 11 June 1966

RETURN AIR MAIL TO:

MR. HUGH P. BRADLEY
AFRICAN MATHEMATICS PROGRAM
EDUCATIONAL SERVICES INCORPORATED
55 CHAPEL STREET
NEWTON, MASSACHUSETTS 02158

3622-66

EDUCATIONAL SERVICES INCORPORATED

Appendix G

NUMBER OF EXPERIMENTAL CLASSES USING ENTEBBE SECONDARY MATHEMATICS SERIES

AS OF OCTOBER 1, 1966

	Five-year course				Four-year course	
Country	Secondary One	Secondary Two	Secondary Three	Secondary Four	Secondary C One	Total
Ethiopia	10				10	20
Ghana	1	1				2
Kenya						0
Liberia	9	9	2	1	4	25
Malawi			3			3
Nigeria	79	27	27	6	12	151
Sierra Leone	6	5	4	3	5	23
Tanzania					37	37
Uganda	4	4	4		4	16
Zambia	1	1			1	3
	110	47	40	10	73	280

EDUCATIONAL SERVICES INCORPORATED

NUMBER OF EXPERIMENTAL CLASSES USING ENTEBBE PRIMARY MATHEMATICS SERIES

AS OF OCTOBER 1, 1966

Country	Primary One	Primary Two	Primary Three	Primary Four	Total
Ethiopia	1				1
Ghana	28	28	25	14	95
Kenya	63	59	1		123
Liberia	14	12	5	4	35
Malawi	11	6	5	5	27
Nigeria	72	28	11	6	117
Sierra Leone	16	6	4	1	27
Tanzania	31	30	20	2	83
Uganda	20	3	2		25
Zambia	26	16	2	1	45
	282	188	75	33	578

Appendix H-I

REPORT OF R. L. FINNEY'S SCHOOL VISITS IN TANZANIA, JUNE, 1966

1. Journal

June 22: Arrived in Dar es Salaam. Consulted with A. Beninati about school visits.

June 23: Left Dsm 0700 for Morogoro. Observed class at Marian Secondary School. Teacher: Sr. Jeanne d'Arc. Sister Jeanne d'Arc taught a lesson from Chapter I of C-I Geometry. The pupils enjoyed the lesson. Sister Jeanne d'Arc and her head mistress were both enthusiastic about new mathematics. They had already taught about half of the C-I Algebra. Left Morogoro 1045 for Kibaha.

Observed C-I Algebra class at Nordic Centre. Teacher Dr. Berg-Sonne. After class Dr. Berg-Sonne talked at great length with Mr. Beninati and me. He said that the amount of C-I Algebra was not too great. He expected his classes to finish the C-I by the end of the year even though the geometry had arrived late. The students enjoyed the program (they seemed bright in class) and enjoyed mathematical symbols like . Dr. Berg-Sonne took time to suggest a number of things we might do to improve the books.

June 24: Visited St. Joseph's Secondary School, Dsm. The Headmistress was quite enthusiastic about the program. She asked Mr. Beninati for another set of 35 books so that she could start a third stream of C-I. Mr. Beninati supplied them the next day. She said that the intelligent students were particularly fond of the program.

Observed C-I Algebra class (Mr. D'Sousa) 0810-0840
Observed C-I Algebra class (Mrs. Fernandes) 1000-1100
Left Dsm. for Minaki.
Observed SMP class in Minaki (Mr. Nkonoki) 1400-1520
Met with Mr. Webb (expatriate in charge of maths). Discussed Mr. Morton Kenner's East African version of the first-year SMP text.

June 25: Visited Aga Khan Boys' Secondary School, Dsm.

Mr. Pandya, who seemed to be the head of the Maths Department, was worried about the possibility that there would be no O-level examination set for the Entebbe Program. Mr. E. J. Saunders, the Assistant Secretary of the Cambridge Local Examinations Syndicate, had recently been in town, and had said that he had never heard of any agreement between ESI and the CLES to set an examination for Entebbe maths! I tried to assure him that it had already been some time since the CLES had agreed to set an exam in Entebbe maths whenever the first students would be ready.

Mr. Pandya also did not know that we had put out a Syllabus for our O-level program.

Observed C-I Algebra class (Mr. Jacob). This class had not started the program until term 2, and probably will not finish the C-I books this year.

Met with Ted Phythian, Joseph Roberts, and David Woodhouse (the Mathematics Department of the University of Dar es Salaam). I outlined my plans for the C Program. We talked a good deal about transformation geometry. They liked my approach, and made a number of useful suggestions for this summer's writing.

Mr. Phythian urged that we run a larger teacher-training institute this year. He had also talked with Mr. Saunders, and wondered what our plans for an O-level examination were.

Met with Mr. Kinunda at the Ministry of Education. Mr. Kinunda mentioned Mr. Saunders. He asked if it were possible for ESI to send more books. Tanzania would use more if it could get them. He would like to have copies of the rest of the C Program as soon as possible to show his colleagues in the Ministry. He was quite pleased to hear me say that there was a syllabus, that an examination would be set when it was needed, that we were writing the C Program with Tanzania in mind, that the Program would be finished this summer, and that the next year's texts would arrive on time.

June 27: Flew from Dsm to Tabora. Consulted with Brother Lawrence of St. Mary's Secondary School about school visits for the next three days. Bro. Lawrence is particularly well-trained. His own maths class was excellent, and the teachers under him taught better than the teachers in the other schools I visited.

June 28: Visited Tabora Girls' School. We arrived for a 0750 class only to find that the regular teacher was on vacation for two weeks and that the substitute teacher was at the hospital to have a wart removed. When the substitute teacher reappeared, she said that she had not yet had time to look at the text and didn't know what she would do in class. Mr. Beninati will probably withdraw the program from this school.

Tea with teachers at Kazima Secondary School 1030. The teachers like the program. They feel that the C-1 texts do not pay enough attention to applications. I think that we have corrected this in the C-2 and C-3 Geometry texts this summer.

Observed C-1 Algebra class (Mr. Derwan).

Visited St. Mary's Secondary School.

Observed C-1 Algebra class (Bro. Lawrence.) An example of what a good teacher can do with bright students.

June 29: Observed C-1 class at St. Mary's (Mr. Makoye).
Observed C-1 class at St. Mary's (Mr. Mathews).
Consulted with St. Mary's teachers about C Program.
Observed C-1 Algebra class at Kazima (Mr. Panchal).

June 30: Observed C-1 Algebra class at Kazima (Mr. Kitonka).
Returned to Dar-es-Salaam.

July 1: Planned for Secondary C.

Buffet at A. Beninati's for Institute of Education, Ministry of Education, and University mathematics people.

July 2: Left for Mombasa.

2. General Comments on Teachers

The teachers, except for the expatriates, are not adequately trained for the C Program. The books did not arrive in Tanzania in time for teacher training institute. A number of the teachers had not been to the institute at all. Many of them, in spite of their obvious good will towards the program, were dogmatic, and insensitive in class, and had not read ahead in the text.

About half of the teachers speak such awkward English that the students have difficulty understanding their questions. A student who knew English well could understand, but the students in Form 1 of secondary school have had English medium classes for only the preceding two years.

I think that the teaching next year will be considerably better. The teachers are, for the most part, learning the mathematics themselves from the student text. By the beginning of the next year they will have some perspective, and more of them will have attended a teacher training institute.

In spite of the language difficulties and the inadequate preparation, the teachers prefer the new maths to the standard program, and the pupils are quite responsive in class.

3. General Comments on Students

The students are bright, and highly selected (only a little over ten per cent of the primary leavers gain entrance to secondary school in Tanzania). They seem interested in the mathematics, and the small number of pupils that I was able to ask said that they were able to read the text. I do not have adequate information about their reaction to the Geometry (the books arrived too recently for them to be used much) but I know that the students enjoyed the Algebra sections on prime numbers and on clock arithmetic. With adequate teaching, these pupils will do very well indeed. The students' most serious problem is one of communicating in class in English. Enormous amounts of time were wasted because the pupils couldn't understand the teacher's questions, and the teacher couldn't understand the students' answers.

4. Extent of use of the Entebbe texts.

In January, 1966, the Secondary Mathematics Institute started the teaching of Secondary C-1 in twelve schools, with a total of over 900 students. There are 27 streams in all. (There are about 400 students, in 6 schools, studying from Mr. Kenner's East African SMP text.)

There is strong interest in getting more Entebbe texts. Sixty thousand students will leave primary school this year in Tanzania. About 7500 of these will enter secondary school. The C Program is now used in only 12 of the 90 secondary schools.

Appendix H-2

REPORT OF PROFESSOR CLARENCE HARDGROVE'S VISIT
TO WEST AFRICA TO OBSERVE ENTEBBE CLASSES
June 8 to 29, 1966

The following is a brief chronological report with summary comments of visits made by Professor Clarence Hardgrove to primary schools using the Entebbe materials experimentally. Professor Hardgrove of Northern Illinois University and Chairman of the Primary Writing Group at the African Mathematics Workshops, visited Sierra Leone, Liberia, Ghana and Nigeria between June 8 and 29, 1966.

June 8-11, 1966 - Freetown, Sierra Leone

In Freetown I had a conference with Entebbe Workshop participants Dyck Harding of Milton Margal Training College, Julius Jonah of Prince of Wales School, Modupe Taylor-Pearce of Secondary Technical School, Dagin Williams of the Department of Mathematics, Fourah Bay College, Margaret Greene of Annie Walsh Memorial School, and Theodore Max-Peters.

I visited 11 Entebbe classes in five schools and wrote each teacher and headmaster a letter of thanks with commendations and suggestions.

I also met with Mr. William Conton, Permanent Secretary of the Ministry of Education, and visited Fourah Bay College with Dr. Williams.

June 11-15, 1966 - Monrovia, Liberia

In Monrovia I had a conference with Entebbe Workshop participants John Norris, a Peace Corps Volunteer, Virginia Sherman-Boyd of the University of Liberia, Theodora Ward of the Department of Education, and H. M. Thompson, a member of the Cornell team at the University of Liberia.

I visited seven Entebbe classes in three schools and wrote each teacher and headmaster a letter of thanks with commendations and suggestions.

I also met with Mrs. Doris Banks-Henries, Director of Higher Education for the Department of Education, and made a tape, "Modern Math in Africa," which is to be broadcast on the "University Hour" on radio and television.

June 15-21, 1966 - Accra, Ghana

In Accra I met with Entebbe Workshop participants Lucy Addy who is employed by the Ministry of Education to supervise Entebbe classes, Theo Armar, Headmaster of the West African Secondary School, Jacob Okine of Accra Academy, and Alfred Oblitey of the University of Ghana.

I visited twelve Entebbe classes in three schools and wrote each teacher and headmaster a letter of thanks with commendations and suggestions.

June 21-29, 1966 - Lagos, Nigeria

In Lagos I had a conference with Entebbe Workshop participants Grace Williams of the University of Lagos, Christiana Adegoke of the Abadina School, University of Ibadan, Ben Ukeje of the University of Nigeria, Chris Modu of the West African Examinations Council, David Fakoya, a member of the Federal Ministry of Education and supervisor of Entebbe classes in Lagos, Mr. Akanji and Mr. Oyokaya. Dr. Williams, Mr. Fakoya and I made plans for a course in September for Primary I-V teachers, division heads and headmasters to study the Entebbe Mathematics Program and to arrange periodic seminars in the school year following the course. The purpose of the course was to consider the mathematics to be taught and the methods of teaching it. There were to be demonstration lessons by some of the teachers we saw doing well and a chance to prepare teaching materials. The seminars would be a place for the discussion of questions which arise during the year.

I visited 28 Entebbe classes in seven schools (St. Jude's Ebute-Metta Primary School, Yaba Methodist School, Igbobi Lagos City Council School, Holy Cross Primary School, Government Demonstration School, Ideal Girls School and Reagan Baptist School) including four of the classes twice, and wrote each teacher and headmaster a letter of thanks with commendations and suggestions. I spent three days revisiting three of the schools for longer periods of time with Miss Janet Levine, a psychologist, and arranged appointments for Miss Levine with Mr. Douglas Ward and Mr. Sharp of USAID, and with Mr. Richard Rowe of the West African Examinations Council.

At the USAID office I met twice with Mr. Ward, the Education Officer, and told him of the plans for the primary teachers course. I also met briefly with Mr. Samuel Fuhr, Chief, Education Division, USAID/Lagos.

Mr. Modu and Mr. Rowe took me for a visit to the West African Examinations Council.

Comments on Teachers

My general suggestions to teachers were 1) that they try to follow as closely as possible the teaching suggestions and the language recommended in the Teachers' Guide and 2) that they try to help the pupils to do more of their thinking, i.e., the teachers should guide more and tell less.

I suggested that any class which was using the Entebbe book in addition to another arithmetic or number book either use the other book or the Entebbe, but not both, as Entebbe Mathematics is a complete course in itself and is not intended to be used with another book.

Some classes did not have enough books and the pupils were sharing, although some were sharing nicely. However, some of the books had been written in by previous classes. As this condition is not conducive to the best learning, I suggested that the teacher paste clean paper over the writing or request new books.

General Comments

The plan books of almost all the classes I visited were in order. The plans were carefully made and followed. The children's exercise books were generally neat and showed some careful work. I suggested that if exercise books which are marked off in squares were available that the children use them for mathematics as the lines will help them to make neat figures, draw the number line and draw geometric figures.

It is an advantage for each school to have a complete stream of Entebbe Mathematics classes. I suggested that in the schools where one class was missing in the stream that they make all efforts to get it reactivated.

In most countries, Entebbe Mathematics is being taught in English very successfully. The English vocabulary required is not great. The children then do not have to learn a double vocabulary as most mathematical terms are universal and many do not have a direct translation into African languages. However, in Lagos the use of English was not so common. I suggested that they consider teaching mathematics in English from Primary 1, which will enable the pupils to have extensive command of the language by the time they reach secondary level.

Appendix I

FEASIBILITY REPORT ON EVALUATION

African Mathematics Program

In order to investigate the possibility of evaluation of the African Mathematics Program, I spent five weeks of last summer in Africa. Unlike the more directed participants of the Mathematics Workshop who went there--sure of the job they had to do and dug in and did it--my task was much different. The direction or directions were uncertain and, in short, the task of the summer might best be expressed as one of defining my task. My summer was spent first observing primary school classrooms in session. This was done to a very limited extent in Lagos, Nigeria, Dar es Salaam Tanzania, and to a greater extent in Nairobi and the surrounding area, and the Mombasa area in Kenya. I observed some Entebbe classrooms, some mathematics classes in the traditional fashion, and other subjects as well, in an effort to get a feeling for class procedure in general. In a rural school outside of Mombasa I was able to talk to classes as a whole, have them prepare compositions for me, and interview pupils individually.

In order to get more of a total picture of African life, I was able to meet with the social workers and the members of the Maendeleo ya Wanawake Club (which when translated means "Women for Progress") and through them become more familiar with othe aspects of community life. I visited other schools, such as nursery schools and schoo for children who do not go on from primary to secondary school. I saw the Harambee self-help scheme in practice in the rural district of Kwali, where the people there were literally building a school, one room per year. I saw there, in a very real sense, the high value the people place on education. In addition, I was able to visit the homes of Asians and Africans living in the area, from those of relatively high means to those who were at the time receiving social aid. In addition to this, just talking to the people at the workshop, the Americans, and particularly, the Africans, added to my overall impression.

So, in short, my time there was spent trying to get, as much as possible in a short period of time, glimpses of the background of the school children, gaining some understanding of the school situation in general, and more specifically, getting some experience in talking individually with primary school pupils. This was done in an effort: first, to become more familiar with them, and second, to explore possible techniques which might be employed in assessing attitude change and preferred cognitive style. On the basis of this experience, I came back to Cambridge and discussed my observations with Dr. Kagan: Now at my present level of assimilation, I have defined what must have been my task last summer.

If any realistic assessment of the effect of Entebbe materials is to be made, we must ask the questions: What are those things about this situation--that is, the African primary school, at this time--which would affect the teaching of the new mathematics? And what considerations must be made in aligning the goals of the Entebbe with the African school situation? My overall impression, with a few exceptions, has been that the orientation of the African classroom is the traditional one of teacher lectures, as the authority, and the children are expected to take in the information and give it back at the appropriate time. Both students and teachers

are accustomed to this kind of approach. Also, since the student's learning is affected by the teacher's ability to teach, consideration must be given to the relatively low education of the African teacher and the relatively brief and "foreign" (in as much as it is unlike previous experience and training in mathematics) training that he is given in understanding and using the Entebbe materials. The teacher may well not be sure of the concepts and feel threatened by the possibility that some of the brighter students in the class may know as much or more than he does. This may well lead to the teacher assuming a more authoritarian attitude, since this is a natural reaction to threat and also since it is the way of teaching to which he is accustomed.

The Pedagogic approach of leading the pupil to inquire requires on the part of most African teachers at this time two new skills: 1) an understanding, acceptance, and application of the technique of Socratic inquiry, and 2) a mastery of the subject matter. With at least some grasp of these skills, the teacher might be aware that a wrong answer may nevertheless include a valid idea and guide the student in this direction, rather than pronouncing a child's attempt "wrong" at a time when he should be made to feel proud of his understanding.

In the classrooms I visited, the teacher's emphasis was practically always on the right answer. Sometimes it was simply a matter of learning based on the fear of punishment for being incorrect. In other classrooms, however, the better teachers (those teachers who had rapport with the class and I witnessed involvement and enthusiasm on the parts of both) reinforced the correct response rather than punishing the incorrect one. Often these teachers would help the child along by posing the "right" questions until he arrived at the "right" answer and then the teacher would reinforce it. Sometimes the teacher involved the class by having them clap for the child who had answered correctly. It seems that this kind of teacher behavior is one step up from the extreme situation of authoritarian-fear based learning. But still the emphasis is on the answer. It is not on the understanding of the problem and probably the child has no idea of the trend of the teacher's questions leading up to the "right answer"; therefore, he could not solve a similar problem again on his own. Hopefully, a teacher and a child having become familiar with the Entebbe materials, would be more apt to bring meaning to the problem itself. But in assessing the effect of the Entebbe, we must consider that the teacher has previously been taught, and in turn has taught, mathematics in the traditional way; he has now been exposed, on the basis of very limited education, to this new approach. However, his background of emphasizing the answer is bound to show itself. This factor must be considered in assessing the degree to which we can realistically expect the given child in this situation to change in some measurable way in the direction of the goals of the Entebbe project.

In designing the eventual evaluation, I would think it only fair to test those pupils who have been taught the Entebbe by teachers who have used the materials at least one year before. There is such a change to be made on the part of the teacher, and since the teacher is more salient than the subject matter, there is a great observable difference in the use of the materials initially and when a teacher has become more familiar with them.

Another problem is the emphasis given to the examination which takes place at the end of Primary 7. From the very earliest years of primary school the children can see this as <u>the</u> long-term goal, which they are to concern themselves with. They learn in school because this is good, and learning in school is preparation for this

exam. This is true from the very beginning right up to the 7th year which is virtually one big cram session. It is true in Africa that this goal is a realistic one. The fact of the matter is, the large majority of the children do not pass the exam in such a way that enables them to go on to secondary school. For example, in the formerly Tanganika part of Tanzania, the estimate for this year is that 10 per cent of the primary school leavers will enter form I of the secondary school. This, then, does determine their level in the society for the rest of their lives. And all this by the time the child has completed 7 years of school! Since this is the case, the children studying in preparation for this exam are aware that their chances of passing are minimal. So here is a definite goal toward which these children are consciously striving. If they achieve it in African society today, the opportunities are open as they have never been before; but the students, except for the few relatively outstanding ones, know that there is a good likelihood they will fail. This is the situation in which the individual African student is learning, and about which he is constantly anxious. The anxiety associated with learning is transmitted to the children from several different sources. Part of it is transmitted by the parent: it is in part transmitted by the teacher, particularly in Primary 7, who wants students to perform well on the exam. The teacher in turn has picked up his cues from the headmaster, who indicates that this particular school should perform well on the exam. There has been research, compatible with our common sense, that tells us that anxiety to a limited extent may serve to motivate, or stimulate, learning; however, when it exceeds a certain level, it is no longer an asset, rather it interferes with learning. In this situation with so much hinging on the right answers, I would suggest that the anxiety level has exceeded the optimal one for learning and this degree of anxiety is even more at odds with the spirit of inquiry which demands a reflection upon relationships in the process of solving a problem. One might be cautious to accept the fact that this anxiety exists to any great extent in the day to day school situation during the primary years; but on the basis of my observations, I would say that it is always present, that it is reinforced every day. In short, the system encourages reliance on authority and has as its base a fear of failure.

This situation does not promise to get better, since the economy of the African countries is not expanding at a rate necessary to absorb the number of school-leavers. Thus, there will be more competition for jobs at a given level and, no doubt, continued reliance on examination grades as criterion for ability.

Here is a thumbnail sketch of my perception of the African child in psychological terms. It is based largely on a rural school outside of Mombasa. There is a question of how far this characterization may be generalized; all I can say is that in the other schools I visited, which I mentioned earlier, although I did not talk with students individually but rather observed classes in progress, what I am about to mention was not contradicted, and perhaps the situation is very similar to the one in Kenya.

The African situation is such now that the African school child is in a position of distinction. The French attitude of "nobless oblige" seems to have found its African counterpart. However, the difference is that this has been brought about by environmental or external circumstances, rather than anything inherent at birth. Since education is not free, it cannot be compulsory, so that there are still many children who do not go to primary school. Those who do attend are made constantly

aware that their parents are financing their education. In many instances this is a sacrifice, and in many more, it is a matter of the parents giving to the child something more than they have had, i.e. an education; so that the situation is such that the parent of a school child really feels that he is providing for his child in "added measure." The child is constantly reminded of this. The parents encourage learning as much as they can; for example, time is allotted for schoolwork at home, books are purchased, often at the sacrifice of other things. In return for providing the opportunity for education, the parents are very strict in their demand that the child, for whom all these allowances have been made, performs well. It was noteworthy that the children, from the very early primary grades, feel a strong obligation toward their parents for educating them, and plan to provide for them later in life. These children very often look forward to being rich as a result of their education so that they will be in a good position to play their reversed role, that of provider for the family. Perhaps these children also show their indebtedness and wish to return the indulgence they have received by practically unanimously choosing the helping professions as a career choice.

But getting back to the child right now. He bears this burden of responsibility for the education which he is receiving and will receive in the future. How can he possibly fail in view of all this sacrifice for him! In addition, he also has the feeling of being a very special person. He is special because not everyone is able to play the role of student; perhaps family finances are such that even some of his brothers and sisters cannot go to school. If this is not the case, certainly there are children in this child's community who are less fortunate than he. Also when compared with the adult community in general, and very likely his parents in particular, this child has already more education than they do. That these children are in a very unique position is in a real sense the actual case; they are receiving that which everyone has agreed upon as the "hope of the future"--education; and so, "nobless oblige," nobility obligates.

The best way of gaining recognition for the African child is to perform well in school, and performance has come to mean performance on examinations. Since most of the people the child comes to contact with are less educated than he, his education is judged by external criteria--that is, grades--rather than understanding of subject matter. Hence, the child seeks approval in a way that has been set up for him. In order to give some flavor for the African child, I will give some of the typical responses to my questions in an interview situation: He wants to learn because learning is good; to not learn is bad. He likes school because he wants to have an education; to not like school is foolish. He is afraid when he doesn't go to school. He is happy when he passes an exam. He admires a person who is in some way responsible for his schooling and wants most to pass the KPE exam at the end of his 7th year. If he is good, he is clever and passes the exam. If he is bad, then he is poor. As one primary 6 student wrote: "If I follow the system, I will be a good boy; or if I do not follow the system, I will put myself in risk."

These expressions of attitude lead me to mention another major problem to be considered. There is much evidence that the African child learns for approval. There is also much evidence that in talking with an adult in a school situation, the child gives the response which he judges to be the one being called for; for example, the idea of liking numbers because they are good for you. This point was demonstrated

further in those instances where I stated the reverse of an accepted idea; for example, "I do not like numbers because..."--and asked the child to complete the sentence. This often brought either a lack of response, or the child repeated the sentence changing it to "I do like numbers," indicating that the "not" was just not a possibility. Perhaps the continued stress on the correct answer has been moved up in the child's mind to include asking a correct question.

In regard to the child's attitude toward mathematics in particular, the emphasis is again on the answers and on the fear of being incorrect. The child typically likes mathematics when: he gets the answers right, because he wants to pass, because it is good for him, because it makes his brain work. He does not like mathematics when: he does not know the answer, when his answers are wrong, because it is too hard, because he does not understand, because it is useless, or, turning the fear inward, because he is lazy. The most extreme responses ranged from "when I give an incorrect answer, I will be killed" to many who responded, "when I give an incorrect answer I will be beaten" to"when I give an incorrect answer I am defeated" and sadly, at best, "when I give an incorrect answer the teacher will correct it."

Another problem to be considered in the design of any evaluation would be that of language. Naturally, the more fascile a child was with English, the easier the communication was with me. There was a predictable range of English fluency and corresponding behavior with me in the interview situation. At one end were the children who had little command of English and would not or could not answer questions: A step up from this were those who were a bit more fascile and who would respond only to questions where a "yes" or "no" answer was called for. The other extreme were those children who were proud of their command of English and were generally more communicative and would answer more open-ended type questions. I found that the children in Primary 3 who had English since Primary I were able to communicate well. It was interesting to note that English words which they did not have command of were affect words. There are a number of hypotheses which may be appropriate here. It may be that these words are learned later in the acquisition of the new language, or perhaps feelings are little expressed in this culture; or, most intriguing I think, perhaps since in most cases all the language learned and spoken before school is in a language other than English and all the child's experiences during this time are verbalized in this other language (even during the school age most often Swahili is spoken at home and outside of school), English is not used in affect situations. Perhaps English is relegated to what one thinks in and not what one feels in.

This problem of language must also be viewed in regard to the teacher. My observations confirm Mr. Kanina's report that to the many primary school teachers who have only two years teacher training after primary school, English is a problem in the teaching of Entebbe. I would suggest that for these teachers who are unsure of their English and who are teaching children who have started learning English in Primary I, there is probably a communication lack in general, and hence there is not the atmosphere for inquiry and spontaneous exchange of ideas.

In administering some tests of spatial relationships to Primary 5 and 6 pupils, it was interesting to note that the large majority of students said the test had been "tough." But at no time, and they were encouraged to do so, did they have specific questions about what they did not understand. It was as though they had no feeling for what it was about the task that was puzzling them. This might have reflected

a lack of ability to analyze a problem. On the other hand, perhaps this situation reflects a problem in communication; perhaps they could not express their puzzlement.

In asking the question of whether the Entebbe group has changed in the direction aimed for, there are several techniques which might be employed to tap attitudes toward self, school, mathematics, authority, and also the child's preferred cognitive approach. Some possible techniques to employ might be a semantic differential task, sentence completion (this was highly successful), a test of concept preference, concept sorting tasks, the 20 questions game to see the child's strategy in questioning for information, and a test of reflection-impulsivity. We might want to get the child's reaction to failure and it would be interesting to see what the child would do when faced with an illogical problem. By way of an interview the child's self-confidence, particularly in the area of mathematics and in his analytical ability, could be assessed. I would say that a one-to-one interview is necessary and that, as much as possible, the idea of a testing situation be eliminated. The examiner would be aided by talking to the class as a group before talking to individual pupils.

In summary, the fear of the African school child is no accident. He has been made to feel afraid deliberately so that his behavior might be easier to control--so that it would be easier to get him to do what is wanted. What is wanted is education, not for anything inherent in the process itself, but for the implications it has for the future. Perhaps education is being viewed or has partially taken over the role of Initiation Rites. That is, it is something you endure and then you are vested with certain rights and privileges, but don't expect to enjoy it. This fear basis for learning sometimes shows itself in this form, but more often it shows itself in the form of "good" children who are just enough afraid to do everything that is wanted without overtly showing that it is fear which is motivating them. They do all the proper things and give all the right answers, but they are afraid to gamble, to try the difficult or unknown. This encouraging and compelling students to work for papers marked 100 is substituted for curiosity, and the satisfaction and interest in working through a problem.

So I submit this report as a very preliminary step in an evaluation. My primary emphasis--in the spirit of the Entebbe--has been on understanding the problem, with secondary emphasis on carrying out the calculations to get the answer (Cor intellectu cor alacer est).

However, the African child in the primary school situation is malleable, and despite his background, he responds to the enthusiasm and encouragement of inquiry when it exists. I have mentioned what I see as the problems involved in undertaking an evaluation. But despite these problems, while in Africa I was able to talk to teachers, I was able to talk to students, and those people did communicate their attitudes. I also saw some Entebbe classes in which the teacher and the students were using the materials in the way they were designed to be used. I would say, on the basis of this, that an evaluation is possible. It would seem that such an evaluation would have to sample at least a few different areas in Africa and in these places attempt an in-depth evaluation of the teachers and students there.

Janet Levine
October, 1966

* understanding

Appendix J

PROGRESS REPORT ON ABC INSTITUTE

(The ABC Institute is financed by funds from the Ford Foundation, ref. Letter of January 17, 1966, to Dr. James R. Killian from Mr. Joseph M. McDaniel, Jr., Secretary to the Ford Foundation)

Introduction

The first residential period of the ABC Institute was held at University College, Nairobi, in July 1966. The Institute is a two year program aimed at preparing senior African teacher training college tutors of mathematics and the mathematics supervisors attached to African Ministries of Education to undertake leadership in introducing modern mathematics into African primary and secondary schools and training colleges.

Participation

The countries participating in the program are: Basutoland, Ethiopia, Ghana, Kenya, Liberia, Malawi, Nigeria, Sierra Leone, Tanzania and Uganda. It is the intention to make available in each of these countries a group of well trained people, knowledgeable about "modern" mathematics, who would be able to assume responsibility for training teachers locally, who would have the materials and the facilities for such training, and who could offer leadership in producing and evaluating new textual materials.

Each of the countries was invited to nominate three senior African mathematics tutors who would be likely to continue in teacher training work (A-participants); the African official in the ministry presently responsible for mathematical education, or one who would be likely to assume such responsibility in the future (B-participants). In addition ten African lecturers in mathematics from African universities were invited to attend, to assist in the instruction and at the same time to work with a distinguished mathematician on topics of mathematical interest.(C-participants).

The Ministry response to send people to the Institute was satisfactory and it was clear that all countries, with the exception of Zambia, recognised the value of this program. However, some countries, due to staff shortages and the impossibility of releasing people from classroom work, were unable to participate fully. There was no Zambian representation, and some countries

did not nominate the numbers requested. Finally the participation was as follows:

A-participants	33
B-participants	7
C-participants	9

One C-participant was withdrawn by his University at the last moment.

A report of the Institute by Professor Richmond, the Chairman, and a list of participants are appended.

Staff

The following lecturers were engaged to give instruction:

Professor Andrew Gleason	Professor of Mathematics, Harvard University. He worked with the C-participants.
Professor Donald Richmond	Professor Emeritus, Williams College.
Professor B.J. Pettis	Professor of Mathematics, University of N. Carolina.
Dr. Grace A. Williams	Faculty of Education, University of Lagos, Lagos, Nigeria.

Drs. Richmond, Pettis and Williams worked with the A and B participants, with C-participant help in the seminars.

Continuation of the Institute

At the end of the residential period, the lecturers and C-participants joined the Mathematics Workshop at Momasa, Kenya to prepare the correspondence assignments necessary for the following eleven months. The assignment courses were prepared and the A and B participants were allocated work on the basis of the individualised knowledge of their ability assessed by the Institute staff and the C-participants. The first two assignments were despatched from Mombasa and the organisation for supervision of the correspondence course was set up with the approval of the C-participants who will be undertaking responsibility for this aspect of the institute.

In general, during the residential period some real enthusiasm was apparent in all three categories of participation. All aspects of the work of the two year Institute were discussed

with the participants in small groups and there was an appearance of firm intent to follow through with the work. Participants and staff were aware of the pressures which would tend to make difficult the regular continuing study necessary for the success of the Institute. The correspondence work was geared to make allowances for these pressures and planning included winter seminars at which work problems could be discussed and enthusiasm rekindled.

During the summer there were discussions with the African Ministries of Education concerning the African Mathematics Program in general, including the ABC Institute and the proposed D-participants for 1967-68. A copy of the reports on these discussions is appended.

Chairman's Report

of

The ABC Institute

The ABC Institute is so-called because of the three classes of participants involved. Group A consists of tutors from Teacher Training Colleges (3 from each country or region); Group B, of representatives of the Ministry concerned with mathematics education (1 from each country); finally, Group C is composed of university mathematicians.

Timetable

The schedule for the A and B participants ran from 8 a.m. to 5:30 p.m., Monday through Friday, as follows: 8-9, Lecture; 9-10, Tutorial Session in the charge of a C-participant; 10-10:30, Coffee Break; 10:30-11:30, Lecture; 11:30-12:30, Study Period; 12:30-2, Lunch Period; 2-3, Lecture on methods of presentation of the material; 3-4, Tutorial with C-participant; 4-4:30, Tea; 4:30-5:30, Study Period.

The morning lectures were on Arithmetic and Algebra (Richmond) and Geometry (Pettis). The afternoon lecture-discussions on methodology were given by Dr. Williams.

The C-participants attended lectures by Professor Gleason from 8 to 9 and from 10:30 to 11:30 a.m., and conducted the tutorials previously mentioned. Between 11:30 and 12:30 they conferred with the A and B Lecturers about the content of their lectures and suitable material for the tutorial sessions. They were also expected to attend the afternoon lecture.

Toward the end of the program, the 8-9 lecture hour was devoted to reports by C-participants on their own research.

Administration

Mrs. B.J. Pettis was in charge of administration of the Institute. The classroom accomodation in University College, Nairobi was very satisfactory and the accomodation and food at the Halls of Residence were adequate. Full co-operation was received from the University authorities and this contributed much to the smooth running of the Institute which, despite

the loss in transit of a crate of books and an initial misunderstanding about the financial arrangements covering the A and B participants, finally built up in the staff and participants a fine esprit de corps.

Continuation Plans

The work of the Institue continues until the summer of 1968 and there will be a further residential period of one month in July 1967. An important feature of the plan is that correspondence courses be conducted by the C-participants for the A and B participants (in general from their own country or region). In this way it is hoped that the knowledge and insight gained during each of the summer sessions shall be retained and strengthened.

The Work of the Institute

My overall impression is that the Institute went rather well. Interest and morale were high. The knowledge of some of our A and B participants turned out to be considerably less than we had anticipated. Consequently, we were able to cover less ground in ourlectures than expected. With few exceptions everyone worked hard. There was little or no hesitation in asking questions and good humor was abundant.

Initially it was anticipated that an early division would be made on the basis of training and ability. On the advice of the C-participants, this was not done. It appeared that the level of the lectures was about right and that there was sufficient novelty in presentation to interest the better ones and that the pace was such that the less able could cope.

However as a result of tests given at the end of the second week and the beginning of the third week, certain adjustments were made. It was clear that almost half of the A and B participants had difficulty with the structure of arithmetic. That this should be true with regard to proofs was not unexpected although the tutorial sessions should have taken care of much of it. What was not expected was that many were unfamiliar with standard techniques for adding fractions, for example. Consequently, I held three special sessions for those who did poorly. The results were gratifying and I feel sure that almost everyone is in reasonably good shape.

As the result of an unsigned poll of the A and B participants and from our visits to the tutorial groups, it became clear that some of the C-participants were not doing a very satisfactory job. In part this was due to a failure to be thoroughly familiar with what went on in the lectures, in spite of the 11:30-12:30 sessions with the lecturers which were designed to keep the C-participants informed. The demands of their own course with Professor Gleason added to the four contact hours a day, plus the assigned reading, devoted to the A and B program, constituted a heavy load.

However, in addition it was apparent that two of the C-participants were not entirely in sympathy with the aims of the program.

It was decided, beginning on the third Friday, that the responsibility for the afternoon tutorial sessions would be taken over by the staff as follows:

(1) Dr. Williams would take the Nigerian Group (minus Akande; + Khalu and Sebeie).

(2) I would take those whose background was secondary teaching and give them more advanced material.

(3) Professor Pettis would supervise the remaining participants. We believe that this measure greatly relieved the situation.

A slight improvement had previously been made by rescheduling the afternoon sessions so that the tutorials came at 2 p.m. and Dr. Williams' session at 3 p.m. This met the after-lunch sleepiness difficulty to some degree.

There was some resistance to the newer approaches which we introduced. This was to be expected. The idea of proof was a new one for many. Two lectures on the nature of mathematics, one by myself and a very excellent one by Professor Gleason, did something to overcome the resistance. Some are skeptical about the value of terminological precision. Here too as time went on, the advantages of the new language became evident. One the pedagogical side, Dr. Williams worked hard to put the participants in the place of the child, using base 12 to create the atmosphere of unfamiliarity which parallels that of the child. There was at first some resistance to this which I think steadily decreased.

We made some attempt to orient the A and B members toward the responsibilities that they will ultimately be asked to take on (participating in the conducting of institutes). This took the form of going through the Entebbe primary books from the point of view of analyzing the children's difficulties and the teaching problems involved. During the final week Professor Gleason gave a very useful general talk on his educational philosophy. We hope to do rather more in discussing the setting up of institutes; it is intended to spend much more time on this aspect of the work of the Institute in the next residential period. It was felt that at this early stage it was more necessary to improve the general mathematical background of the participants.

Correspondence Work

During the two weeks following the Institute, the C-participants, Dr. Pettis, Dr. Williams and I worked out three sets of correspondence courses: a course for the very weak (5), one for the average to good (22) where there will be some difference in the number of assignments covered, and finally a course for the secondary group (10). The courses split into assignments which, when completed by the participants, are to be mailed to their supervisors at two-week intervals.

It was appreciated that the A and B participants on returning to their own countries and their normal duties would find it difficult to find time to complete the assignments. In discussions with the participants, mostly in small groups, it was agreed that a time allocation for assignments of 3 hours every two weeks would not be too burdensome.

As not all regions/countries had C-participant representatives, and in view of the weakness of two of the C-participants, Dr. Williams, Dr. Abbiw-Jackson, Dr. Simbo and Ato Yohannes Menkir undertook to assume responsibility for the correspondence education in the areas where adequate supervision was not possible.

1966 ABC INSTITUTE
LIST OF PARTICIPANTS

A and B Participants

Adebomi, Mr. S. O., Muslim Teacher Training College, Surulere, Nigeria
Adeleye, Mr. G., Wesley College, Ibadan, Nigeria
Afolabi, Mr. A., Baptist College, Iwo, Nigeria
Akande, Mr. S.A., Ahmadu Bello University, Zario, Northern Nigeria
Amissah, Mr. S. E., Government Secondary Technical School, Takoradi, Ghana
Awosika, Miss Kike, Lagos City Council (Education Dept), Obalende, Lagos, Nigeria
Avinyia, Mr. B., Arva Teacher Training College, Box 63, Arva, Uganda
Bettie, Mr. Joseph, Laboratory High School, University of Liberia, Monrovia, Liberia
Chukura, Mrs. O., Government Teacher Training College, Surulere, Nigeria
Dogbe, Mr. E. B., Government Secondary School, Tamale, Ghana
Enenmoh, Mr. L. M., P.T.T.C., Warri, Nigeria
Gadama, Mr. A. E., St. John's Teacher Training College, Lilongwe, Malawi
Greene, Mrs. M., Annie Walsh Memorial School, Freetown, Sierra Leone
Hedd, Miss F. C., Government Secondary Technical School, Congo Cross, Freetown, Sierra Leone
Ikime, Mr. I., Education Office, Ubiaja, Isnan, Nigeria
Irusota, Mr. B.O.E., Government Teacher Training College, Abraka, Nigeria
Isiagi, Mr. W. O., Bishop Kitching Teacher Training College, Ngora, Uganda
Kidan, Ato Abebe Gabre, Addis Ababa Teacher Training Institute, Addis Ababa, Ethiopia
Khalu, Mr. M. C., Ministry of Education (Inspectorate), Freetown, Sierra Leone
Laryea, Mr. G. A., Presbyterian Training College, Akropong-Akwapim, Ghana
Mleme, Miss L., Kapeni Teacher Training College, Blantyre, Malawi
Mizambwa, Mr. C., Teacher College, Morogoro, Tanzania
Momolu, Mr. William W., Zorzor Rural Teacher Training Institute, Zorzor, Liberia
Mortagbe, Mr. A. D., Government Secondary Technical School, Takoradi, Ghana
Mwajombe, Mr. R., Ministry of Education, Dar-es-Salaam, Tanzania
Muze, Mr. Mishael S., Shinyanga Secondary School, Mwadui Mines, Tanzania
Newa, Mr. Alfred, Teacher College, Mpwapwa, Tanzania
Ningi, Mallam Sule, Teacher Training College, Sokoto, Nigeria
Odawa, Mr. G. N., Siriba College, Maseno, Kenya
Ojidoh, Mr. J. C., P.T.T.C. Abudu, via Benin City, Nigeria
Ojo, Mr. J., Katsina Training College, Katsina, Nigeria
Okon, Mr. J., Government Advanced Teacher Training College, Owerri, Nigeria
Sawyerr, Mr. S. H. A., Prince of Wales School, King Tom, Sierra Leone
Sebele, Mr. N.E.K., Education Department, P. O. Box 123, Serowe, Bechuanaland
Snoh, Mr. T. Blamo, Kataka Rural Teacher Training Institute, Kataka, Liberia
Summerville, Mrs. H. J., Lynch Street, Monrovia, Liberia
Tembo, Mr. F. N., Robert Laws Teacher Training College, Embangweni, Malawi
Tosh, Mr. A. C., Ministry of Education (Inspectorate), Limbe, Malawi
Williams, Mr. C. A., Protestant Teacher Training College, Yaba, Nigeria

C Participants

Ampomah, Mr. Robert A., University College of Science Education, Cape Coast, Ghana
Igboko, Mr. P. M., University of Nigeria, Nsukka, Nigeria
Jackson, Mr. J. S., Madingley Hall, Cambridge, England (of Ghana)
Kizza, Mr. E. M., University College, Nairobi, Kenya
Lee, Dr. Peng-Yee, University of Malawi, Blantyre, Malawi
Menkir, Mr. Yohannes, Haile Selassie I University, Addis Ababa, Ethiopia
Okuneye, Mr. Ade, University of Ife, Ibadan, Nigeria
Rhemtulla, Mr. Akbar, King's College, Cambridge, England (of Tanzania)
Simbo, Dr. John, Fourah Bay College, Freetown, Sierra Leona

Appendix K

Report of Visits made in Africa during July, August and September 1966

by Professor W.T. Martin of M.I.T., and Mr. J.L. Aldrich and Mr. H.P. Bradley

In connection with Educational Services Incorporated's

African Education Program

Professor Martin, Chairman of E.S.I.'s African Mathematics Program Steering Committee, Mr. James L. Aldrich, Deputy Director of E.S.I., and Mr. Hugh P. Bradley, Director of the African Education Program, visited African countries to discuss:

a. The use of the Entebbe Mathematics Series Matherials in schools, and future plans for the expansion of the program.

b. Teacher Training Institutes.

c. The ABC Institutes.

d. The Development of Primary Science Education.

e. Ideas on a Social Studies Program.

The countries and regions visited were: Uganda, Kenya and Tanzania (Professor Martin and Mr. Bradley); Ethiopia (Mr. Aldrich and Mr. Bradley); and Malawi, Zambia, Federal Nigeria, Northern Nigeria, Western Nigeria, Ghana and Liberia (Mr. Bradley alone).

Uganda

People Visited: Mr. H. Hawes, Assistant Director of Institute of Education
Mr. Rowland Anderson, USAID Appointee to Institute of Education (Math, lecturer)
Mr. A. Mazrui, Department of Political Economy, Makerere University College
Dr. M. Posnanski, Centre for African Studies, Makerere University College
Mr. James Aryada, Assistant Chief Inspector of Schools, Ministry of Education, Uganda
Mr. Senteza Kajubi, Director, Institute of Education, Makerere University College (seen in Nairobi)
Mrs. Balbone, (University of Massachusetts team), Headmistress, Tororo Secondary School
Mr. E. Trethaway, USAID Education Advisor, Kampala, Uganda
Professor C.C. Welter, Professor of Mathematics, Makerere University College
Dr. D. Mann, Mathematics Department, Makerere University College

a) Plans

1. Mr. Kajubi and Mr. Hawes stated that the Institute of Education would be responsible for ordering and supervising the use of the Primary texts and the Basic Concepts texts of the Entebbe Series. They stated that Basic Concepts is the textbook on which the mathematics syllabus of the Training Colleges in Uganda has been based and that all demonstration schools

attached to Training Colleges should be using the Entebbe Primary Texts.

It was agreed that this new system of ordering and supervising was much better than the previous system of dealing through the Ministry of Education. The Ministry does not have the administrative strength of personnel to deal adequately with these tasks.

Dr. Anderson showed some enthusiasm for the idea that he should make supervision of the Entebbe Mathematics Series the basis of his work in Uganda. Arrangements were made for him to visit the Workshop.

2. Mr. Aryada expressed regret that Uganda had not returned the reporting form but claimed that it had not been received. He offered personally to ensure that it would be completed if another copy were sent. He showed no resentment that Tororo was using the Entebbe Secondary Materials but on the other hand did not explain why he had wanted the 600 copies of Secondary C for the Ministry. There was no indication that the Entebbe Secondary Materials would be used to any great extent in Uganda.

Mrs. Balbone, headmistress of the Tororo Secondary School, is using the Secondary C material in all streams in her school and was enthusiastic about the results. She did, however, express worry regarding the need for Secondary C Two books in June 1967. She was assured that she would be supplied with materials which would enable the classes to continue with their work.

She has received directly from the Cambridge Overseas Examination Syndicate a letter stating that her students following the Entebbe course would be able to sit a suitable examination when the time came for them to present themselves.

All people visited, including Professor Walter and Dr. Mann, were told of the Steering Committee's desire to offer an Additional Math. Course and a higher School Certificate Course. It was evident that these courses were recognised as a necessary part of a school course in Africa.

3. There was some discussion with Mr. Kajubi, Mr. Hawes, and with Mr. Aryada on the long term plans for school mathematics education in Uganda. Uganda has clearly made a decision that, in time, "modern" mathematics will be taught in all schools. The discussion touched on the preparation of local adaptations of Entebbe and other materials,

on the training of teachers, and on the cost of changing the mathematics text books. E.S.I.'s long term projection of its program as in the USAID Proposal (May 1966) was discussed and fitted well into Uganda's own more immediate plans.

There was also some discussion with Mr. Trethaway about the long term plans for Uganda. There appeared to be agreement that continuing assistance will be necessary for some time.

4. Mr. Kajubi and Mr. Hawes described the plans for a Curriculum Development Centre at the Institute. This centre would perform tasks similar to those of the Centre in Nairobi, but would be University-based and have other differences. In particular, although it was intended to adopt English as the medium of instruction (a Uganda N.P.A.), it was intended to develop the mathematics and science curricula alongside the English curriculum so that vocabulary for other subjects could be developed simultaneously in the language program. The Institute wished to appoint a mathematician to undertake the supervision of this curriculum work in mathematics. A request was made for E.S.I. assistance.

We consider this appointment crucial and recommend most strongly that USAID/Uganda assist the Institute in this appointment. An alternative is a British Council-supported British appointee. In the past and in other places unsuitable appointments have obstructed the necessary experimentation of the Entebbe materials.

b) Teacher Training Institutes

Mr. Kajubi, Mr. Hawes and Mr. Aryada asked for assistance in running Teacher Training Institutes for teachers using the Entebbe Texts. They were assured that E.S.I. would give such assistance on a co-operation basis and within fiscal limits if the request were received in time. They were asked to try and plan the Institute to either precede or follow the Institute presently being planned in Dar es Salaam. In this way the one visiting lecturer could assist in each of the countries.

c) ABC Program

The visitors pointed out that it was to be regretted that Uganda had not sent its full complement to the ABC Institute. Mr. Hawes pointed out that a better response

might have been possible if the Institute of Education had also been informed officially about the ABC institute. It was agreed that, in the future, the Institute of Education should receive copies of all letters sent to the Minister.

d) Primary Science Education in Uganda

The Institute Director and Assistant Director were informed that the E.S.I. Elementary Science Program would gladly co-operate with their plans to develop an elementary science curriculum.

e) Ideas on a Social Science Program

With all people visited many interesting discussions were held on the ideas presently being considered for the development of a Social Science Program. It was clear that there is a great need for such a program. All stated that it was an urgent problem in school education, and that in an unstructured way some work is already being done.

The E.S.I. ideas proposed met with a most warm and enthusiastic reception and all people visited were only too keen to propose people who could assist. The following names should be considered as people who can contribute to this work: Mr. Senteza Kajubi; Dr. A.Mazrui; Dr. M. Posnansky; Dr. M.S. Kiwanuka; Mr. Enoch Rukare; Mr. S. Ntiro. In passing, a probe was made regarding the possibility of Mr. Kajubi freeing himself from his present obligations to undertake a responsible position on a Pan African curriculum development organization. No committment was made, but it was clear that he did not consider the possibility unpleasant.

Conclusion: In general, the visitors were very satisfied with their efforts. In the past it has not been possible to obtain such a warm response in discussions.

Kenya

People Visited: Mr. Njeroge, Permanent Secretary, Ministry of Education
Mr. K. Mwendwa, Chief Education Officer
Mr. Maina, Deputy Chief Education Officer
Mr. J.H. Gitau, Assistant Chief Education Officer (Inspectorate)
Mr. H.J. Kanina, Inspector (Mathematics)
Mr. G.P. Oluoch, Director, Curriculum Development Centre, Nairobi
Dr. A.T. Porter, Vice Chancellor, University College, Nairobi

Dr. SH. Ominde, Dean, Faculty of Arts, University College, Nairobi
Mr. Frank Sulton, Ford Foundation Representative, East and Central Africa
Mr. A. Bernal, USAID, Nairobi
Dr. H. Alexander, Visiting Professor (USAID) University College, Nairobi
Mr. Kerr, Librarian, University College, Nairobi

a) Plans

The Ministry officials, sitting as a committee in discussion, informed the visitors that it was their intention to continue to use the Entebbe Primary materials as a basis for local experimentation. There were indications that there may be some delay in the development of the local adaptation. It was not clear that Kenya Primary II would appear next year.

Real interest was shown in the Secondary materials, and Mr. Kanina was asked to review the Entebbe materials and report on examination difficulties which might arise if Kenya experimented with Entebbe materials as well as the adapted School Mathematics Project materials.

Mr. Kanina was also asked to encourage the use of the Basic Concepts Teacher Training materials in Kenya Teacher Training Colleges.

b) Teacher Training Institutes

No real interest in a teacher training institute was apparent. The British Council and the S.M.P. had an Institute planned for late August for Secondary School Mathematics teachers. Primary teachers are trained by in-service programs during term time.

c) ABC Institute

The Ministry officials regretted the poor Kenya representation at the Institute but stated that the time was unsuitable. It was pointed out that other countries had made acceptable adjustments to their programs because they considered the ABC Institute an important means of developing mathematical education in their countries. An offer was made to accept late nominees if their mathematical background was suitable. A "D" participant will be nominated for next year.

d) African Science Program

The officials expressed enthusiasm for the work of the African Elementary Science Program and gave assurance of continued co-operation, including the appointment of suitable Kenyans.

e) Social Studies

The plans for a possible Social Studies program was discussed. The co-operation with present developments in Kenya were discussed and much enthusiasm for the general method of approach was apparent.

Tanzania

People Visited: Mr. J.A. Sawe, Chief Education Officer
Mr. C.L. Tarimu, Chief Inspector of Schools
Mr. H.J. White, Inspectorate
Mr. T. Wagi, Inspectorate
Mr. P. Hall, Inspectorate
Mr. M. Kinunda, Inspectorate (Mathematics and Science)
Professor Honeybone, University College, Dar es Salaam, Institute of Education
Professor Widstrand, University College, Dar es Salaam, Faculty of Arts and Social Science (Sociology)
Professor Whitely, University College, Dar es Salaam, Faculty of Arts and Social Science (Linguistics)
Professor Svendsen, University College, Dar es Salaam, Faculty of Arts and Social Science (Economics)
Professor Robertson, University College, Dar es Salaam, Dean of Science
Professor Ranger, University College, Dar es Salaam, Faculty of Arts and Social Science, (History)
Professor Berry, University College, Dar es Salaam, Faculty of Arts and Social Science (Geography)
Professor Kimble, University College, Dar es Salaam, Faculty of Arts and Social Science (Political Science)
AID Representative

a) Plans

Ministry officials showed continuing enthusiasm for the Primary and Secondary materials and increased interest in the use of Basic Concepts. The primary program is progressing well and it is thought that the translation program may be able to end at Primary Five or Primary Six. Some difficulty is being experienced in translating Primary Three. There is every intention to continue with the Secondary C program but some concern about the possible delay in the arrival of books. Reassurances were given as were promises of maximum support.

b) Teacher Training Institutes

Institutes will be held in December/January. Primary and Secondary teachers will attend and E.S.I. co-operation was requested.

c) ABC Institutes

The Ministry was congratulated on the good choice of participants for the ABC Institute and there were assurances that these participants will return next year. A "D" participant will be nominated for 1967.

d) African Science Program

Pleasure was expressed on the appointment of a Science Educator for the Science Curriculum Centre at University College. Officials emphasised the Tanzanian need was for a heavy agricultural bias in elementary science and expressed the hope that the science centre would develop suitable materials.

e) Social Studies

Ministry officials and University faculty expressed great interest in the plans for the Social Studies program. In particular, Mr. Sawe, Professor Honeybone, Professor Berry, Mr. Tarimu and Mr. Kinunda showed great enthusiasm. Professor Ranger, Mr. White, and Mr. Hall had some reservations which seemed to arise from a feeling that an outside body was about to take over that which they considered properly theirs. Other officials and faculty recognised the need for a wider approach and saw good opportunities for incorporating the present Tanzanian effort into a wider program with greater financial and educational backing.

Malawi

People Visited: Mr. Fiddes, Chief Inspector of Schools
Mr. L. Anthony, Deputy Chief Education Officer
Mr. L. Mallunga, Assistant Chief Inspector of Schools
Mr. A.C. Tosh, Inspector (Mathematics)
Mr. T. Kalea } - Supervisors
Mr. S. Mwanamai }
Mr. Heppell, Training Colleges and Primary Education
Mr. Frank Kazambe (Mombasa Participant), Inspectorate)
Mr. M. Pinchin, Inspectorate (Science)
Dr. Michael, Vice-Chancellor, University of Malawi
Mr. C. Konvolinka, USAID

a) Plans

The officials indicated a desire to continue with the controlled experiments with the Entebbe Primary materials, building up the number of classes as teachers become available. The Secondary materials are also being introduced gradually, although Mr. Tosh (British expatriate) has reservations about their suitability. An extended use of the Basic Concepts books in Training Colleges is being considered.

b) Teacher Training Institutes

It was stated that Malawi would wish assistance in running a Teacher Training Institute this winter.

c) ABC Institutes

It was agreed that Mr. Tosh was not a suitable nominee for the ABC institute--but it was agreed that he should continue in the program. A D-participant will be nominated for next year.

d) African Primary Science

The officials expressed great satisfaction on the appointment of a science educator and had great hopes for useful collaboration.

e) Social Studies

Dr. Michael of the University expressed a desire to co-operate in the Social Studies program if one should develop. He considered the present planning to be following sensible lines. Equal interest was shown in the Ministry and it was recognised that local efforts required this planned external support if a good primary social studies program was to develop.

Zambia

People Visited: Mr. Bowa, Undersecretary of State for Education (Professional) Acting Permanent Secretary
Mr. C. H. Thorneycroft, Parliamentary Undersecretary of State for Education
Mr. R.M. Sibson, Chief Inspector of Schools
Mr. N. Setidisho, Inspectorate (Mathematics)
Dr. R. Sklar, University of Zambia (Political Science, USAID appointment)
Dr. John Omer-Cooper, Dean of School Humanities and Social Science
Mr. Howard, USAID Director of Mission

a) Plans

Mr. Sibson and the other Ministry officials sitting in committee indicated that it was their intention to continue using, and to expand the use of, the Entebbe Primary materials. Mr. Sibson stated that he would use the Entebbe material in conjunction with the experiments with the New Primary Approach presently being tried in Zambia. There was no suggestion that the experiments going on would be brought to an end. Indeed the adverse report received seemed rather to be a complaint that Zambia was having trouble training their teachers. Tutors need help in using the Basic Concepts. Suggestions were made regarding the training of Zambians to undertake local supervision and to help in the use of Basic Concepts.

b) Teacher Training Institutes

In the confused situation arising from the adverse report and the favourable conversations, no firm statement was made about institutes. It is clear that if the Entebbe materials are to be used with the N.P.A., an Institute will be necessary.

c) ABC Institutes

Officials expressed regret that no one could be spared to attend the ABC Institute. Mr. Setidisho and Mr. Thorneycroft seemed surprised that there had been no Zambian participation.

d) African Primary Science

Interest in the Elementary Science Program was shown and comment was made that Zambia had participated in the Science Workshop. It would appear that there is real interest in setting up a science centre, but no firm action will be taken unless one can get past Mr. Sibson. In general the Zambians in the Ministry seemed anxious to co-operate with E.S.I. programs, but find the Sibson obstacle difficult to deal with.

e) Social Studies

Mr. Bowa and Mr. Thorneycroft showed great interest in the possibility of an E.S.I. Social Studies program. They commented on the urgent Zambian and African need for a well based program of this sort. Dr. Sklar and Mr. Omer-Cooper also showed very much interest indeed and Mr. Omer-Cooper particularly was enthusiastic, contributing

his own views and ideas. Dr. Sklar had strong feelings that such a program should be based firmly in Africa and that the main motivation and direction should come from Africans.

Ethiopia

People Visited: His Excellency Ato Million Neknik, Vice-Minister of Education
Ato B. Getahun, Director of Teacher Training Colleges
Ato Y. Menkir, University Haile Selassie I (Mathematics)
Mr. J. Fitzgerald, Ministry (Mathematics)
Mr. G. Last, Ministry (Social Studies)
Mr. E. Boyce, Ministry (USAID)
Mr. Lovegrove, Ministry (UNESCO Teacher Training)
Mr. N. Narin, Deputy Director, Peace Corps
Mrs. J. Campbell, Deputy Director, Peace Corps
Mr. B. Buchan, Peace Corps
Mr. Carlos Nelson, Acting Director, USAID Mission
Mr. Kent, Program Officer, USAID
Mr. R. Wilcox, Director, University Demonstration School (USAID)
Ato M. Yimer, Haile Selassie I University Faculty of Education

a) Plans

In discussions with His Excellency Ato Million Neknik and his officials, there were indications that Ethiopia may participate more fully in the program. His Excellency asked Ato Yohannes Menkir to supervise the use of Basic Concepts in Training Colleges, and the introduction of the Secondary Series into the schools. Ato Yohannes Menkir seemed to favor a gradual controlled approach, but Mr. Fitzgerald was anxious to move more quickly. It seems likely that local supervision is possible, as Ato Yohannes - an ABC "C" participant - and Mr. Fitzgerald are both enthusiastic about the program. The local "adaptation" of Secondary One done by Peace Corps Volunteers met with some local criticism. The Demonstration School wishes to continue experimenting with the Secondary material and also to try out the Primary work under the supervision of Ato M. Yimer.

b) Teacher Training Institutes

The Ministry officials and University faculty stated that an Institute was necessary. They were asked to write, giving dates, numbers and help needed.

c) The ABC Institute

It was appreciated that opportunities had been missed by sending only one A-participant. Ato Yohannes and Ministry officers stated they would try to find other

participants who might, even at this late date, be accepted by the program.

d) African Primary Science

There appeared to be real interest in the African Elementary Science Program and there was some confusion and embarrassment that there had been a breakdown in communication resulting in no Ethiopian participation in the Science Workshop. However there were no clear indications that, at the moment, there is an administrative set up into which a Science Centre can easily fit. Further detailed investigation is needed.

e) Social Studies

Mr. Geoffrey Last, a senior official of the Ministry who was recorder for the 1965 UNESCO Conference on Social Studies, confirmed the Ministry's interest in the Social Studies Program, and at the same time indicated how present efforts in Ethiopia could contribute to the objectives of the Program.

Nigeria

People Visited:
Mr. H.M. Somade, Chief Inspector of Schools, Western Nigeria
Mr. Boulton-Maggs O.B.E., Chief Inspector of Schools, Northern Nigeria
Mr. J.O. Mejabi, Inspectorate (Mathematics), Northern Nigeria
Mr. Bakari, Ministry (Overseas Aid), Federal Nigeria
Professor C.O. Taiwo, Principal, Institute of Education, University of Lagos
Dr. Grace A. Williams, Mathematics and Education, University of Lagos
Dr. B. Williams, Assistant Professor, Political Science and Political Economy, University of Lagos
Dr. Babalola, African Studies, University of Lagos
Dr. P.O. Ogunbowale, Yoruba Studies, University of Lagos
Mr. T.T. Solaru, Representative, Oxford University Press, Ibadan
Dr. H.C. Ahrnsbrak, Chief of Party, University of Wisconsin, Northern Nigeria Teacher Education Project
Dr. H.L. Sorensen, Chief of Party, Harvard/Newton Mission to Aiyetoro Comprehensive School
Mr. P.A. Oguntunde, Senior Mathematics Master, Aiyetoro Comprehensive School
Mr. A. Skapski, Ford Foundation Representative
Mr. J.O. Ojo, Diocesan Education Secretary, Kaduna
Fr. P.J. Kerr, Education Secretary, Catholic Mission, Kaduna
Dr. L.A. Fahm, Associate Professor of Economics, Universtiy of Lagos
Mr. P.G.O. Gbadamosi, History Department, University of Lagos

a) Plans

Northern Nigeria officials stated that they would like to use the Entebbe Secondary books experimentally in Government schools. Dr. Ahrnsbrak of the Wisconsin Group showed interest in using the Basic Concepts in the four year teacher training colleges and reacted well to the suggestion that the demonstration schools attached to the colleges should experiment with the primary texts. In general, Northern Nigeria is very active in trying out Modern Mathematics materials.

Mr. Somade of Western Nigeria stated that he did not approve of the elementary trial classes as there was little prospect of the spread of the program in the immediate future. He agreed that training colleges should be training teachers to deal with modern mathematics. It is the Ministry's intention to use the Secondary C materials following the use of the Aiyetoro adapted Entebbe Secondary One in the new comprehensive schools presently being planned. Existing experiments are continuing and a Western Nigerian class using Entebbe materials will be sitting School Certificate in 1967.

Dr. Grace Alele Williams, University of Lagos, was organising an Institute to take place in Federal Nigeria. This institute began on September 1 and finished on September 16. It was intended that it would make available teachers who could use the Entebbe materials.

b) Teacher Training Institutes

An institute was being planned in Lagos for September 1 - September 16. The lecturers were local people. No firm plans were made for an institute in Northern Nigeria. An Institute is being planned by Dr. G. Williams for Mid-West Nigeria for January 1967. An Institute for secondary teachers is being planned in Western Nigeria for March/April 1967.

c) The ABC Institutes

There were discussions on the possibility of the A, B and C participants of the different regions of Nigeria attending the Mid-West Institute for part of the time to discuss mutual problems and for a series of seminars.

) African Primary Science

Because of the possible departure of the present Director of the Institute of Education of Ahmadu Bello University, there is now a greater interest in a science centre. Mr. Boulton-Maggs indicated that he disagreed with the decision of the Director that the Institute should not concern itself with primary education. He discussed the possibility of opening the centre in a training college. This matter should be pursued.

e) Social Studies

The meeting with the members of the Social Science faculty of the University of Lagos was most stimulating. General approval of the ideas was given. In particular, Dr. B. Williams and Mr. P.G.O. Gbadamosi showed much enthusiasm. Professor Taiwo and Mr. Solaru were also very keen on the ideas involved and indicated that they would like to be involved. Ministry reaction was more reserved, but not unfavourable.

Ghana

People Visited: Mr. J.W.L. Milis, Chief Education Officer, Ministry of Education
Miss L. Addy, Ministry (Primary Mathematics)
Mr. J. Obese-Jecty, Registrar, University College of Cape Coast
Dr. D'Sa, Dean, Fadulty of Science and Mathematics
Dr. F.E. Pinder, Director, USAID Mission
Dr. R. Klein, Director, Peace Corps Ghana
Mr. Chapnick, USAAD
Mr. T.Q. Armar, Headmaster, West Africa Secondary School, Accra

a) Plans

Mr. Milis re-affirmed his desire to experiment with Entebbe materials in six Secondary Schools. There is, however, a difficulty in finding teachers to undertake the work. Peace Corps co-operation was discussed. Experiments in Mr. Armar's Secondary School are continuing and the Primary Program continues to expand under the supervision of Miss Lucy Addy. There was some discussion regarding the use of the Basic Concepts texts in Ghanaian Training Colleges. Mr. Klein, the Peace Corps Director in Ghana, stated that he would be willing to appoint Peace Corps Volunteers to training colleges to use Basic Concepts, and that, the Ministry agreeing, he would arrange for Volunteers to co-operate in the use of the Secondary materials in Ghana Secondary Schools.

Teacher Training Institutes

During the visit a Teacher Training Institute was being held at the University of Ghana, Legon. Professor Vincent Haag was the visiting lecturer. Ghanaians made up the rest of the staff, with some Peace Corps assistance in seminars. Another Institute is planned for 1967.

c) The ABC Institutes

It was pointed out to Mr. Mills that the Ghanaian A-participants at the ABC Institute were not entirely suitable and did not satisfy the conditions for such participation. Mr. Mills stated that he felt that the Training College tutors would not have been good enough to attend. It was pointed out that the purpose of the Institute was to take the people presently in the work and to improve their mathematical background. It was agreed that the Ministry should try to locate suitable people to participate in the remainder of the Institute.

d) African Primary Science

On the advice of Mr. Mills, a visit was made to University Cape Coast to discuss mathematics and the Primary Science Centre. Unfortunately, Dr. Ackah was visiting the United States, but there were some useful talks with the Registrar and Dr. D'Sa. It was clear that there was great interest in the African Science Program and there was some discussion how this sort of work could co-operate with the USAID-proposed Science Summer Institute for 1967. Mr. Chapnick, USAID, was present at these discussions.

e) Social Studies

Some work on primary Social Studies is presently being done in Ghana. Mr. Mills showed interest in the wide plan which would be able to use and greatly reinforce the work being done locally. Unfortunately, it was not possible to have discussions with University social scientists.

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People Visited: Miss Theodora Ward, University of Liberia, School of Education
Dr. S. Clark, USAID Visiting Lecturer, University of Liberia
Dr. G. Holmgren, USAID Rural Education

(continued)

Mr. J. Sills, Director, Peace Corps Liberia
Mr. J. Bettie, SanFrancisco Project and Liberia High School
Mr. J. Norris, Peace Corps Supervisor Eniebbe Program

a) Plans

Unfortunately, a sudden Cabinet meeting prevented a meeting with Secretary Caine. Discussions with Mr. Norris, Mr. Holmgren and Mr. Sills concerned continuing Peace Corps involvement in the program and methods whereby the USAID Rural Education program could co-operate with the planned regional travelling institutes which are to train teachers in modern mathematics. Mr. Norris is going up country to supervise the use of Entebbe materials in rural areas, and Mr. J. Bettie will be general controller of the program working from the Ministry. In general there is a strong effort to spread the use of the Entebbe materials and present activities are mainly directed at training teachers. Under strong supervision these plans should succeed.

b) Teacher Training Institutes

Present plans are to set up required centres using Peace Corps Volunteers and Liberians to undertake on-going instruction of teachers in required areas. It is also intended to make use of a mobile unit to reinforce local efforts. Local demands for assistance and information are clear indications of a spreading interest.

c) The ABC Institute

Liberian participation was satisfactory. The on-going correspondence course will be supervised by Dr. John Simbo of Fourah Bay College, Sierra Leone.

d) African Primary Science

Miss Ward, Dr. Clark and Mr. Norris stated that there is a desire for a science centre in Monrovia. Mr. Lewis was mentioned as the local counterpart, and a possible site was viewed. Miss Ward stated that she thought a shorter Science Workshop of four weeks would be better than one lasting six weeks.