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PROGRESS REPORT
to the
AGENCY FOR INTERNATIONAL DEVELOPMENT
on the
AFRICAN MATHEMATICS PROGRAM
November 1, 1967 to November 30, 1968
under
AID Contract csd-1567

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TABLE OF CONTENTS

	Page
<u>PROGRESS REPORT</u> - Summary of activities during the period November 1, 1967 to November 30, 1968	1
The 1968 Workshop	1
Teacher Training Institutes	2
Publication and Distribution of Entebbe Mathematics Series	8
ABC Institute	9
Africa Travel Report	10
Co-operation with Other Agencies	11
Planning Ahead	11
<u>APPENDICES</u>	
A The Mombasa Mathematics Workshop 1968	13
1968 Workshop Participant List	18
B Report of Testing Group	20
C Steering Committee Meeting July 22, 1968, Mombasa, Kenya	27
D Reports of Teacher Training Institutes	31
E Progress Report on ABC Institute	52
F Travel Report - Africa Spring 1968	60
G Travel Report - Africa Summer 1968	76
H Report on Teacher Assistance Project in Ethiopia	79
I Work Still Outstanding in the African Mathematics Program	85
J East Africa Regional Plans	88
Report of Committee	88
Summary of Meeting	92
Letter: Suggestion for Regional Co-operation	95
K Preliminary Draft Proposal for Sierra Leone	96

PROGRESS REPORT

The following is a Progress Report to the Agency for International Development on the African Mathematics Program of Education Development Center, Inc., for the period November 1, 1967 to November 30, 1968. The principal activities during the period under AID Contract csd/1567 include: (1) holding the 1968 Mathematics Workshop to conclude the preparation of mathematics texts for Tropical Africa; (2) organizing Institutes in Kenya, Tanzania, Zambia, Liberia, Sierra Leone, Malawi, Uganda, Ghana, Ethiopia and Nigeria to train teachers of trial classes, head teachers, training college tutors and Ministry officials to use the Entebbe Mathematics Series; (3) arranging for completion of publication of the manuscripts written at the 1967 Workshop and for distribution of the Entebbe Mathematics Series to African schools and teacher training colleges; (4) visits to participating countries in April - May by Mr. John Joanou and in June, July and August by Professor W. T. Martin and Mr. H. P. Bradley to discuss the program.

Another activity, funded by the Ford Foundation, was the holding at University College, Nairobi, of the third and final 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.

1. The 1968 Workshop

The seventh annual Mathematics Workshop was held at the Nyali Beach Hotel, Mombasa, Kenya, July 1 - August 10, 1968, under the chairmanship of Professor W. T. Martin and Dr. Awadagin Williams. A Primary Course Guide and a two-year course in Advanced Mathematics were prepared at the Workshop by a group of thirty-eight mathematicians and teachers. (See Report and Participant List - Appendix A.)

The Testing Group prepared tests for Primary Four, Primary Five and Secondary C Three, plus a model Primary Leaving Exam and model

O-Level Exam. (For a Report of the Testing Group see Appendix B.)

A meeting of the Steering Committee of the African Mathematics Program was held July 22, 1968 at the Workshop. (See Report - Appendix C.)

2. Teacher Training Institutes

Earlier reports to AID (March 4, 1964, January 31, 1965, September 30, 1965, December 30, 1965, May 31, 1966, October 30, 1966, January 31, 1967 and November 30, 1967) described 37 courses held in the participating countries to train teachers and supervisors of experimental classes as well as participation in other related mathematics improvement efforts in Tropical Africa.

Nineteen Teacher Training Institutes have been held in ten African countries from December 1967 to November 1968. (See Reports of Teacher Training Institutes - Appendix D.)

Seven Institutes were held in August/September: one in Ghana for Primary Six, two in Ethiopia for Grade Seven supervisors, using adapted Primary Three and Four texts, one in Ife, Nigeria, for tutors and one triple Institute for primary teachers in Lagos, Nigeria.

Discussions with officials of the Ministries and Curriculum Development Centers and university faculty members during the annual visit to Africa resulted in requests for more Institutes within the coming year.

Teacher Training Institutes

December 1, 1967 - November 30, 1968

KENYA

Date: December 4 - 16, 1967

Site: Kenya Institute of Administration, Nairobi, Kenya

Organizer: Curriculum Development & Research Centre (now Kenya Institute of Education), Ministry of Education, Kenya

Director: Mr. George Edmonds, Curriculum Development & Research Centre

Lecturers: The following local lecturers assisted at this Institute:

Dr. Irving Hollingshead, University College, Nairobi
Mr. Samuel Kagiri, Curriculum Development & Research Centre
Mr. Andreas Dunkels, Kenya Science Teachers College, Nairobi
Mr. George Edmonds, Curriculum Development & Research Centre
Mr. Gideon Kimote, CDRC
Mr. William Bussey, Peace Corps Volunteer, Kenya

Participants: 32 mathematics tutors, 21 math and science tutors,
and primary school supervisors from Nairobi City Council

KENYA

Date: December 13 - 21, 1967

Site: University College, Nairobi, Kenya

Organizer: Curriculum Development & Research Centre, Ministry of Education

Director: Mr. George Edmonds, Curriculum Development & Research Centre,
Ministry of Education, Kenya

Lecturers: The following local lecturers assisted at this Institute:

Dr. Irving Hollingshead, University College, Nairobi
Mr. S. N. Kagiri, Curriculum Development & Research Centre
Mr. F. G. Richards, CDRC

Participants: 26 secondary school teachers

TANZANIA

Date: December 11 - 22, 1967

Site: University College, Dar es Salaam, Tanzania

Organizers: University College, with the co-operation of the Ministry
of Education

Directors: Professor J. E. Phythian, University College, Dar es Salaam,
Tanzania
Dr. A. Beninati, Institute of Education, University College

Lecturer: Professor Roy Dubisch, University of Washington, Seattle, Wash.

Participants: 98 secondary school teachers

ZAMBIA

Date: January 8 - 19, 1968

Site: University of Zambia, Lusaka, Zambia

Organizer: Ministry of Education, Zambia

Directors: Mr. S. H. Erlwanger, Ministry of Education
Mr. Martin Sibson, Ministry of Education
Mr. John Mashambe, Ministry of Education

Lecturers: Miss Lenore John, formerly of Laboratory Schools,
University of Chicago
Mr. Colin Goldsmith, British Council
Mr. Brian Bolt, British Council
Mr. Brian Wilson, British Council

Participants: 56 secondary school teachers

LIBERIA

Date: January 15 - February 9, 1968

Site: Demonstration School, Monrovia, Liberia

Organizer: Department of Education, Liberia

Directors: Secretary Augustus F. Caine, Department of Education
Mrs. Doris Panks Henries, Department of Higher Education
Mr. Bai T. Sherman, Department of Teacher Education

Lecturers: Local lecturers assisted at this Institute

Participants: 29 primary school teachers

SIERRA LEONE

Date: March 25 - April 11, 1968

Site: Catholic Teachers College, Bo, Sierra Leone

Organizer: Ministry of Education, Sierra Leone

Directors: Mr. F. B. Dyck-Harding, Milton Margai Training College,
Goderich, near Freetown, Sierra Leone
Mr. D. S. M. Lahai, Ministry of Education
Mr. Holly Hollingsworth, Peace Corps Volunteer & Entebbe
Mathematics Supervisor, Sierra Leone

Lecturers: Professor Ross L. Finney, University of Illinois, Urbana, Illinois
Mr. Holly Hollingsworth, Peace Corps Volunteer

Participants: 65 primary school teachers

SIERRA LEONE

Date: March 25 - April 11, 1968
Site: Fourah Bay College, Freetown, Sierra Leone
Organizer: Ministry of Education, Sierra Leone
Director: Mr. F. B. Dyck-Harding, Milton Margai Training College,
Goderich, near Freetown, Sierra Leone
Lecturers: Local lecturers assisted at this Institute
Participants: 50 primary school teachers
(Report not yet available)

NIGERIA

Date: April 16 - 21, 1968
Site: University of Lagos, Lagos, Nigeria
Organizers: Ministry of Education, Nigeria, and University of Lagos
Director: Dr. Grace A. Williams, University of Lagos
Lecturers: Local lecturers assisted at this Institute
Participants: Secondary school teachers
(Report not yet available)

UGANDA

Date: April 16 - 30, 1968
Site: Makerere University, Kampala, Uganda
Organizer: Institute of Education, Makerere University
Director: Dr. Rowland C. Anderson, Institute of Education, Makerere Univ.
Lecturer: Professor Paul A. White, University of Southern California,
Los Angeles, California
Participants: 34 primary teacher training college tutors and principals

GHANA

Date: April 22 - May 3, 1968
Site: Girls' Primary School, Accra, Ghana
Organizer: Ministry of Education, Ghana
Director: Miss Lucy L. Addy (now Mrs. Lucy L. Tagoe), Ministry of Education
Lecturer: Professor Shirley A. Hill, University of Missouri, Kansas City, Kansas
Participants: 20 primary school head teachers and 56 primary school teachers

MALAWI

Date: April 22 - May 2, 1968
Site: Blantyre Secondary School & Limbe Primary School, Blantyre, Malawi
Organizer: Ministry of Education, Malawi
Director: Mr. Frank Kazembe, Ministry of Education
Lecturers: Professor Donald Ostberg, Northern Illinois University, DeKalb, Illinois
Mr. David St. John Jesson, University of Malawi, Blantyre
Mr. Frank Kazembe, Ministry of Education
Participants: 53 primary school teachers

TANZANIA

Date: May 20 - 31, 1968
Site: University College, Dar es Salaam, Tanzania
Organizer: Institute of Education, Ministry of Education
Director: Dr. A. Beninati, Institute of Education, Ministry of Education
Lecturers: Dr. A. Beninati and other local lecturers assisted at this Institute
Participants: 50 primary school inspectors and 40 teacher training college tutors

ETHIOPIA - Double Institute

Date: August 12 - 30, 1968

Site: Haile Selassie I University, Addis Ababa, Ethiopia

Organizer: Ministry of Education, Ethiopia

Directors: Ato Tadesse Terrefe, Ministry of Education
Mr. John C. Fitzgerald, Ministry of Education
Mr. Roger Hartman, Peace Corps Volunteer & Entebbe Mathematics
Co-ordinator, Ethiopia
Messrs. Phil Thorn and Tom Orum, Yale University 5 Year B.A. Program

Lecturers: Professor B. J. Pettis, University of North Carolina
Professor Paul Johnson, University of California, Los Angeles
Ato Bisrat Dilnesahu, Haile Selassie I University

Participants: 107 grade seven supervisors

NIGERIA - Triple Institute

Date: August 19 - 30, 1968

Site: Government Teacher Training College, Lagos, Nigeria

Organizer: Education Department, Lagos City Council

Director: Mrs. Kike Ademakinwa, Education Department, City Hall, Lagos

Lecturers: Dr. Grace A. Williams, University of Lagos, and other local
lecturers

Participants: 230 primary school teachers, 20 head teachers and 8 tutors

NIGERIA

Date: August 19 - 31, 1968

Site: University of Ife, Ile-Ife, Western State, Nigeria

Organizer: University of Ife

Directors: Dr. A. Babs Fafunwa, University of Ife
Chief P. O. A. Dada, Institute of Education, University of Ife

Lecturer: Professor Paul A. White, University of Southern California,
Los Angeles, California

Participants: 32 primary and secondary teachers and teacher training college
tutors

GHANA

Date: August 25 - September 6, 1968
Site: University of Ghana, Legon, Accra, Ghana
Organizer: Ministry of Education, Ghana
Director: Miss Lucy L. Addy, Ministry of Education
Lecturer: Professor George Springer, Indiana University, Bloomington,
Indiana
Participants: 40 primary school teachers and 18 head teachers

3. Publication and Distribution of Entebbe Mathematics Series

The remaining texts of the Entebbe Mathematics Series completed at the final 1968 Mathematics Workshop include: the Primary Course Guide, one volume; Advanced Mathematics, 4 volumes - 2 each Student Text and Teachers' Guide. A Sourcebook for Training College Tutors, prepared at the ABC Institute in Nairobi, was also completed at the Workshop. In addition, the Primary Six texts and the Handbook for Primary Teachers were reviewed.

All publication and distribution tasks required by the 1968 Workshop texts and Handbook for Primary Teachers and 4 volumes of Additional Mathematics will be undertaken directly by the African Mathematics Program, utilizing Workshop participants and local printers.

During this report period, in addition to the pre-publication tasks for Primary Six, Science Research Associates, Inc., of Chicago, has reprinted Secondary C Two Algebra, Secondary C Three Algebra and Secondary C Four, the final volume in the 4 year Secondary course. This latter text is a reprinting of Secondary Five, with new covers and front matter.

3. Publication (cont.)

Our sub-contract with SRA terminates December 31, 1968. Due to this termination, the printing of the Primary Six texts will be accomplished in the Boston area. Also, consequent with the termination of the sub-contract and the pending conclusion of the experimental program, the entire inventory of Entebbe texts is being shipped to the participating African countries. Allocation has been based on the country requests, our evaluation of their requirements and the availability of the books.

Detailed information on the increased use of Entebbe textbooks in 1968 is not yet available.

4. ABC Institute

The ABC Institute, an activity of the African Mathematics Program sponsored by Education Development Center, is financed by a Ford Foundation grant for support of teacher training institutes for the improvement of mathematics teaching in Africa. The Institute is a two-year program (1966 - 1968) which aims to make available in each participating country a core of people who will undertake the supervision of development of curricular reform in mathematics, and who will bring about the necessary re-education of teachers and tutors.

"ABC" refers to the categories of African participants: A-participants are senior mathematics tutors from teacher training colleges; B-participants are the officials in the Ministry of Education who are responsible for mathematical education, or who are likely to assume such responsibility; C-participants are lecturers in mathematics from African universities who have been invited to assist in instruction at the Institute. (During the 1967/68 phase of the Institute a D-group, consisting of secondary school teachers, was added.)

The third residential session of the ABC Institute was held for a third time at University College, Nairobi, July 1 - 12, 1968, under the chairmanship of Dr. Grace A. Williams, University of Lagos, Nigeria. The Institute had forty-nine participants including thirty A, twelve B, and seven C participants.

A further activity of the ABC Institute is to prepare such written and audio-visual aids as might seem helpful to the teacher training tutors. In this regard three main projects are underway: the preparation of a Sourcebook for Training College Tutors, and the production of teacher training films and tapes. (See Progress Report on ABC Institute - Appendix E.)

5. Africa Travel Report

During the spring and summer months, Professor W. T. Martin, Mr. Hugh P. Bradley and Mr. John Joanou visited all the participating countries. The purpose of this travel was to visit Ministries of Education, local USAID officers and local Peace Corps directors to discuss the African Mathematics Program. In particular, discussions were held (1) to learn the extent of each country's commitment to, and immediate and long-term plans for, school curriculum reform in mathematics; (2) to explain to Ministries the effect of the change in funding of the program and to encourage them to submit proposals for further action to local USAID missions; (3) to alert local USAID missions to the countries' plans for curriculum reform in mathematics and (4) to assess the desire for teacher education films in mathematics. A detailed report of the conversations with these officials will be found in Appendix F.

For a report of Mr. Joanou's travel in Africa see Appendix G.

6. Co-operation with Other Agencies

It has been possible in some countries to bring about close co-operation with the Peace Corps and with other agencies. For example, at the request of the local Ministries, Peace Corps Volunteers have been assigned to supervise the use of Entebbe mathematics in Ethiopia, Kenya, Liberia and Sierra Leone. In Kenya, Tanzania and Uganda, Teacher Education in East Africa - appointed tutors in Teacher Training Colleges have assisted in the introduction and trial use of Entebbe mathematics by organizing teacher training institutes and in-service courses and distributing books.

In 1967 Yale University appointed two of its Fellows of the Five-Year B. A. Program to work with the African Mathematics Program. These two Fellows, replaced by another in 1968, worked in Ethiopia in co-operation with the Peace Corps in a Teacher Assistance Project. (A Report on this Project appears in Appendix H.)

In West Africa, the Northern Nigeria Teacher Education Project (University of Wisconsin) has successfully introduced the Entebbe materials in seven Training Colleges.

7. Planning Ahead

Despite the change in the funding of the Program, some research tasks remain and some tasks initiated by the research have to be completed.

The testing program will need about two more years before the necessary test preparation and pretesting are completed.

The closure of the sub-contract with Science Research Associates, Inc., and pressures of work of key consultants have delayed the publication of some of the 1967 Workshop texts and the 1968 Workshop texts are still at the earliest stages of pre-publication. It is hoped that all books will be

completed by December 1969.

The main outstanding obligation arising from the research activities is the provision of assistance to train teachers to take through to the end of the Primary or Secondary schools those children who initially started in experimental classes in Standard 1 or Form 1. There could be much bad feeling and accusations of lack of fair dealing if these classes and children have suddenly to switch to traditional mathematics because of the sudden cessation of the experimental program. It is estimated that Institutes are needed for another two years.

A list of work outstanding in the experimental program is given in Appendix I.

Finally, it seems certain that all the participating countries intend to introduce modern mathematics into all the schools under their jurisdiction. They realise that such a large-scale change in mathematical education will necessitate a tremendous program of training and retraining teachers. At present none of the countries has sufficient well-qualified personnel to initiate such programs, and few have the finances to cover the training costs. The importance of mathematics in school and its increasing importance in a technological world has added impetus to the desire for change. It is to be expected that most of these countries will be making formal and informal requests for assistance in their retraining program. (Examples of discussions and proposals on on-going programs are attached in Appendices J and K.)

* * *

In conclusion, EDC wishes to express its thanks to the Office of Program Policy and Co-ordination of AID/W, to the Contract Officers of AID/W responsible for csd-1567 and to the educational advisors of the AID missions in the participating countries for their co-operation in this joint effort to improve mathematics education in Tropical Africa.

THE MOMBASA MATHEMATICS WORKSHOP

SUMMER 1968

by Mr. Julius Jonah

The seventh and final Mathematics Workshop was held at Nyali Beach Hotel, Mombasa, Kenya, from July 1, 1968 to August 10, 1968. The participants this year came from Ethiopia, Ghana, Kenya, Malawi, Nigeria, Sierra Leone, Tanzania, Uganda, the United Kingdom and the U.S.A. Co-chairmen were Professor W. T. Martin of the Massachusetts Institute of Technology and Dr. Awadagin Williams of Fourah Bay College, University of Sierra Leone.

Plenary Session

The first part of the plenary session was opened on Monday, July 1, 1968 by Professor W. T. Martin. He remarked that Dr. Awadagin Williams, the other co-chairman, would arrive a week late, and then welcomed the participants and introduced Mr. B. G. Kiai, Acting Provincial Education Officer, and Mr. John Bundred, Inspector of Schools, Coast Province. After a report by Mr. Frank Kazerbe on Entebbe mathematics activity in Malawi and statements by chairmen of the various writing groups on their plans for the summer, Professor Martin discussed the status of the African Mathematics Program. He read a cable from USAID/Washington to local AID missions in Africa which described the change in funding of the program and explained that the program had previously been sponsored mainly by the Research Department of AID, but as the program was moving from the experimental stage into the implementation stage, on December 31, 1968 the funding will no longer be undertaken entirely by USAID/Washington. Implementation costs would have to be assumed by Ministries and local USAID missions or other granting agencies.

Next Professor Vincent Haag reported on the Evaluation Meeting which he had attended at USAID/Washington in June, and Mr. Bradley discussed future

directions of the African Mathematics Program, such as the production of teacher training films and tapes.

Plenary Session - Part Two

The second part of the plenary session was held on Tuesday, July 2, after the arrival of the participants from West Africa who had been delayed en route. Mr. I. Cheluget, Deputy Provincial Commissioner, formally opened the session and welcomed the participants to Mombasa. Reports were then given on the position of Entebbe mathematics in nine participating countries. These reports reflected the strong enthusiasm with which Entebbe mathematics has been received and indicated the need for increased teacher education programs.

After the reports, Mr. Bradley made mention of the Social Studies Conference which was to be held at Nyali Beach Hotel from August 19 to August 31, 1968.

New Arrivals

On Sunday, July 7, Dr. Awadagin Williams, co-chairman of this year's Workshop, arrived. On the 12th and 13th of July, Professor Paul Johnson, Dr. Grace A. Williams and Mr. F. B. Dyck Haeding arrived; they had been members of the staff at the Nairobi ABC Institute. These four people joined the various writing groups to help with the activities of the Workshop.

Workshop Activities

1. Main Activities. There were three writing groups this year: Primary, Secondary and Testing. The work carried out by each group was as follows:

Primary Writing Group

The Primary group, led by Professor Clarence Hardgrove of Northern Illinois University, achieved its aims in its four-week period: (1) The Primary Six Teachers and Pupils books were revised and edited; (2) The Handbook for Primary Teachers (Primary 1-6) was thoroughly revised, exercises were added and final editing was done; (3) The Primary Course Guide (the main production) was completed. This volume contains six parts: Introduction,

Overview of Entebbe Primary Program, Outline of Program Flowchart, Four Plans for Use of the Six Primary Books, and Suggestions for Transition from Entebbe Primary Program to Entebbe Secondary Program.

Secondary Writing Group

Chairmen of this group were Professor Hartley Rogers of the Massachusetts Institute of Technology and Dr. D. K. Abbiw-Jackson of the University of Science and Technology, Kumasi, Ghana. The main task of the group was to write the Advanced Mathematics for the A-level course, which requires work over two years for approximately one-third of the student's time. The final form of the Additional Mathematics for O-level which was started last year and the first draft of the Advanced Mathematics texts were completed in the six-week period. The chairmen and editors stayed on for two more weeks to complete the work on Advanced Mathematics.

Testing Group

The Testing group, whose chairman was Professor Robert Dilworth of the California Institute of Technology, completed the following by the end of their six weeks: a specimen Primary Leaving Examination and specimen O-Level Examination, two forms each of end-of-year Primary Four and Primary Five exams, and a comprehensive test for end of Secondary C Three. The Primary Three tests that were pre-tested in Nigeria and Ghana were scored and the results compiled ready for a complete statistical analysis, and Secondary C One and C Two test results were put in final form.

2. Other Activities

A. ABC Institute Sourcebook. Dr. Grace Williams and Professor Paul Johnson, who arrived in Mombasa in mid-July from the ABC Institute in Nairobi, spent four weeks at the Workshop and in that time completed a Sourcebook for Training College Tutors. The Sourcebook contains suggested syllabuses for

teacher training colleges and explains how topics should be treated and tested. It is hoped that the Sourcebook will be of help in the running of teacher training institutes.

- B. Seminars. Apart from the writing sessions, seminars were held twice a week at which lectures on mathematics (sometimes followed by discussions) were given by members of the Workshop. Some of the topics lectured on dealt with basic ideas of mathematics; others were more special and high-powered.
- C. Entertainment. An able entertainment committee arranged interesting activities at least once a week in the evenings. The entertainment consisted of variety concerts, film shows and dancing.
- D. Ghana Teacher Training Films. Two mathematics films made in Ghana were shown. These films showed Entebbe primary mathematics being taught to Ghanaian children by Ghanaian teachers. The films were very well received, and valuable suggestions were made for improvement in later films.
- E. Visits. An important visitor to the Workshop this year was Dr. Bruce Vogeli of Columbia University, who made a preliminary visit to make arrangements for the forthcoming visits of the Evaluation Committee of AID. He talked with African members of the Steering Committee, the chairmen of the writing groups, and with individual country groups.
- F. Steering Committee Meetings. During the Workshop period the Steering Committee of the African Mathematics Program met to consider the whole program and future plans. In one of these meetings Professor Martin emphasized that the ~~Steering~~ Steering Committee should continue to have a fundamental role in plans for implementation, and in addition, that ad hoc committees

for special tasks and country or regional committees would almost certainly be needed also. Professor Martin said he plans to appoint such committees as the need arises.

Conclusion

In these seven years of active participation and co-operation at the Workshops, it has been evident that Africans, Americans and Europeans have all gained mathematically and culturally. It has been a wonderful experience for us all, and I am sure that we shall always remember those years of hard work, friendship and understanding. We (the Africans) are indeed grateful for the opportunity the U.S.A. through EDC has given us to participate in this program.

As one speaker said at the farewell banquet, "This is the type of help the developing countries in Africa need - help with no strings attached." And as another speaker said at the same gathering, "The ball is at our feet." The ball is indeed at our feet, and our efforts shall not flag in seeing that the ball is carefully directed towards the desired goal of modern mathematics.

August 30, 1968

1968 MATHEMATICS WORKSHOP PARTICIPANTS
MOMBASA, KENYA

Co-Chairmen: WILLIAMS, Dr. Awadagin D., Fourah Bay College, Freetown,
Sierra Leone
MARTIN, Professor W. T., Department of Mathematics, Massachusetts
Institute of Technology, Cambridge, Massachusetts, USA

Primary Writing Group Chairman: Professor Clarence E. Hardgrove

ADDY, Miss Lucy L., Ministry of Education, P.O. Box M. 45, Accra, Ghana
HAAG, Prof. Vincent H., Department of Mathematics, Franklin & Marshall College,
Lancaster, Pennsylvania
HARDGROVE, Prof. Clarence E., Department of Mathematics, Northern Illinois
University, DeKalb, Illinois
HILL, Prof. Shirley A., School of Education, University of Missouri at Kansas
City, Kansas
JONAH, Mr. Julius E., Prince of Wales School, King Tom, Freetown, Sierra Leone
KAZEMBE, Mr. Frank N., Ministry of Education, P.O. Limbe, Malawi
TROYER, Prof. Robert J., Department of Mathematics, Phillips Hall, University of
North Carolina, Chapel Hill, North Carolina

Advanced Mathematics Group Chairmen: Dr. D. K. Abbiw-Jackson
Professor Hartley Rogers, Jr.

ABBIW-JACKSON, Dr. D. K., Department of Mathematics, University of Science and
Technology, Kumasi, Ghana
AGBAJE, Mr. Titus A., Ibadan Grammar School, P.O. Box 21, Ibadan, Western Nigeria
ALLOTEY, Dr. F. K. A., University of Science and Technology, Kumasi, Ghana
BELL, Prof. Charles B., Department of Mathematics, Case Western Reserve University,
Cleveland, Ohio
DILNESAHU, Ato Bisrat, Department of Mathematics, Haile Selassie I University,
Addis Ababa, Ethiopia
GOLDBERG, Prof. Samuel, Department of Mathematics, Oberlin College, Oberlin, Ohio
GREEN, Prof. John W., Department of Mathematics, University of California, Los
Angeles, California
HILTON, Prof. Peter J., Courant Institute of Mathematical Sciences, New York, N. Y.
KREIDER, Prof. Donald L., Department of Mathematics and Astronomy, Dartmouth
College, Hanover, New Hampshire
LYNCH, Mr. Ransom V., Phillips Exeter Academy, Exeter, New Hampshire
MATTUCK, Prof. Arthur P., Department of Mathematics, Brandeis University, Waltham,
Massachusetts
McFADDEN, Prof. Robert, Department of Pure Mathematics, The Queen's University of
Belfast, Belfast, Northern Ireland
McKEAN, Prof. Henry P., Jr., Department of Mathematics, Rockefeller University,
New York, New York
McNABB, Mr. William K., St. Mark's School of Texas, Dallas, Texas
MUZE, Mr. Mishael S., Head, Mathematics Department, Shinyanga Secondary School,
Nwadui Mines, Tanzania
OGUNTUNDE, Mr. P. A., Comprehensive High School, Aiyetoro, Abeokuta, Western
State, Nigeria
OSTBERG, Prof. Donald R., Department of Mathematics, Northern Illinois University,
DeKalb, Illinois

(continued)

ROGERS, Prof. Hartley, Jr., Department of Mathematics, Massachusetts Institute of Technology, Cambridge, Massachusetts
SWAIN, Mr. Henry G., New Trier Township High School, Winnetka, Illinois
WILLIAMS, Dr. Awadagin, Department of Mathematics, Fourah Bay College, Freetown, Sierra Leone

Testing Group Chairman: Professor Robert P. Dilworth

AMISSAH, Mr. S. E., Government Secondary Technical School, P.O. Box 252, Takoradi, Ghana
AVINYIA, Mr. Baranaba, Arua Teacher Training College, P.O. Box 63, Arua, Uganda
DILWORTH, Prof. Robert P., Mathematics Department, California Institute of Technology, Pasadena, California
HARDING, Mr. F. B. Dyck, Milton Margai Training College, Goderich, Freetown, Sierra Leone
JACKSON, Mr. Joe S., Department of Mathematics, University of Ghana, Legon, Accra, Ghana
JOHN, Miss Lenore S., 1153 East 56th Street, Chicago, Illinois
JOHNSON, Prof. Paul B., Department of Mathematics, University of California, Los Angeles, California
JONES, Mr. M. B., Christ's Hospital, 2 King Edwards Road, Horsham, Sussex, England
PIETERS, Mr. Richard S., Phillips Academy, Andover, Massachusetts
TEJUNOLA, Dr. H. O., Department of Mathematics, University of Ibadan, Ibadan, Western Nigeria
WILLIAMS, Dr. Grace A., Faculty of Education, University of Lagos, Lagos, Nigeria

Visitors

BRUNO, Mr. Björn, Department of Mathematics, Kenya Science Teachers College, Nairobi, Kenya
DUNKELS, Mr. Andreas, Department of Mathematics, Kenya Science Teachers College, Nairobi, Kenya
HARTMAN, Mr. Roger, Peace Corps Volunteer, c/o U.S. Peace Corps, P.O. Box 1096, Addis Ababa, Ethiopia
HEIN, Mr. Steven M., Yale University Five-Year B.A. Program, c/o Ministry of Education, P.O. Box 2399, Addis Ababa, Ethiopia
PHYTHIAN, Mr. J. E., Head, Mathematics Department, University College, P.O. Box 9184, Dar es Salaam, Tanzania
(Member, African Mathematics Program Steering Committee)
VOGELI, Dr. Bruce, Department of Mathematics, Teachers College, Columbia University, New York, New York

Support Staff Administrator: Mrs. Theresa Bradley

AKANJI, Mr. Michael B., Department of Mathematics, University of Ibadan, Ibadan, Western Nigeria
BRADLEY, Mrs. Theresa, 47 Dartmouth Avenue, Needham, Massachusetts
HARRISON, Miss Annette, Lee College, Baytown, Texas
NOLAN, Miss Patricia, African Mathematics Program, EDC, 55 Chapel Street, Newton, Massachusetts
WILLIAMS, Miss Peggy, Women's Health and Physical Education Department, Texas Technological College, Lubbock, Texas

REPORT OF TESTING GROUP

by Robert P. Dilworth

PRIMARY TESTING

During the 1965 Workshop, the first steps were taken to develop a comprehensive test to be used with classes completing the Primary III text. It was intended that this test should measure the ability to do elementary problem analysis and problem solving as well as mathematical knowledge and skills. Several sequences of questions were developed during the 1965 Workshop and were refined and extended during the 1966 Workshop. These sequences were tested in-depth in Ghana in the spring of 1967. The sequences were then further modified and combined into three tests, each test consisting of two parts with each part requiring 30 minutes of testing time. These tests were pretested in the spring of 1968 in three African countries. In Ghana, the pretesting was carried out under the supervision of Miss Lucy Addy. In Malawi, Mr. Frank Kazembe supervised the pretesting, and in Nigeria the pretesting was carried out under the supervision of Dr. Grace Williams.

One of the first tasks of the Testing Group was the scoring and preliminary analysis of these test papers. This task was carried out and the preliminary results indicate that, with some modification, the sequences of questions should provide an adequate basis for tests which will accomplish the general objectives outlined above. Before the final form of the tests can be set, item analyses and correlation studies must be made. Since suitable computing facilities are not available at the Workshop, this work must be done later in the U.S.

The second major task with regard to Primary testing was the preparation of a specimen paper for a Primary Leaving Examination. Discussions with representatives of the various African countries have indicated that a paper

covering the Primary volumes through the first half of Primary VI would be most useful. Since many of the present Primary Leaving Examinations have portions in multiple choice form, it was decided to use the multiple choice form with four choices for each question. A pool of questions was constructed. In collaboration with the Primary Writing Group, questions were selected from the pool and refined for inclusion in the final form of the specimen paper. This paper will be available for distribution in the fall.

Finally, the Testing Group prepared end-of-course examinations for Primary IV and Primary V. Two parallel forms for each test at each level were constructed. These tests will be available for pretesting this fall.

The following members of the Testing Group participated in the development of the Primary tests: B. Avinyia, R. P. Dilworth, Lenore John, H. O. Tejumola, with the assistance of F. B. Dyck Harding and J. Jonah for the latter portion of the Workshop.

SECONDARY TESTING

The principal tasks of the Testing Group with respect to Secondary testing were to (1) prepare a test covering the material in Secondary C-3, (2) revise tests C-1 and C-2 in the light of their use in Tanzania in the spring of 1968, (3) collaborate with the Secondary Writing Group in preparing the final form of the Additional Mathematics Syllabus and Specimen Examination. It was also felt desirable to have a comprehensive examination covering C-1, C-2, and C-3 and to start a pool of questions for an A-level Specimen Examination.

Two parallel C-3 tests were prepared. As with the previous tests in this series, each test consists of 40 questions in five-choice form to be taken during a 2 hour period. These tests will be available for pretesting in the fall.

The results of the Tanzania pretesting became available during the second week of the Workshop. The statistical data included difficulty and discrimination indices as well as information on distractor performance. This data was used to revise the C-1 No. 1 test which was prepared in 1966 and the two C-2 tests which were prepared in 1967. Unfortunately, the second C-1 test was not pretested this spring, but some modifications were made in the light of the C-1 No.1 data. The C-2 tests turned out to be rather too difficult, and many of the revisions were designed to correct this deficiency.

The Testing Group and members of the Secondary Writing Group collaborated in the revision of the Additional Mathematics Syllabus and Specimen Examinations. The preliminary versions had been prepared during the 1967 Workshop when only a portion of the Additional Mathematics text was available. Thus the preliminary Syllabus did not accurately represent the final test. The Syllabus was modified to correct this deficiency. Finally, some of the questions on the Specimen Examinations were altered to make the Examination correspond to the Syllabus.

Two revision tests covering the material in volumes C-1, C-2 and C-3 of the Secondary series were prepared. Each test consisted of two sections. The first section is a 2-hour test consisting of 10 essay type questions. The second section is a 2-hour test consisting of 40 short answer questions.

Drafts of the Advanced Mathematics chapters did not become available until late in the Workshop, so that it was not feasible to start a pool of questions for an A-level Specimen Examination.

The members of the Testing Group working on the Secondary tests were S. Amisshah, J. Jackson, P. Jones and R. Pieters. Mr. Pieters supervised this part of the work.

As a special project, the Testing Group was asked to consider the design of an appropriate examination to be given at the completion of a five-year program at a Teacher Training College. It is envisioned that such a program

would include work based on the Basic Concepts Series as well as Certificate level work in secondary mathematics. After considerable discussion it was concluded that the Specimen Examination should consist of two parts. The first part would be a 2 1/2 hours essay type examination designed to test the kind of understanding of mathematics which is needed by a prospective teacher. The second part would be a 2 1/2 hours short answer or multiple choice examination designed to test mathematical knowledge and skills. It is contemplated that this second part can be constructed by appropriate selections from the extensive pool of secondary questions already at hand. On the other hand, the first part requires the formulation of questions of a quite novel type. Each of the members of the Testing Group devoted some time to devising such questions. A number of promising possibilities were obtained, and from these a tentative draft of a 2 1/2 hour examination was prepared.

FUTURE ACTIVITIES

Since many of the tests are still in preliminary form, it should be useful to outline what should be done to complete the testing program.

1) Primary III Tests. Item analyses and correlation analyses should be made on the results of the Ghana, Nigeria and Malawi pretesting. About 1/2 hour of computer time will probably be required. On the basis of the results, final forms for the tests should be assembled and prepared for distribution. This could well be done this fall. After the first relatively large use by experienced teachers, the tests should be normed.

2) Primary IV and V Tests. These tests should be distributed to appropriate countries this fall and winter for pretesting. When the results are known (perhaps next spring) the tests should be put in final form. If norming is required, this could be done about a year later. Analysis of pretest results would require about 1/2 hour of computer time.

3) The Primary Leaving Examination prepared this summer is a specimen examination designed to serve as a guide to the Ministries who will be setting such examinations for Entebbe classes. However, the level of difficulty rests entirely on the collective judgment of the members of the Primary Writing and Testing Groups. It would be very useful to have this test administered on an experimental basis to classes completing at least the first half of Primary VI. The results would provide a valuable objective check on the suitability of the Specimen Paper. Furthermore, it is likely that many classes will want to use this examination as a practice or evaluative examination during the sixth year. If so, the test should be pretested and an experimental administration would provide the appropriate data for this purpose.

4) The second C-1 test has not been pretested in Tanzania. The revised version of this test should be reproduced and forwarded to Tanzania this fall for pretesting.

5) The two forms of the C-3 test prepared this summer should be reproduced and forwarded to Tanzania for pretesting. Suitable classes should be available in the spring of next year. If the computer runs are made in Tanzania, funds should be provided to reimburse the University for this service.

6) When the pretest results are in, final forms of the C-1 No.2 and C-3 Nos. 1 and 2 tests should be prepared for distribution.

7) Prof. J. E. Phythian (University College, Dar es Salaam) has indicated that there will be considerable interest in early use of the C-1-2-3 revision tests. After the first such use, the results should be reviewed and, if necessary, the level of difficulty of the tests should be adjusted.

8) The Specimen O-level Examination prepared in 1966 has been widely circulated. The second paper prepared in 1967 is presently secure since it is likely to be used in an actual administration by the Cambridge Overseas Examinations Syndicate. After use, it should be made available as a practice or mid-year examination. Its value in this capacity would be considerably enhanced if test and item data could be obtained from the Cambridge Syndicate for analysis purposes.

9) A preliminary form of a 2 1/2 hour essay test covering the material of the Basic Concepts Series and appropriate for testing students completing a course in a Teacher Training College was prepared. A similar 2 1/2 hour short answer test should be constructed from the secondary question pool. These two tests would then make up the two sections of a specimen examination for the Teacher Training Colleges.

10) An A-level Syllabus and Specimen A-level Examination should be prepared this fall as soon as an edited copy of the A-level text is available.

Professor Robert P. Dilworth
Chairman, Testing Group

APPENDIX

Status of Tests

PRIMARY

- Primary III. Pretested this spring. Will be put in final form this fall and will be ready for distribution.
- Primary IV. Two tests in preliminary form are ready for pretesting when classes are available.
- Primary V. Two tests in preliminary form are ready for pretesting when classes are available.
- Specimen Primary Leaving Examination. Ready for reproduction and distribution.

SECONDARY

- Secondary C-1. Two tests prepared in 1966. One was pretested in Tanzania and revised in 1968. Ready for reproduction and distribution. The second must be pretested before it is ready for distribution.
- Secondary C-2. Two tests prepared in 1967. Both have been pretested in Tanzania and revised in 1968. Ready for reproduction and distribution.
- Secondary C-3. Two tests prepared in 1968. These are in preliminary form and will be pretested in Tanzania this year.
- Secondary C-1-2-3 Revision. Two tests prepared in 1968. Each test consists of two sections. The first section is a 2-hour essay type test while the second section is a 2-hour short answer test. This test may be distributed but with the proviso that it will probably be modified after pretesting.
- Additional Mathematics. Specimen Examination accompanying the Syllabus. A 2 1/2 hour essay type examination with is ready for distribution.

TEACHER TRAINING

A preliminary 2 1/2 hour, essay type test has been assembled. It will be combined with a 2 1/2 hour, short answer test constructed from the pool of secondary questions to make up a specimen examination to be used as a model for examinations in the Teacher Training Colleges.

STEERING COMMITTEE MEETING - MOMBASA

The Steering Committee of the 1968 Mathematics Workshop met on Monday, July 22, 1968 at 4:30 p.m. in Room 1 of the Nyalí Beach Hotel. Professor W. T. Martin presided. Members of the Steering Committee present were: Dr. D. K. Abbiw-Jackson, Mr. Hugh P. Bradley, Professor Robert Dilworth, Professor Vincent Haag, Professor Clarence Hardgrove, Professor Shirley Hill, Professor J. E. Phythian, Dr. Awadagin Williams, Dr. Grace Alele Williams.

REPORT OF PRIMARY GROUP

Professor Clarence Hardgrove reported on the work done on Primary Six, Teachers' Handbook, and the Entebbe Primary Course Guide. She reported that only one copy of Primary Six is available for inspection at this time. She further stated that this copy is very poor, and that it does not represent the work that was sent to SRA. SRA is editing this copy this summer.

Ten copies of the Teachers' Handbook are available. Fifty copies were used at the ABC Institute. With the addition of a few exercises and a few minor editing changes, the copy will be ready for publication.

The Entebbe Primary Course Guide, a guide for use of Entebbe Mathematics Series, Primary, is being prepared. This volume contains six parts: Introduction, Overview of Entebbe Primary Programme, Outline of Programme--Flow Chart, Four plans for use of the six primary books, and Suggestions for transition from Entebbe Primary Programme to Entebbe Secondary Programme. Professor Hardgrove reported that the group felt that Group D was the poorest of the four plans presented. It is not as well balanced as the other programmes.

Professor Phythian reported that some schools in Tanzania are using a book a year, and some will be ready for Book 6 in January. There was discussion as to the amount of time spent during the school day on mathematics in the Tanzania schools in order to accomplish this one book in one year coverage. Professor Phythian reported that strong emphasis is placed on mathematics in the Tanzania schools at the present time.

Mr. Bradley reported that 20,000 copies of the Teachers' Handbook, Primary Six, will be printed; 7,000 copies of the Entebbe Primary Course Guide will be printed; 7,000 copies of Additional Maths will be printed. There was also some discussion concerning the distribution of the Entebbe Primary Course Guide. The advisability of distribution to Ministries, Teachers Colleges, officials and teachers was discussed but no decisions were made.

PRIMARY TESTS

Professor Dilworth reported that the Testing Group now has the primary test that was pre-tested in Nigeria and Ghana. They are presently being scored, and he hopes to have statistical results shortly.

The Testing Group has prepared a Specimen Primary Leaving Examination. It is now complete. Professor Dilworth further reported that two forms of an end-of-year Primary 5 exam and one form of an end-of-year Primary 4 exam will be in good order by the end of the Workshop. It is assumed that these tests will then be made available to teachers who would like to administer them. There was some discussion of the problems arising in administering these tests under Plans B, C, and D of the Entebbe Primary Course Guide, since some of the material is not presented sequentially. Professor Dilworth observed that even though the tests stay fairly close to the book, they are flexible enough not to be a serious problem. There was further discussion of the fact that these tests have not been pre-tested because there is no more support available.

The need for pre-testing end-of-year tests does not seem as great as if they were leaving exams. Professor Dilworth did observe, however, that a more satisfactory test could be obtained if it were pre-tested.

Professor Martin said that the group should not write off pre-testing. He noted that there is an obligation to see the programs through in Ghana, Nigeria and Tanzania, and the final results of the experimental program will not be known until some form of testing has been done.

REPORT OF SECONDARY GROUP

Dr. Abbiw-Jackson reported that twenty chapters of Additional Maths are in final form. The two chapters of the Probability section will be ready before the end of the Workshop. The editors are getting the copy into final shape. He further reported that the group hopes to have the final copy of the Advanced Maths by the end of the Workshop. He said that Professor Hartley Rogers will adapt the Probability in the Advanced Maths to fit the Additional Maths.

Professor Pythian reported that some schools in Tanzania will be ready for these books in January. He further inquired about the Teachers' Guide, most of which was written last summer. The report is that they will be ready by the end of the Workshop.

Professor Martin commented that the work that is completed by the end of August is all that will be done on the A-Level course. The problem on the A-Level course seems to be deciding what to leave out. There is an abundance of material. The course content is essentially the same as outlined by Dr. Awadagin Williams in 1967, although some changes have come about through the work done here this summer.

Mr. Bradley reported that SRA has decided not to publish any books after they complete Primary 6. The only way to be able to offer the books now being written will be to find another printer. If it is necessary to offer bids in order to find a publisher, it will take about nine months. The alternative is to get a job printer or use EDC equipment for these last four volumes. It was stated that Mr. Henry Swain might be available as producer-editor of the remaining books. There was also some discussion

as to whether EDC would be willing to take the added responsibility of this work, or whether their equipment would be available.

SECONDARY TESTS

Professor Dilworth reported that the results of tests of C-1, Form 1, used in Tanzania look good. There were no copies of Form 2 sent to Tanzania. It is important to try to correct this error and send them C-1, Form 2 in order that data may be obtained on this test also.

Data are available on both tests of C-2. These tests will be put into final form this summer. Indications are that the tests are hard. Professor Dilworth suggested that it is important to be on the lookout in preparation of other tests that they, too, are not too hard. The group is preparing two tests, essentially parallel forms, for C-3, and a comprehensive test to come at the end of C-3.

ABC INSTITUTE, SOURCEBOOK

Dr. Grace Williams reported on the progress of the ABC Institute Sourcebook. She indicated that there had been requests from several sources for this kind of material. The participants at the ABC Institute have written syllabuses for teacher training colleges explaining in some detail what topics should be covered, what should be tested for, and the reason for introducing these topics.

In addition to the syllabuses, the Sourcebook will be helpful in handling Institutes. Dr. Williams stated that if supported by a competent mathematician, the ABC participants will be valuable at Institutes. This Sourcebook will have some additional material that they need.

Because of the different maths background of the two-year and the five-year teacher training college students, two syllabuses are being prepared. The Sourcebook must give some thought to the low grade teacher training colleges which still exist.

Professor Martin commented that he thought the final session of the ABC Institute had been very successful. A great deal of good work had come from the Institute.

DISPOSITION OF LIBRARY VOLUMES

Concerning the disposition of the library volumes, Professor Martin reported that he had asked that the books be sent on "permanent loan" to the various African universities and teacher training colleges. He asked the members of the Steering Committee who are resident in Africa to act as a group to select certain volumes that they felt would be useful to their various schools.

EVALUATION. DR. BRUCE VOGELI'S VISIT

Professor Martin reported that Dr. Bruce Vogeli will be here for a week, beginning Thursday, July 25, for an evaluation visit. Professor Martin has arranged for Dr. Vogeli to meet with the following groups: African members of the Steering Committee, Chairman of the Primary Group, Chairmen of the Secondary and Testing Groups, and with individual country groups. It was not clear at the moment what information Dr. Vogeli would want. His visit may be to find out whom Professor Gail Young should see when he visits the different countries later in the year.

FUTURE ACTIVITIES

Professor Martin emphasized that the African Mathematics Program is not ended. He felt that those countries who have experimental programs must be helped to the end of their programs. The Steering Committee should continue to have a fundamental role in plans for implementation. At the same time ad hoc committees for special tasks and country or regional committees, will almost certainly also be needed. He plans to appoint such committees as the need arises.

Professor Martin reported further on a meeting to be held in Trinidad of all Commonwealth countries in September to consider elementary mathematics. EDC has been invited to send representatives to this meeting.

Professor Phythian, in closing, stressed the fact that the program is in many different stages in Tanzania, and that country will need support for several years. Other participants whose countries are in similar experimental programs expressed the same feeling.

TEACHER TRAINING INSTITUTES

Appendix D

Summary: Report by Curriculum Development & Research Centre on the Institute for Mathematics Tutors from Primary Teachers Colleges at the Kenya Institute of Administration in Nairobi, Kenya
December 4 - 16, 1967

A. Purpose of the Institute

This course was designed to strengthen the background of mathematics tutors in modern mathematics and provide them with guidance on modern techniques of teaching mathematics in the primary schools.

B. Organization

The Institute was organized, staffed and directed by the Curriculum Development & Research Centre, without the aid of U.S. lecturers. It was financed by the Kenya Ministry of Education and Education Development Center.

C. Participants

Thirty-two mathematics tutors and 21 mathematics and science tutors attended the course, as well as the primary school supervisors from the Nairobi City Council, and one representative of the Kenya National Union of Teachers.

D. Program

1. Lectures on Mathematics. These lectures were designed to give the participant a clearer understanding of the real number system with particular emphasis on the group and field properties. Participants gained some experience in working with bases other than 10 and were given some work with transformation geometry.
2. Lectures on Methods. The major emphasis was on discovery techniques in these lectures, which covered teaching of addition, subtraction, multiplication and division; use of the number line, use of addition and multiplication tables, properties of square numbers, prime numbers, triangular numbers and multiples. The tutors also listened to tapes which were later broadcast to the colleges and were given advice on how to make radio programs an integral part of their teaching.

Some of the notes used in the methods were mimeographed and bound in the form of a Mathematics Handbook for Primary Teachers, and each college was given thirty copies for use in their methods courses.

3. Organization of Time. The mathematics tutors spent two hours per day on academic background, two hours per day on methods and two hours per day on discussion of textbooks, listening to and discussing radio programs and visiting demonstration classes (the latter under the supervision of the science section).

E. Evaluation

The verdict of the tutors was that the course was useful and would be most helpful to them in their teaching. The main criticism was that more emphasis should have been placed on methods of teaching in the upper primary standards. Overall, the course was very successful. Most of the tutors are using our notes with their own students and some of them are using them in their upgrading courses for untrained teachers and headmasters.

F. General Comments

Some of the participants said that they were now convinced that the so-called new mathematics would make mathematics more understandable and enjoyable for youngsters. Others said that for the first time they really understood elementary arithmetic. They were particularly interested in how pupils can be guided to find patterns in the operations, in addition and multiplication tables, and in counting charts.

Submitted by Mr. S. N. Kagiri
Curriculum Development & Research
Centre

Summary: Report by Curriculum Development & Research Centre on the
Institute for Secondary Teachers at University College,
Nairobi, Kenya
December 13 - 21, 1967

A. Purpose of the Institute

The course was planned for those secondary teachers who will be introducing the Entebbe Secondary C One books into Kenya schools in January, 1968. Its two main purposes were to familiarise the teachers with the content of the books and to give them sufficient background mathematics so that they could acquire confidence in handling the new materials.

B. Organization

The Curriculum Development & Research Centre organized the course, which was financed jointly by EDC and the Ministry of Education. The following local lecturers were employed: Dr. Irving Hollingshead, Lecturer at University College and Consultant to the Entebbe Secondary Mathematics Program in Kenya; Mr. S. N. Kagiri, Mr. F. G. Richards and Mr. George Edmonds of the CDRC staff; Mr. B. J. Mehta and Mr. Roger Soucey of Kenyatta Teacher Training College.

C. Participants

Twenty-six teachers participated in the course, including teachers who will be introducing Entebbe Mathematics into schools next year and teachers, mainly this year's graduates of Kenyatta College, who will be teaching mathematics next year and who are interested in modern mathematics. Participants in the second category attended without reimbursement for expenses; therefore, their enthusiasm for modern mathematics, which caused them to sacrifice their time and money, was very encouraging.

D. Program

1. Lectures. Topics discussed in lectures included set theory, algebraic systems, the number system, numeration systems, number theory and geometry.
2. Discussion of Modern Secondary Mathematics Program. Under the direction of Dr. Hollingshead, the teachers examined the Entebbe Secondary C One texts topic by topic, analyzing the content and comparing the approach adopted by Entebbe texts with that of other secondary mathematics programs, such as SMSG, School Mathematics Project, Scottish Mathematics Group and University of Illinois Committee on School Mathematics. This part of the course was intended to familiarize the teachers with the Entebbe materials and to broaden their thinking about the teaching of modern mathematics.

Most of the topics covered were not taken to a conclusion; it was hoped that by posing certain questions and leaving them unanswered, the lecturers would stimulate teachers to search for ideas, building on the foundation of what they had learned.

(continued)

E. Peace Corps Participation

Mr. Douglas Shult, Peace Corps Volunteer teaching in Kenya, was an outstanding participant. He and two other Volunteers, Mr. William Bussey and Mr. Sidney Coon, did much to enliven the discussions and prompt the lecturers. Mr. Bussey and Mr. Shult discussed their experience with teaching the Entebbe materials in Nigeria.

F. Evaluation

The organizers of the course felt that on the whole it was reasonably successful. The lecture material went over well, and the teachers displayed an obvious enthusiasm for modern mathematics. Participation in the discussions was good; at the beginning some of the teachers lacked confidence in talking about the new ideas, but towards the end they spoke quite freely.

Most of the ideas learned by the teachers will be directly useful to them in the classroom. Even when the ideas discussed in the lectures had no immediate connection with what was contained in the text, trouble was taken to show how an understanding of the concepts could be brought to bear in their teaching.

Submitted by Mr. S. N. Kagiri,
Curriculum Development & Research Centre

Summary: Report by Professor Roy Dubisch on the Teacher Training Institute at University College, Dar es Salaam, Tanzania, December 11 - 22, 1967

A. Organization

The Institute for secondary school mathematics teachers was sponsored and organized by the University College, Dar es Salaam, with the co-operation and assistance of the Ministry of Education.

The main organizers of the course were Dr. A. Beninati of the Institute of Education, University College, and Professor J. E. Phythian of the Mathematics Department, University College. The other seven staff members besides myself were from either the Ministry of Education or University College.

B. Participants

Participants at the Institute included 98 secondary school mathematics teachers whose academic backgrounds ranged from A-level to university graduate level.

C. Program

1. Morning lectures. Teachers were divided into groups for teaching Year 1, Year 2 or Year 3. Some morning lectures were given to individual groups, and some, to the combined year groups. Year 1 lectures were on Basic Algebra and Basic Geometry; Year 2 and 3 lectures included such topics as symmetry, points, lines, congruence, measurement and transformation geometry; and Year 3 lectures were on finite geometries and the concept of proof. Lecture topics for all years combined included analysis, probability and statistics, algebraic structures, and computers and linear programming.
2. Afternoon discussions. During the afternoon participants broke up into groups to discuss the textbooks, computer programming, modern A-level mathematics, and "the way ahead." It was felt that the amount of time scheduled for discussion was a bit excessive and that some of the participants could have profited more from supervised study for half of that time.
3. Late afternoon activities. These activities were of recreational or general educational interest; for example, swimming, tennis, excursions to nearby towns, visits to museums and to a computer, and a Farewell Dinner.
4. Evening activities. Evenings were spent in watching films or slide shows, listening to lectures on SMP in the United Kingdom and modern mathematics in the U. S., and listening to teachers' SMP and Entebbe project school reports.

D. Conclusion

The Institute was quite successful and the overall quality of lecturers high. Three weaknesses noted were (1) the attempts to give lectures to the entire group, (2) the excessive amount of time scheduled for discussion and (3) the lack of sufficiently advanced activity for the university mathematics majors.

Morale and enthusiasm for the course and for the new math programs were very high. Participants' course work and discussions were tied closely with the courses they were scheduled to teach (about half Entebbe and half SMP), and there is no question but that the knowledge gained by the teachers will be

Summary: Report by Mr. S. H. Erlwanger on Teacher Training Institute at University of Zambia, Lusaka, Zambia, January 8 - 19, 1968

A. Purpose of the Institute

This course was organized by the Ministry of Education specifically for the teachers who will be involved in the following four projects: Entebbe Secondary C Mathematics, School Mathematics Project (EA), Midlands Mathematical Experiment and Scottish Mathematics Group. The aims of the course were (1) to familiarise the teachers with aspects of modern mathematics through lectures, (2) to examine critically the content, approach, and sequential arrangement of topics of the textbooks as a preparation for their use in schools in the next year, and (3) to finalize details about the four projects.

B. Participants

Fifty-six participants, representing 36 secondary schools, were present. Of these, some were teachers who would be involved in the projects; the rest were teachers from schools adjacent to the project schools, who had been invited as observers.

C. Program

Miss Lenore John (formerly of Laboratory Schools, University of Chicago) was the U.S. lecturer. During the first week of the Institute she and Mr. Colin Goldsmith, who was sponsored by the British Council, gave lectures on the following topics: introduction to sets, operations on sets, sets in geometry, number systems, relations, functions and graphs, linear programming, symmetry, transformations, matrices, probability and statistics, topology and algebraic structures. Miss John worked mainly with Entebbe mathematics and Mr. Goldsmith worked with S.M.P. and assisted with others. In the second week they were joined by two other lecturers from the British Council, Mr. Brian Bolt and Mr. Brian Wilson, who assisted with group work (mainly S.M.P.) and some lectures.

The course schedule was organized to provide two two-hour lectures each morning, attended by all participants. In the afternoon, the participants met in four groups, distributed according to the experimental text they were to teach. The supervisors and lecturers met with these groups for further discussion of the lecture topics and for closer examination of the topics in the relevant experimental course. On one afternoon, following the lecture on computer mathematics, a trip was made to the computer on the University campus. In general, group work discussions were very valuable and useful for the teachers, supervisors and inspectors.

D. Organization

The Institute was organized by Messrs. Erlwanger and Mashambe of the Ministry of Education. They were assisted by members of the University of Zambia who will supervise these four projects. The course was financed by the Ministry.

E. Evaluation

Miss John noted that the participants seemed to have a good deal of professional interest; many took part in discussions and pursued questions during tea breaks and at other odd moments. Generally, the teachers gained a clearer and wider insight into their own projects and to some extent other projects as well. In

Summary: Report by Mr. Don E. Perardi, Peace Corps Volunteer,
on Vacation School for Teachers at Demonstration School,
Monrovia, Liberia, January 15 - February 9, 1968

A. Purpose of the Institute

The purpose of the three-week course was to introduce modern mathematics to the teachers via the Entebbe mathematics materials. The emphasis was not specifically on "teaching Entebbe mathematics"; rather, it was on introducing basic concepts of modern mathematics and helping teachers develop their own ideas on how these concepts can be best presented to their students.

B. Organization

Three members of the Department of Education initiated and organized this Institute: Dr. Augustus F. Caine, Dr. Doris Banks Henries and Mr. Bai T. Sherman. The Department of Education paid for the transportation of the teachers to and from their posts, and EDC furnished books and reimbursed teachers for their room and board.

C. Participants

Twenty-nine primary school teachers took part in the Institute. Of these, 19 teachers successfully completed the course. About one-third of those who finished the course were teachers who had not been invited but who had heard about the course and had come on their own initiative. Therefore this sector of the group was highly motivated.

D. Program

The three instructors of the Institute were Mr. Joe Bettie of the Lab High School in Monrovia, Mr. Samuel Abanobi, a senior at Cuttington College with previous experience in Entebbe Institutes, and Mr. Joe Marchese, a Peace Corps Volunteer teaching at the University of Liberia. No U.S. lecturer was employed.

The instructors tried to cover the first three volumes of the Basic Concepts of Mathematics in the Entebbe series. Each day there was (1) a lecture and discussion of Volume I, (2) a demonstration and lecture on Volume II and (3) a lecture and discussion on Volume III.

E. Evaluation

On the whole, the instructors felt that the purpose of the Institute had been achieved at least for the 19 teachers who completed the course. Six of the teachers should be able to do an excellent job of teaching modern mathematics, and all of the 19 should show some improvement in their teaching of arithmetic this year.

F. Recommendations

Though this Institute was perhaps not as successful as some in the past, the improvement made by the 19 teachers warrants that a similar program be carried out in future vacation periods. To that end, the following recommendations were made: (1) the planning and organization of the project must be started earlier and done in greater detail; (2) more tests and evaluation should be given with corresponding feedback to keep the teachers motivated; (3) plans should be made to have real demonstration classes with actual students so the participants can learn technique as well as content; (4) credit toward high school promotion or college should be given to participants who complete the course.

Summary: Report by Professor Ross L. Finney on Teacher Training Institute
at Catholic Teachers College, Bo, Sierra Leone
March 25 - April 11, 1968

A. Purpose of the Institute

The purpose of this Institute was to prepare primary teachers for the introduction of modern mathematics into their classes, using as a reference text Basic Concepts of Mathematics, Volume I.

B. Participants

Sixty-five primary school teachers took part in the course. Although only fifty teachers were accepted, two hundred had originally applied for admission, and by the end of the first week attendance reached sixty-five and stayed at that high level throughout the two weeks.

C. Organization

The Institute was organized jointly by Mr. Holly Hollingsworth, Peace Corps Volunteer in Sierra Leone, and Mr. D.S.M. Lahai, Inspector of Schools, Southern Province. Financial assistance was given to the Ministry of Education by EDC.

D. Program

Teachers heard 27 one-hour lectures on topics such as the following: Sierra Leone's contribution to Entebbe Mathematics, set notation, number line, bases, addition, mathematical sentences, ways to picture subtraction to children, multiplication, commutative and distributive properties, and New Mathematics: discover, explain, involve and entertain.

Tutorials were held twice a day at which four staff tutors assisted: Miss Nancy Campbell, mathematics teacher at Christ the King College in Bo; Mr. Holly Hollingsworth, Peace Corps Volunteer; Mr. D.S.M. Lahai, from the Ministry of Education; and Mr. Mathews, Principal of Bo Teachers College. So that each participant would be able to get acquainted with the whole staff, tutors were rotated.

The tutors were imaginative, patient and had good rapport with their groups. Also, at lectures they illustrated and answered questions intelligently, and knew enough mathematics to go beyond the lectures in their groups. (Unfortunately, Mr. Hollingsworth had to leave the Institute during the first week, having been recalled to the U.S. for draft induction.)

E. Conclusion

A good deal of elementary mathematics and a good deal about mathematics teaching at the primary level were communicated to the participants, as was evidenced by the facts that attendance increased as time went on, classes were consistently lively, tutorials were vigorous and performance on the two hour examinations was good. Throughout the course participants' morale was high. One memorable quotation illustrating the teachers' enthusiasm was made by a participant who marched to the blackboard during a class argument in one of the lectures to prove a point, saying, "This is Entebbe Maths, so we have a right to prove theorems."

Summary: Report by Professor Paul A. White on Institute for Tutors
held at Makerere University, Kampala, Uganda
April 16 - 30, 1968

A. Purpose of the Institute

The course was designed to improve the modern mathematics background of primary tutors and principals in teacher training colleges, emphasizing especially geometry and topics from the Entebbe Teachers' Handbook and Secondary C One, C Two and C Three.

B. Participants

Thirty-four primary teacher training college tutors and principals attended the Institute.

C. Organization

Mr. Rowland C. Anderson of the Institute of Education at Makerere University was responsible for organizing and supervising the course. EDC assumed financial responsibility for participants' lodging at the University.

D. Program

1. Lectures. The lectures were mainly on modern geometry as taught in secondary schools in the U.S.A., or as presented in the Entebbe series. In morning and afternoon lectures participants were given an opportunity to work on solving problems in class. Modern definitions of the fundamentals of Euclidean geometry were given, and discussion was held on how the new definitions and axioms differ from the old. Motion geometry with applications was discussed on an intuitive basis in the last few lectures.
2. Other Activities. The other parts of the course were excellent and well received. Additional lectures were given by Mr. Anderson and Mr. George Edmonds, who was visiting from the Curriculum Development & Research Centre in Nairobi, Kenya. Both Mr. Anderson and Mr. Edmonds had a tremendous amount of practical information that should be of direct use in the classroom. Mr. Edmonds brought many mechanical aids that he had constructed which the tutors could easily reproduce themselves for classroom use.

E. Evaluation

It was felt that there was reasonably successful communication with the classes, perhaps partly due to the fact that many of the participants had had some introduction to modern mathematics through in-service courses taught by Mr. Anderson in the preceding year. In particular, the participants with good traditional backgrounds were able to catch on quickly. The Institute should be useful to them in their future teaching.

Paul A. White
University of Southern California

Summary: Report by Miss Lucy L. Addy on Teacher Training Institute
at Girls' Primary School, Accra, Ghana
April 22 - May 3, 1968

A. Purpose of the Institute

The Institute was a two-week, non-residential course for Primary Five and Primary Six teachers who are or will be involved in teaching Entebbe materials in Ghana.

B. Participants

In all, there were 76 participants. This group was made up of 20 headteachers, 25 Primary Five teachers, 25 Primary Six teachers and 6 Primary Four teachers. Twenty schools in the Accra area were represented. Six Peace Corps Volunteers, who are secondary mathematics teachers in Ghana, and Mr. Joe Jackson of the Mathematics Faculty, University of Ghana, served throughout the Institute as tutors.

C. Organization

The Institute was organized by the Ministry of Education. Mr. J. S. Ocran, Principal Education Officer for Primary and Middle Schools, officially opened the Institute and Mr. Service Addo, Principal Education Officer, spoke briefly at the closing session. There were a number of visitors--primarily education officers.

EDC assisted financially and sponsored the U.S. lecturer to the Institute, Professor Shirley A. Hill of the University of Missouri.

D. Program

Professor Hill lectured on topics from Primary Five. Lectures were organized around mathematical ideas and did not necessarily follow the sequence of Primary Five materials. All in all, the following topics were covered: sets of numbers, number theory, operations on numbers, numeration, geometry, simple ideas of probability and statistics and measurement.

Each morning a lecture was held from 8:30 to 9:30, a tutorial, from 9:35 to 10:15 and another lecture from 10:20 to 11:15. Following a lunch break a tutorial was held until 1 p.m. Six of the headteachers were appointed leaders of the six tutorial groups, and the Peace Corps Volunteers acted as tutors in the groups as well. At these tutorials, participants discussed the lectures, activities in the Primary Five books and solved some of the problems.

E. General Comments

In his opening address to the participants Mr. Ocran, Principal Education Officer, emphasized that refresher courses were going to be a permanent feature in the country's educational set-up. He said that Entebbe Mathematics was making a substantial impact on the progress of the pupils using it and announced that half of the pupils in Class One in the whole country would be using Entebbe Mathematics in the very near future depending on the availability of teaching personnel.

(continued)

E. General Comments (cont.)

Mr. Service Addo, at the closing plenary session, pointed out that the teachers were performing an important duty to the nation and stressed that such seminars were necessary. He encouraged the teachers to go back to the classroom and teach the mathematics meaningfully and in an interesting manner. The Deputy Chief stressed that eventually the Ministry would rely heavily on the core of teachers who had been sufficiently briefed to teach the new mathematics.

F. Comments on the Course by Professor Shirley Hill

The course was successful in accomplishing its aims. Although there was a large body of content to cover--all of Primary Five--because of the previous experience of many of the group in such courses, it was possible to complete the material. The Class Six teachers, who were new to the program, will have further opportunity for study in the course planned for August, 1968.

The success of the Institute was largely due to the efficient organization and planning of the administrator, and to the esprit de corps and enthusiasm of the headteachers, who imparted their confidence to the participants. The teachers were hard-working and very anxious to improve their competence. This morale factor cannot be overemphasized.

Miss Lucy L. Addy

Education Officer,
Ministry of Education

Summary: Report by Professor Donald Ostberg on Teacher Training Institute
in Blantyre, Malawi
April 22 - May 2, 1968

A. Purpose of the Institute

This was the third of what is becoming an annual Institute for primary teachers engaged in teaching Entebbe mathematics in Malawi. The purpose of the course this year was to further improve their knowledge of modern mathematics and method of teaching using the Entebbe materials.

B. Participants

Participants were primary teachers currently using Primary One - Five in some 50 classes. Numbers in attendance ranged from 45 at the outset to 53 by closing day, and included a number of headmasters who were interested in learning more about the Entebbe Program. Several teachers in the Blantyre-Limbe area who heard about the Institute attended sessions at their own expense.

C. Organization

The Institute was jointly sponsored by EDC and the Malawi Ministry of Education, and was organized and administered very ably by Mr. Frank Kazembe of the Ministry. For the first six days the Institute met at the Blantyre Secondary School; it then moved to the Limbe Primary School when the term began at the secondary school.

In addition to myself, Mr. Kazembe and Mr. David F. St. John Jesson, from the University of Malawi, gave lectures. Four ABC participants from Malawi also conducted some of the tutorials and supervised the sessions devoted to practical work.

D. Visitors

The Institute was formally opened and closed by Mr. L. B. Mallunga, Assistant Chief Education Officer in the Ministry of Education. Toward the end of the first week Mr. R. Chisala, Permanent Secretary in the Ministry, and Mr. L. P. Anthony, Chief Education Officer, visited the Institute and talked with a large number of the participants. Finally, the closing of the course was marked by interviews with myself and several of the participants in which the Entebbe program was discussed, and the interviews were subsequently broadcast by the government radio station in Blantyre.

E. Lectures

The 24 lectures were devoted to a discussion of the structure of arithmetic and computational algorithms taught in primary school. Every effort was made to make the lectures complement one another, which apparently resulted in a balance between "theory" and "application" that appealed to most of the participants. These lecture sessions were a success; participants seemed to enjoy them and many took an active part in the proceedings via questions and comments.

(continued)

F. Tutorials

There were ten tutorials, which were question and answer sessions on material in the Entebbe primary texts. Teachers met in separate groups by grade level and were asked to decide among themselves which units of the texts they wanted to discuss. Sections of the text which were considered helpful to the teachers, or particularly weak, were pointed out and discussed.

G. Practical Sessions

The afternoon sessions devoted to the construction of classroom teaching aids seemed very successful. A spirit of friendly rivalry developed among the various groups, and they vied with one another to see which one could produce the greatest number and most colorful set of materials -- finally ending up with four or five rooms filled with materials.

H. Concluding Remarks

The organization and administration of the Institute was extremely well handled by Mr. Kazembe, and the contributions of Mr. Jesson and the teachers who assisted in tutorials and practical sessions also deserve a great deal of credit for our success. Finally, the participants themselves were very good. Many had participated in the earlier Entebbe Institutes, and it was clear that they had profited from this participation. In fact, the success of this year's Institute can be attributed very much to those prior sessions.

Donald R. Ostberg
Northern Illinois University

Summary: Report by Dr. A. Beninati on Institute for Primary School Inspectors and Teacher Training College Tutors at University College, Dar es Salaam, Tanzania
May 20 - 31, 1968

A. Purpose of the Institute

This was the fourth course of this type held in Tanzania since 1964. The twofold purpose of all of these courses is to increase the participants' knowledge of new mathematics and to develop a course of study that can be taught to primary school teachers by the participants.

B. Status of the New Mathematics Program

Right now nearly all primary schools are teaching new mathematics in Standard 1 and Standard 2. In November this year these schools will be teaching new maths in Standard 3; in November 1968, in Standard 4, and so on, so that by 1972 virtually all primary children will be studying new mathematics. The present and future graduates of Grade A colleges will have been trained to teach the new mathematics. The problem is to retrain the in-service teachers.

C. Organization

Financial arrangements for this course were as in the past; that is, EDC paid for food and lodging, the Ministry of Education paid the transportation costs and the Institute of Education arranged for the course and paid incidental expenses. No U.S. lecturer was required.

The staff for the Institute included Dr. A. Beninati from the Institute of Education, who administered and lectured, and four other local lecturers— one from Morogoro Teachers' College, one from the Institute of Education and two from the Ministry of Education. Six seminar leaders were selected from participants who are mathematics tutors in Grade A Teachers' Colleges.

D. Participants

Fifty primary school inspectors and 40 teacher training college tutors attended the course.

E. Morning Program

The daily program included a lecture by Dr. Beninati from 8:30 to 9:30 on "Why, What, How of New Mathematics," followed by other lectures on topics such as sets, geometry, metric measurement, non-decimal bases, statistics, graphs and visual aids. Participants adjourned for lunch at 12:10.

F. Afternoon Program

From 2:00 until 4:30 in the afternoon the following activities took place: work with pupils' books, constructing visual aids, viewing filmstrips, discussing problems arising from lectures and problems of conducting in-service courses. In addition, reports from various regions were given.

G. Remarks by Senior Assistant Chief Education Officer

In his Opening Address Mr. J. H. Mzaba expressed the Ministry's commitment to the new mathematics programme. He emphasized that the success of the programme depended upon the participants and urged them to study the new texts on their own. The participants were, he said, offering a great service to their country.

Summary: Report by the Ministry of Education on Double Institute for
School Supervisors at Haile Selassie I University, Addis Ababa,
Ethiopia
August 12 - 30, 1968

A. Purpose of the Institute

The purpose of the Institute was to give a grounding in the Basic Concepts of the New Mathematics programme now being introduced gradually into all Ethiopian schools, secondary and primary. The texts used included Basic Concepts I, II and III, Modern Mathematics for Ethiopia, Junior Secondary One and the Entebbe Primary One Texts and Guides. A principal aim of the course was to familiarise the supervisors with the new concepts and teaching methods so that they could (1) assist with implementation this September 1968 in all Grades Seven (Junior Secondary One) and (2) orient elementary teachers in their districts during the year prior to introduction in all Grades One in September 1969.

B. Participants

In view of the large number of participants (107), as well as number of lecturers (3) and tutors (10), the course had to be arranged as a double Institute. The participants were supervisors or directors - one from each Awraja (district) of the provinces outside Addis Ababa as well as from Addis Ababa itself. All were Ethiopian and all had previously completed a one-year course for supervisors and directors at Haile Selassie I University

C. Organisation

The Institutes were organised by Ato Tilaye Kassaie of the Ministry of Education and Fine Arts, in collaboration with Provincial Education Officers, Mr. Roger Hartman (Peace Corps Volunteer) and Mr. John Fitzgerald (Advisor, Ministry of Education). The visiting lecturers were Ato Bisrat Dilnesahu (Haile Selassie I University), who participated in the 1968 Writing Workshop in Mombasa, Professor Paul Johnson (U.C.L.A.) and Professor B. J. Pettis (University of North Carolina). The latter two lecturers were sponsored by EDC.

D. Program

1. Lectures. Lectures were given on sets and sentences, numbers and numeration, operations and their properties on whole numbers, integers and rationals, and clock arithmetic. Geometry lectures included geometrical figures, measurement and rigid motions.
2. Other Activities. Teaching aids were made up prior to the course and were used extensively during tutorials. These included sets of Attribute Blocks and Geo-Boards. Other materials - such as duplicated notes on special mathematical topics prepared by ABC Institute participants, the visiting lecturers, Ato Bisrat and tutors - were also given to the participants to make up implementation kits to help them with Grade Seven and elementary teachers during the coming year.

3. Meeting with Education Officials. Towards the end of the course a meeting was arranged with Senior Ministry officials and some Provincial Education Officers at which participants stated that they were convinced of the value of the new mathematics and new teaching method but pointed out that certain difficulties, such as lack of funds for transportation and living costs, hindered the proper implementation of the programme in their districts. The Ministry officials promised to do all that was possible to help supervisors carry out their duties.

E. Conclusion

The lecturers were of the opinion that the ability of the participants far exceeded their expectations, and that the attitude to the new mathematics was most favourable. The results of tests given revealed that most participants had gained a good grasp of the new techniques.

As a result of the performance and response, Ato Bisrat, Mr. Hartman and one other tutor invited some 25 outstanding participants to stay on another week for some more advanced mathematical lectures. Fifteen of those asked attended the additional lectures on a voluntary basis and paid for themselves.

All participants at the double Institute were awarded certificates, and those who stayed on for another week were awarded advanced-level certificates.

Submitted by:

Ato Tilaye Kassaie
Chief Expert,
Curriculum & Teaching Materials
Ministry of Education & Fine Arts

Summary: Report by Dr. Grace A. Williams on Teacher Training Institute
at Government Teacher Training College, Surulere, Lagos, Nigeria
August 19 - 30, 1968

(Due to the large number of participants this Institute was held as
three Institutes in one.)

A. Purpose of the Institute

The two aims of the course were (1) to prepare a new group of teachers to undertake Primary One teaching in January 1969 and (2) to assist teachers already using Entebbe Primary texts with some topics in the new texts for the next form.

B. Organization

Mrs. Kike Ademakinwa from the Education Department, City Hall, Lagos, organized the course. Dr. Grace Williams from the University of Lagos lectured and directed the activities. The Institute was jointly sponsored by the Education Department, Lagos, and EDC.

C. Participants

There were over 225 primary teachers involved in this year's Institute. The teaching and administrative arrangements were eased by distributing the teachers into three Institutes and having many tutors to assist during the tutorial section.

This arrangement meant that the lecturers and tutors were busy from 9 a.m. until 1 p.m., for when one group was having lectures, another would be having discussion, and yet another group, having a tutorial. However, all the participants, lecturers and tutors were happy to learn and show each other what experiences they had gained during the past year. Using those tutors who have attended all the three conferences since 1966 and some who attended the course in 1964, it is possible to have integrated courses benefiting not only the newcomers, but those who had attended previous Institutes and are now going to teach new classes.

D. Lectures

Lecture topics included the following: sets, numeration, the number line, properties of multiplication and division, the physical world around us, planes, lines and points, angles.

E. Follow-Up

Arrangements are underway for two representatives from each of the schools participating in the new mathematics experiment to meet with me and work out a programme covering some essential topics on which they feel they could use some help. Twenty lectures are proposed, each of two hours' duration, between December 1968 and June 1969. The plan is for those tutors to assist the teachers in their schools and for the representatives of the Lagos City Council to co-ordinate the services as well as give assistance to the schools.

Summary: Report by Chief P. O. A. Dada on the Institute for Teacher Training College Tutors held at the University of Ife, Ile-Ife, Western State, Nigeria

August 19 - 31, 1968

A. Purpose of the Institute

This course was planned to help tutors in teacher training colleges and some primary and secondary schools in the Western State to acquire the concepts and processes which will enable them later to start teaching New Mathematics at these various levels. The majority of the 32 participants were training college tutors.

B. Organization

Chief Paul Dada of the Institute of Education, University of Ife, organized the Institute, which was opened by Professor A. Babs Fafunwa, Dean of Education and Acting Vice-Chancellor of the University.

C. Lectures

The chief lecturer was Professor Paul White of the University of Southern California, who was sponsored by EDC. Four local lecturers (two from colleges and two from high schools) assisted in seminars and methodology sessions. Lectures covered a variety of topics that have been introduced in recent years into the teaching of primary and secondary mathematics. Stress was put on those subjects pertaining to the primary school, such as sets, relations and functions, applications to the study of whole and rational numbers, clock arithmetic, and an introduction to geometry.

D. Other Activities

No clear line was drawn between lecture, seminar and methodology; most of the sessions were concerned with subject matter as well as methods of presentation, although the use of educational aids was confined to methodology. In addition to the regular program, special lectures on problems of education in Western State were given, and films were shown which provided much-needed relaxation for the participants.

E. Estimate of Success of Instruction

The success of communication was varied because of the varied backgrounds of the participants. Most of the material was within the grasp of the secondary school teachers, but many of the others were handicapped by their indifferent knowledge of algebra. The participants should be able to use many of the ideas introduced relative to representation of numbers. They will not be able, however, to use much of the rest directly in their classes unless they are teaching from "modern" texts, in which case almost all of the ideas would relate closely to their teaching.

F. Follow-Up

It is hoped that future courses will be of a more advanced nature and that the lines between lecture, seminar and methodology might become more clear-cut.

(continued)

F. Follow-Up (cont.)

(Professor Paul White has indicated that definite plans have been made for a correspondence course based on Entebbe materials to be given to the participants during the coming school year. Plans also include a follow-up course next summer and the following summer for the same participants, and a new course for secondary teachers.)

G. Evaluation

Gauged by the degree of enthusiasm of the participants and the lecturers, it would be safe to say that this was a very successful beginning course. The emphasis on "beginning" is necessary, because in terms of actual academic achievement or the prospect that this one course would enable us to start teaching New Mathematics in our schools, one would have reservations. But the course was most productive and participants here would be the logical material for more advanced courses in the future. It was agreed that Mrs. W. O. Ogunlusi and Mrs. J. O. Akintoye were outstanding in the course. These two participants were remarkable because they showed outstanding aptitude in spite of the paucity of relevant background. There were several others who have had some previous training in the field and are teaching mathematics in schools who grasped the new ideas readily.

Submitted by:

Chief P. O. A. Dada
Acting Secretary,
Institute of Education
University of Ife

Summary: Report by Miss Lucy L. Addy on the Primary Six Institute
at University of Ghana, Legon, Accra, Ghana
August 25 - September 6, 1968

A. Participants

The Institute was held for 40 Primary Six teachers who will be teaching Entebbe materials within the Accra education district during the next two years and for 18 head teachers, one representing each school using the materials experimentally. There were nine visitors to the Institute -- five education officials, three teachers and one Peace Corps Volunteer.

Organization

The course was organized by the Ministry of Education and jointly sponsored by the Ministry and EDC. Mr. J. S. Ocran, Principal Education Officer for Primary and Middle Schools, officially opened the Institute, and Mr. Service Addo, Principal Education Officer for Research and Development, closed it.

C. Lectures

Professor George Springer of Indiana University was the visiting lecturer sponsored by EDC. His lectures included the following topics: sets of numbers, sets of points, measurement of geometric figures, rational numbers, integers, the number plane, movement geometry, collecting, organizing and interpreting data, and "What are the Chances?" The course followed very closely the Teachers' Guide for Primary Six.

D. Tutorials

Tutorial sessions were conducted by Mr. J. S. Jackson of the University of Ghana, Dr. F. K. A. Allotey and Dr. D. K. Abbiw-Jackson of the Institute of Science and Technology in Kumasi, and two Peace Corps Volunteers, Miss Deane Downs and Mr. Steve Weiss. Five head teachers were appointed leaders of the tutorial groups which worked under the five tutors. At the tutorials the participants discussed the lectures and activities in the books, and worked most of the problems in the Teacher and Pupil Books. A separate group for beginners was handled throughout the course by Miss Addy.

E. Demonstration Lessons

Two demonstration lessons were organized at which 36 pupils from the South Labadi Road Estate Primary Five class were used. Two topics from Primary Five text were taught: fractions, and folding and turning symmetries of geometric figures. Participants were given the opportunity to discuss each lesson immediately after it. The general opinion was that both lessons were well-conducted and helpful.

The two teacher training films made in Ghana demonstrating fractions and folding and turning symmetries were shown.

F. Plenary Sessions

In Mr. Ocran's remarks at the opening session he stressed the importance of the Entebbe Mathematics Experiment and solicited the co-operation of all the participants for its success. He also announced that the aptitude of the teachers at the seminars had given high hopes for the experiment's success.

At the closing session Mr. Service Addo told the participants the story of a powerful ruler who had an imposing storey-building constructed but, because some groups of workers did not work as expected of them owing to lack of technical know-how and proper supervision, the building suddenly collapsed when it was almost completed. Mr. Addo related this story to the part the teachers were expected to play to make education in general and the Entebbe Mathematics Experiment in particular successful.

The Deputy Chief Education Officer informed the teachers that since they had been specially briefed in the teaching of Entebbe Mathematics, the Ministry of Education would rely on them for the success of the project.

Professor Springer added that he found the participants enthusiastic in the new approach to the teaching of mathematics.

Lucy L. Addy (Miss)
Education Officer,
Ministry of Education

EDUCATION DEVELOPMENT CENTER
55 Chapel Street, Newton, Massachusetts 02160
African Mathematics Program
November 1968

PROGRESS REPORT ON ABC INSTITUTE

Introduction

The ABC Institute, an activity of the African Mathematics Program sponsored by Education Development Center, is financed by a Ford Foundation grant for support of teacher training institutes for the improvement of mathematics teaching in Africa.* The Institute is a program which aims to make available in each participating country a core of people who will undertake the supervision of development of curricular reform in mathematics, and who will bring about the necessary re-education of teachers and tutors.

"ABC" refers to the categories of African participants. A-participants are senior mathematics tutors from teacher training colleges; B-participants are the officials in the Ministry of Education who are responsible for mathematical education, or who are likely to assume such responsibility; C-participants are lecturers in mathematics from African universities who have been invited to assist in instruction at the Institute. During the 1967/68 phase of the Institute a D-group consisting of secondary school teachers was added.

Courses have been held to introduce the ABC participants to the new content and new pedagogy of "modern" mathematics and to improve their mathematical background so that they will be able to act as mathematical advisors to their Ministries, offer leadership in mathematical education and assist in running courses for other teachers and tutors from training colleges. Residential courses, bridged by ten-month correspondence courses, were held in July (1966-67-68). The correspondence courses taken by the AB and D participants were

* Ref. letter of January 17, 1966 to Dr. James R. Killian from Mr. Joseph M. McDaniel, Jr., Secretary to the Ford Foundation.

prepared, marked and supervised by the C participants.

A further activity of the ABC Institute is to prepare such written and audio-visual aids as might seem helpful to the teacher training tutors.

Participation

Participating countries are: Ethiopia, Ghana, Kenya, Liberia, Malawi, Nigeria, Sierra Leone, Swaziland, Tanzania, Uganda and Zambia.

All three of the residential periods of the ABC Institute were held at University College, Nairobi, Kenya. (See progress reports submitted in November 1966 and 1967.) In 1968 there were thirty A-participants, twelve B-participants and seven C-participants.

At the request of the United States Office of Education twelve Zambians who were attending a one-year mathematics teacher education study tour in the United States were accepted as participants in the 1968 concluding session of the ABC Institute. The proposed study of this part of the Institute - use of teaching aids, Teacher Training College syllabus preparation and implementation and pedagogy in general - was particularly suitable for the course these tutors were following and was not available at the required level anywhere in the United States.

The absence of the Biafran participants, who had been a very strong group, was deeply regretted by all who knew them.

1967/68 Correspondence Course

The work done in the correspondence courses between the 1967 and 1968 Institutes was satisfactory. Over forty per cent of the A, B and D participants who attended the 1967 Nairobi Institute participated in the correspondence course for ten months and returned to Nairobi in 1968. The drop in correspondence course participation appeared in some cases to have been caused by the added responsibilities and duties put upon the participants by Ministries which

The correspondence lessons were supervised by the seven C-participants who had attended at Nairobi in July 1966 and 1967, plus five other mathematicians connected with the African Mathematics Program. Participants were divided into groups according to country or region, and a C-participant tutor or course lecturer from their own area who had worked with them at the residential course was assigned to supervise each group. Three of the tutors called their participants together for one or two weekend seminars during the course of the year to discuss any problems or difficulties which may have arisen with the correspondence work.

Special Materials

An integral aspect of the overall ABC Program is the creation of special materials and audio-visual aids which might later be used by Institute participants in in-service courses for their colleagues, and in courses for the mathematical education and re-education of primary and secondary school teachers. In this regard three main projects are underway: the preparation of a Source Book, and the production of teacher training films and tapes.

A considerable amount of material for the proposed Source Book was prepared at the 1968 residential course in Nairobi. This material is now being reviewed and revised in preparation for publication.

With the help of the Ghanaian Ministry of Education, two films showing African mathematics classes being taught by African teachers have been prepared by the Ghanaian Film Industry Corporation and Mr. John Friedman of EDC's Film Studio. They are entitled, "Assigning Fractions to Points on a Number Line" and "Folding and Turning Symmetries." These films were viewed at the ABC Institute this year. Participants thought the films were a great help and asked that more be prepared. A third film is presently being edited.

It is planned to make tapes for training college tutors to use in conjunction with the Teachers Handbook 1-6 and Basic Concepts. One such tape for use with Basic Concepts has been made by Professor Paul Johnson of U.C.L.A. At the Institute a record made from the tape was played and enthusiastically received by the participants, who expressed the hope that many more records such as this one be made available to them. Some twenty additional tapes, aimed at reinforcing the content of the teacher training texts and giving an additional flavor of the wonder of mathematics and its importance in the modern world, are under consideration.

Third Residential Course

Only those A, B and D participants who were likely to be involved in primary teacher education, in-service or pre-service, were invited to this third residential session. With the addition of the Zambian participants from the United States, the total participation was as follows:

A participants:	33
B participants:	7
C participants:	7
D participants:	3

All participating countries were represented.

Staff

The following lecturers were engaged to give instruction:

Dr. Grace A. Williams (Chairman)	Lecturer, University of Lagos, Nigeria
Professor Donald E. Richmond (Chairman, 1966 course)	Professor Emeritus, Williams College, Massachusetts
Professor Paul B. Johnson (Lecturer, 1967 & 68 courses)	Professor of Mathematics, University of California at Los Angeles
Mr. F. B. Dyck-Harding	Lecturer, Milton Margai Training College, Sierra Leone

C-participants who assisted in instruction include:

Mr. John Mashambe	Inspectorate, Ministry of Education, Zambia
Ato Yohannes Menkir	Lecturer, Haile Selassie I University, Ethiopia
Mr. Adegboyega Okuneye	Lecturer, University of Ife, Nigeria
Dr. E. John Simbo	Lecturer, Fourah Bay College, Sierra Leone
Mr. D. F. St. John Jesson	Lecturer, University of Malawi

Dr. A. Beninati of the Institute of Education, Dar es Salaam, Tanzania - a member of the Teacher Education in East Africa program - assisted in instruction also. One additional lecturer was Mr. George Edmonds, T.E.E.A. maths educator attached to the Curriculum Development and Research Center (now Kenya Institute of Education). Also present as junior staff members were Mr. Steven Hein, a mathematics student in the Yale University Five-Year B. A. Program, which requires one year of work abroad in one's special field; and Mr. John Fitzgerald (Ministry of Education) and Mr. Roger Hartman (Peace Corps Volunteer) from Ethiopia.

Miss Patricia MacNeille served as administrator of the residential Institute.

Work of the Institute

The main objectives of this final Institute were:

- (1) To give the participants an opportunity to write materials that were useful to them and which could be incorporated into a Source Book.
- (2) To give participants experience in handling films and tapes as teaching aids.
- (3) To relate the mathematics learned at previous Institutes to future work of participants.
- (4) To review some difficulties in mathematics.

The following activities were designed to try to achieve these objectives:

Lectures

Daily lectures were given by the staff members. During the first week Dr. Williams and Professor Johnson suggested guidelines for running institutes and designing programs, while Professor Richmond lectured on teaching certain mathematical concepts. The lectures given the second week attempted to give some assistance to participants in introducing special topics in their colleges. Discussion in tutorials followed these lectures.

Audio-Visual Aids

Other activities included viewing of five mathematics films to suggest ideas for topics which might be taught, and of the two teacher-training films made in Ghana. The latter provoked useful discussion about the content and method of teaching modern mathematics. Another valuable activity was listening to the record made by Professor Johnson which was designed to be used in connection with Basic Concepts.

In order to get new ideas for audio-visual aids, participants spent one day at the Curriculum Development Centre in Nairobi (now the Kenya Institute of Education), where Mr. George Edmonds (USAID Maths Educator attached to the Centre) showed and discussed aids developed at the Centre.

Each day the participants broke up into smaller groups under the direction of the seven tutors, where they discussed the lectures, films and other audio-visual material.

Source Book

Most of the groups considered the making of a teacher-training mathematics syllabus for the Source Book very important, and much work was done in this area. During the second week the seven writing groups met for the greater part of the day to write syllabuses for Teacher Training Colleges, outline suggestions for

Institutes and two and three week in-service courses, and prepare short lectures. In their discussion, tutorial groups working on syllabuses showed a deep understanding of the subject and topics they chose to include.

The work of the Institute was successfully completed. The participants wrote syllabuses for two-year and five-year Teacher Training Colleges for inclusion in the Source Book. In the succeeding two weeks Dr. Grace Williams and Professor Paul Johnson reviewed the work done on the Source Book and prepared a manuscript which will be the basis of the forthcoming publication. This manuscript contains sample programs for primary and secondary institutes and in-service institutes, hints on operating tutorials and suggested syllabuses for Training Colleges.

The Future

While several main objectives of the ABC Institute have been achieved in the past three years through the three residential courses and correspondence courses, three activities will be important in the future: the Source Book, teacher-training films and tapes. At present more tapes are under consideration. Distribution of the two pilot films to approximately fifty Training Colleges for experimental use by tutors who have taken part in the Institutes is now underway. The tutors are being asked to evaluate them, and it is intended to produce more films on the basis of these evaluations.

An initial proposal for ten more films has been submitted to the Ford Foundation. These will show the growth of mathematical ideas within the school curriculum and help the teacher by demonstrating the teaching of topics which are sometimes thought to be difficult. On their visits to Ministries this summer, Professor Martin and Mr. Bradley received clear indications of the need for such films, and expressions of willingness to invest some funds for the purchase of prints.

Conclusion

As several country reports at the 1968 ABC Institute indicated, it is obvious that ABC participants are playing a major role in Teacher Training Colleges as well as initiating and supervising tutorials and conducting in-service courses in their respective countries.

The Assistant Minister for Education of Kenya at the closing session of this year's Institute voiced what appears to be a feeling held generally throughout the participating countries:

"Now Kenya and other sister countries will have a small cadre of people knowledgeable about modern or what many people prefer to call good mathematics. These should be capable of making adaptations of the materials available to suit local conditions and be able to assume responsibility for training teachers locally. These participants will play a leading role in this quiet revolution in the teaching of mathematics which is currently taking place all over the world."

All the evidence, reports from African Ministries, from the ABC participants themselves and from the observation of the program's visiting lecturers, indicates that the ABC Institute has achieved one main part of its business - the development in each country of a cadre of people knowledgeable about modern mathematics in schools. The second aim of the Institute - to provide these cadres with suitable aids, written and audio-visual - is also well underway. Pilot films have already been prepared, the Source Book awaits revision, editing and publication, and the preparation for the production of tapes for use with Basic Concepts is already well underway. It is felt that the ABC Institute has already made a significant impact on the teaching of mathematics in the participating countries. The completion of the remaining tasks will round off what has already proved to be a most rewarding program.

TRAVEL REPORT (JUNE, JULY, AUGUST 1968)

VISITORS Professor W. T. Martin, M.I.T., Chairman, Steering Committee,
African Mathematics Program
Mr. Hugh P. Bradley, Director, African Mathematics Program

COUNTRIES INVOLVED

Discussions were held with officers for the Ministries of the following countries:
Ethiopia, Ghana, Kenya, Liberia, Malawi, Nigeria, Sierra Leone, Tanzania, Uganda and Zambia.

PURPOSE OF VISITS

- (a) To discuss the results and future needs of the countries' programs for the experimental use of the texts produced by the African Mathematics Program.
- (b) To discuss the future use of the graduates of the ABC Institute.
- (c) To explain the effects of the U.S.A.I.D./Washington decision to cease funding the Program from the Research Division.
- (d) To learn the extent of each country's commitment to, and immediate and long term plans for, schools curriculum reform in mathematics.
- (e) To alert local U.S.A.I.D. missions to the countries' plans for curriculum reform in mathematics.
- (f) To assess the desire for teacher education films in mathematics.

GENERAL COMMENTS

- (a) It was found that all countries have made firm decisions to introduce reform curriculum mathematics throughout the schools systems. Many countries have already taken the initial steps to bring about this vast change in content and teaching approach. The problem has been recognised as a Teacher Education problem and in most places proposals are being made to tackle the problem through changes in curriculum in the preservice teacher training colleges and retraining of the college tutors, to cope with these changes.
- (b) It is clear that in most countries the ABC Institute achieved its objectives. In some countries the participants are already in training colleges and in others plans are being made to make such appointments. Most places use the participants as seminar leaders in institutes, and as supervisors of the experimental program.
- (c) All countries, but especially those having experimental programs, expressed great concern about the future of these programs. There were comments, polite but strong, that these programs could not be dropped; that classes which have started the "new" mathematics must be taken through to the end and

that EDC had a commitment to ensure an adequate supply of books and adequate training for the teachers.

- (d) The discussions with local U.S.A.I.D. missions were on a most friendly basis. There was an understanding of the difficulties that the new funding decision has created - but unfortunately also some fears that local funds might not be available at such short notice.
- (e) Finally, all Ministry officials and educators asked, stated quite firmly that there is a real need for teacher education films in mathematics and expressed a willingness, suitable films being available, to pay something towards the costs of the prints.

DETAILED COUNTRY REPORTS

LIBERIA

PEOPLE PRESENT FOR THE DISCUSSION

DEPARTMENT OF EDUCATION MEETING

Under Secretary S. F. Dennis
Mrs. Doris Banks-Henries, Adviser, Textbooks and Curriculum Reform
Mr. J. Brien Dennis (Mathematics)
Mr. Stephen M. Yekeron (Science)
Miss Rita Ray, A.I.D. Consultant Language Arts and Social Schemes
Sister Mary Armelphia
Mr. Gordon Holmgren, Rural Education, U.S.A.I.D./Liberia
Mr. A. S. Nebo, Secondary Education
Mr. Don Perardi, P.C.V., Maths Program Supervisor
Mr. R. Hailer, C.O.R., P.C.V.
Mrs. Edith Kamara, Primary Education
Mr. Sharman, Teacher Education
Mr. David Immick, U.S.A.I.D. (With responsibilities for Sierra Leone)
Dr. P. Ristoben, U.S.A.I.D.

PEACE CORPS MEETING

Mr. R. Hailer
Mr. D. Perardi
Dr. P. Ristoben

OTHERS

Mr. J. Bettie, Monrovia Consolidated School District
Mrs. H. Sommerville, Monrovia Consolidated District
Mr. Harding, Assistant Superintendent, Monrovia Consolidated School District
Miss Theodora Ward, University of Liberia

DEPARTMENT MEETING

The Department and the Peace Corps are developing a very intensive in-service teacher education program involving Peace Corps teams with counterparts - four people in each team - visiting schools in the various counties, helping the teachers to introduce new programs in mathematics, science and language, running week-end seminars, observing lessons and generally giving help. Each team would work with a limited number of schools to ensure frequent contact and proper follow-up on work started.

In the course of the meetings at the Department and at the Peace Corps offices these plans were discussed in great detail. The Department has decided to introduce new mathematics into all classes and intends to use this Peace Corps scheme to implement this decision.

It was agreed (a) that the Department would issue a notice informing the schools that the Entebbe Series was also an officially approved text for the schools and colleges, (b) that Mr. J. Brien Dennis would be appointed to be the full time liaison officer in the Ministry acting as counterpart to Mr. Perardi, (c) that the Zorzor Teacher Training College and the Kakata Training College would introduce modern mathematics courses, (d) that the Peace Corps teams would meet once a year at Zorzor and Kakata so that the colleges will be involved in the program.

In the discussion with teachers and officials of the Monrovia Consolidated School System it was stated that an afternoon and evening Teacher Training Institution will be open within a year. It is the present intention to engage Mr. J. Bettie and Mrs. H. Sommerville, two participants in the ABC Institute, as mathematics lecturers in this new training program.

Mr. Holmgren and Mr. Immick showed great interest in the plans which were discussed.

The Peace Corps asked for assistance for the introductory training of the peripatetic teams. It was finally arranged that a Ghanaian teacher would visit Liberia to teach some demonstration lessons and lead discussions on the lessons. Similar help was asked for the science preliminary training and a request was also made for a Ghanaian science teacher to teach demonstration lessons.

GHANA

PEOPLE PRESENT AT THE MEETING IN THE MINISTRY OF EDUCATION

Mr. D. A. Brown	Principal Secretary
Mr. Mills	Chief Education Officer
Mr. Service Addo	Education Officer i/c Training College
Miss Lucy Addy	Education Officer i/c Entebbe Project in Ghana
Dr. Abbiw-Jackson	Steering Committee, African Mathematics Program, Mathematics Department, University of Science and Technology, Kumasi
Mr. A. Mc Kie	U.S.A.I.D.

PEOPLE AT U.S.A.I.D. MEETING

Mr. Gordon Evans, Program Officer
Mr. Frederic Gilbert
Mr. Alan Mc Kie
Mr. Richard Cashin (Director) paid a short visit

PEOPLE AT PEACE CORPS MEETING

Dr. Kirk, Director
Mr. Carol Buchanan
Mr. Olsen

At the meeting in the Ministry Mr. Brown stated that Ghana had already decided to introduce modern mathematics into all schools, has already produced a Ghanaian adaptation of the Entebbe Primary One and Two texts, and intended to complete a full Ghanaian adaptation of all texts.

The teacher education problem was discussed in great detail, including the ability of tutors, the number and size of colleges, their location, academic status of the students who attend and the length of the course.

It was clear that the first task was to give the training college mathematics tutors an adequate mathematical background to cope with the new courses in modern mathematics which would be introduced into the colleges. It was felt that if the colleges were geared to deal with the new mathematics syllabus they could then be used as centers for mathematical training in their areas. Only by such an approach could the vast in-service training program be tackled.

Finally Mr. Brown and his officers stated that they would need the help of EDC to supervise this task of re-programming the mathematics courses in the colleges and in the retraining of tutors in the colleges. EDC's responsibility would be (a) to select a mathematical educator to work with the Ministry in the teacher college program, (b) to supervise this work and ensure continuity, (c) to ensure that suitable books for tutors and their students were available. On the other side, the Ministry agreed to the appointment of the local officer to work with the mathematical educator.

In further discussion, the Ministry officials pointed out that EDC has a responsibility to ensure that the children who have been involved in the experimental work with Entebbe texts are allowed to complete the primary course. It was felt that at least two more years are necessary for this work and that texts must also be available.

In the afternoon, at the request of the Principal Secretary, the visitors sat with Miss Lucy Addy and Dr. Abbiw-Jackson and worked out in much greater detail a scheme for implementation and for the satisfactory conclusion of the experimental work. This scheme was presented to the Principal Secretary for his consideration.

The U.S.A.I.D. officials showed much interest in the reasons for and the outcomes of the visit and were extremely concerned (a) that their request for help should be made soon and (b) that their funds for support might not be available or sufficient.

The discussion with the Peace Corps officers proved very useful insofar as the Peace Corps is presently placing Volunteers in Training Colleges as tutors.

SIERRA LEONE

Date: June 15 - June 19, 1968

PEOPLE PRESENT AT MEETING IN THE MINISTRY

Mr. W. Conton	Chief Education Officer
Miss L. Stuart	Adviser on Curriculum Affairs
Dr. A. Williams	Member of Steering Committee, African Mathematics Program, Acting Head of Maths Department, Fourah Bay College
Mr. F. B. Dyck-Harding	Milton Margai Advanced Training College

U.S.A.I.D. MEETING

Mr. Fliflet	Economics Officer, U.S. Embassy, and U.S.A.I.D. residual officer
Mr. B. Nolan	Finance Officer, U.S. Embassy

PEACE CORPS MEETING

Mr. J. Kennedy	Peace Corps Director
Mr. Tutman	Peace Corps Assistant Director

INTERNAL IMPORTANT MEETINGS

Dr. Victor King	Director, Institute of Education and Professor of Education, University of Sierra Leone at Njala
Mr. John Lewis	Institute of Education, University of London
Mr. Julius Jonah	Prince of Wales School, Freetown
Mr. V. Johnson	University of Sierra Leone, Njala
Mr. R. Francis	EDC Science Educator

Until this year the Sierra Leone Ministry of Education has adopted a very cautious policy towards the experimental program with the Entebbe books. At the meeting held during this visit Mr. Conton decided that it was the Ministry's policy to introduce modern mathematics into all schools and colleges as soon as possible. He asked for the assistance of Education Development Center in dealing with the initial crucial task, the introduction of modern mathematics curricula into all training colleges. In a later meeting Mr. Dyck-Harding and Dr. A. Williams in consultation with the visitors drafted a detailed proposal for consideration by the Chief Education Officer. This proposal requested the appointment of a mathematical educator to work in co-operation with the Ministry and the new National Institute of Education to prepare college mathematics tutors to cope with the new syllabuses in modern mathematics which the mathematics educator would be asked to prepare, introduce and supervise in the eight training colleges. The proposal also outlined financial help needed for text books and the extent of the Sierra Leone contribution to the program.

It was felt that a regional plan with Liberia could be outlined so that this mathematical educator could contribute to the Liberian Government on Liberia P.C.V. plans for the improvement of mathematical education in Liberia.

The U.S.A.I.D. residual officer, while friendly and cooperative, did not feel that he could do much as he was about to retire in a few days. A cable was sent to Mr. D. Immick, who looks after Sierra Leone education affairs from Liberia, informing him of the possibility of a regional proposal's being developed. It was agreed that a letter would be sent to Mr. Fliflet's successor informing him of the outcome of the Sierra Leone meetings.

The Peace Corps continues to be most cooperative with the program. Mr. Kennedy reconfirmed his intention to appoint a successor to Mr. Hollingsworth when he becomes available in September. Under an expanded program as outlined in the proposal the excellent work done by Mr. Hollingsworth can be even more fruitful than in the past.

Dr. Victor King was deeply interested in the details of the proposal and welcomed the suggestion that the mathematics educator should work closely with the Institute. He also said that there was a real need for teacher education films on mathematics and that the Institute would certainly want to purchase satisfactory ones if they were available.

NIGERIA

PEOPLE INVOLVED IN MEETINGS

LAGOS CITY

Mr. Dahunsi	Chief Education Officer, Lagos City
Dr. G. A. Williams	Member of Steering Committee, African Mathematics Program, Department of Mathematics and Education, University of Lagos
Mrs. Kike Ademakinwa	Education Officer, Lagos City

LAGOS STATE

Mr. C. Williams	Acting for Permanent Secretary, Ministry of Education, who was called to a meeting with the Military Governor
Dr. G. A. Williams	
Mrs. K. Ademakinwa	
Mrs. M. Neville	U.S.A.I.D. Education Adviser, Teacher Education

FEDERAL MEMBERS

Mr. S. Moses	Chief Education Adviser
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U.S.A.I.D. (LAGOS)

Dr. Griffith Davis	Acting Head, Education Division (Communications and Teacher Aids)
Dr. Dietrich	Education Adviser (Secondary)
Mrs. M. Neville	
Dr. C. P. Edwards	Adviser (Higher Education)
Dr. Reid	Ibadan
Mr. Reed	Kaduna

COLLEGE OF EDUCATION, UNIVERSITY OF LAGOS

Chief C. O. Taiwo Provost

NORTH CENTRAL STATE MINISTRY OF EDUCATION

Mr. Amina Salihu Permanent Secretary
Mr. V. B. Gwani Chief Education Officer
Mullain Haruna Soba Chief Inspector of Schools

WESTERN STATE MINISTRY OF EDUCATION

Mr. J. O. A. Sofolahan Chief Inspector of Schools
Mr. J. O. Fatimehan Inspector (Science)

INFORMAL DISCUSSION WITH THE FOLLOWING

Dr. J. Battle College of Education, University of Lagos
Professor Hicks Department of Education, University of Ahmadu Bello
Mr. M. Fox Ford Foundation
Dr. R. M. Owen Chief of Party, Wisconsin Team
Dr. W. Maxwell Deputy C.O.P., Wisconsin Team
Mr. Hodges Chief Inspector of Schools, Northwest State
Mr. Smart Chief Inspector of Schools, Northeast State (Maiduguni)
Mr. Farren Chief Inspector of Schools, Benue Plateau (Jos)
Chief Dada Acting Secretary, Institute of Education, Ife
Professor Ajayi History Department, University of Ibadan
Mr. Nana Inspector, Agriculture, Deputy of Education, Western State

LAGOS CITY MEETING

In the meeting with Mr. Dahunsi, the Chief Education Officer, the progress of the experimental program was described and there followed a discussion on further steps needed to ensure the spread of the reformed curriculum. Mrs. Ademakinwa, who supervises the work under the direction of Grace A. Williams, reported that there are 44 schools, 193 teachers and 188 classes using the Entebbe materials. Last year there was an Institute in September for 150 teachers and there have been follow up monthly seminars in the districts for teachers who attended. The work is closely supervised and regular help given to those who need it. With the extended use of the materials there is need for additional supervision.

Mr. Dahunsi felt that the training colleges should now be changing their curriculum to suit the changing conditions in the schools. He felt the need for help in personnel and for supply of teacher training textbooks and said the city would be glad to take part in any program of this sort which Lagos State would initiate.

LAGOS STATE MEETING

The meeting with Mr. Williams was useful, but in the absence of Mr. Durosinmi-Etti, the Permanent Secretary who was called unexpectedly to a meeting with the Military Governor, no decisions could be made. Mr. Williams said he would recount to the Permanent Secretary our conversation and Mrs. Neville offered to call on him at a later date.

FEDERAL MINISTRY MEETING

Mr. S. Moses, the Chief Adviser to the Federal Ministry of Education, had previously been involved in introducing the Entebbe materials into Lagos City. He was enthusiastic about the work the African Mathematics Program has been doing. At this early date the duties and responsibilities of the new Federal Ministries are not entirely defined, but Mr. Moses thought that he may have some responsibility for the requests for external aid and for the appointment of expatriates. We were assured of good will in any event.

U.S.A.I.D. MEETING

Dr. Davis, Acting Head of Education Division, U.S.A.I.D., Lagos, was informed of the results of the visits to Liberia, Ghana, Sierra Leone, Lagos City, Lagos State and the Federal Ministry. Despite concern about the availability of funds and the lack of time to obtain firm proposals before January 1969, there appeared to be a desire to help and interest in the work. He was particularly interested in the plans to make films in Ghana and the use of long-playing records or tapes as aids in the teacher training process.

Mrs. Neville, Education Adviser on Teacher Education, was most cooperative and helpful in all things. Her interest in the teacher education problem and in the work of the African Mathematics Program continues to encourage us in our work.

NORTH CENTRAL STATE

We were given a most friendly welcome by Sheik Amina Salihu, the Permanent Secretary, and his officers. As elsewhere, the problems were problems of teacher education and discussions followed what was by now a normal pattern. The need for personnel assistance and teacher education textbooks was again discussed in detail. Later Mr. Gwani, a very able Chief Education Officer, stated he would be presenting a proposal which, he hoped, would enable EDC to assume some responsibility for the satisfying of these needs.

Mr. Reid, U.S.A.I.D./Kaduna, also appeared to recognise the mathematical needs of the state. It is not clear however that his plan for operating through the Institute of Education at Ahmadu Bello University at Zaria will be more effective than the appointment of someone directly under the Ministry and operating directly with the Ministry's authority from Kaduna.

The conversation with Dr. Owen and Dr. Maxwell of the Wisconsin Team was cordial. It was suggested that their plan for rewriting the Entebbe texts was perhaps ill-considered in view of the calibre of the people involved in the initial writing compared with that of the proposed new writers. In particular

it was stated that new writing would be justified only if undertaken by local people - under adequate mathematical supervision. Otherwise only a lead-in type of text would be acceptable - on the grounds that the language of the early Entebbe texts was too difficult for the level of language ability in Northern Nigeria. Such a text would be a preparatory text leading into the first books of the Entebbe series.

WESTERN STATE MEETING

Mr. Sofolahan, Chief Inspector of Schools, has already made plans with the Institute of Education at the University of Ife to undertake an in-service training program in mathematics. This plan involves the setting up of a large Institution with the help of some expatriate staff. He showed little interest in the pre-service teacher education program which the African Mathematics Program feels is necessary for the satisfactory completion of a program of implementation. In the circumstances, it seems that the Ministry and the University have no need of the African Mathematics Program as an intermediary.

EAST AFRICA

PEOPLE INVOLVED IN MEETINGS

TANZANIA

Mr. A. Newa	Mathematics Inspector, Ministry of Education
Mr. J. E. Phythian	Professor of Mathematics, University College, Dar es Salaam
Mr. Albert Beninati	Mathematics Lecturer, Institute of Education, University College, Dar es Salaam

KENYA

Mr. J. Mambo	Mathematics Inspector, Ministry of Education
Mr. D. C. Phall	Mathematics Curriculum Development Centre, Institute of Education
Mr. Kagiri	Head, Mathematics Section, Institute of Education, Curriculum Development and Research Division
Mr. J. Swift	Alliance High School
Mr. G. Edmonds	Mathematics Section, Curriculum Development Centre, Research Division, Institute of Education
Mr. J. Weinstein	Mathematics Lecturer, University College, Nairobi
Mr. I. Hollingshead	Mathematics Lecturer, Department of Education, University College, Nairobi
Mr. D. Morris	Mathematics (Secondary) Curriculum Development Centre, Institute of Education

UGANDA

Dr. C. P. Welter	Professor of Mathematics, University College, Makerere University
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Mr. Senteza Kajubi Director, Institute of Education, Makerere University
Mr. R. C. Anderson Mathematics Lecturer, Institute of Education, Makerere
University

U.S.A.I.D.

Mr. A. Bernal Assistant Education Adviser, U.S.A.I.D./Nairobi

T.E.E.A.

Mr. C. Manone Chief of Teacher Education for East Africa Program

OTHER PEOPLE WITH WHOM DISCUSSIONS WERE HELD

Professor Morris Alala Head, Mathematics Department, University College,
Nairobi
Professor F. C. Cammaerts Head, Department of Education, University College,
Nairobi
Mr. Ivy Ford Foundation, Nairobi
Mr. E. Gales Regional Program Operation Officer, U.S.A.I.D./East
Africa
Mr. Boucher Regional Director, U.S.A.I.D./East Africa
Mr. A. Bernal Assistant Education Adviser, U.S.A.I.D./East Africa

MEETING OF THE REGIONAL STEERING COMMITTEE FOR MATHEMATICS IN EAST AFRICA

The visitors were invited to attend sessions of these meetings, which concerned the spread of modern mathematics throughout the region and the proposed East African Mathematics Society.

After a short description of the effects of the forthcoming change in the funding of the African Mathematics Program and a description of some of the visits in West Africa, the meeting had free discussion on how best to ensure the continuing spread of the new curricula in primary schools, secondary schools and training colleges. In this discussion it was made clear that, while willing to do anything it could to help, EDC had no wish to supercede any of the activities of T.E.E.A. or to do tasks which T.E.E.A. felt it could undertake and do equally well. It was clearly the feeling of the meeting -- backed by a statement from Mr. Manone -- that almost everyone felt that EDC should continue to function in East Africa and that the best results for East African Mathematics would be a continuation of the present happy cooperation of the two programs. The first meeting adjourned with a request that the visitors return to the final session of the meeting, at which reports of sub-committees would be presented.

At this final session a committee presented a series of proposals.* Also presented was a proposal which suggested that EDC might assist in setting up an East African Mathematics Society.

* See Appendix J.

MEETING WITH PROFESSOR CAMMAERTS

Professor Cammaerts explained the relationships between the new Kenyan Institute of Education, the University Department of Education and the former Curriculum Development Centre. He suggested that any program for implementation of curriculum reform in mathematics in Kenya should be centered in the Kenyan Institute of Education under Mr. Lajembe, the new Director of the Institute.

MEETING WITH U.S.A.I.D. OFFICIALS

Mr. Boucher made it clear that practically no funds are now available in East Africa for bilateral programs and that only true (!) regional programs can be supported. This statement appeared to mean that a mathematics curriculum development centre could be set up and staffed in only one of the three countries, although the personnel could have country rather than entirely regional responsibilities. Objectively this should be possible, but the desire for expansion in all three Institutes of Education -- with local government support -- may make agreement on a location very hard to obtain. It is already known that Kenya and Uganda are both looking for expansion in this direction.

Mr. Boucher stated that a program could be developed in any one of three ways:

- (a) A straight request for a regional program emanating from all three countries,
- (b) three separate proposals for a common activity coming from each country and being amalgamated as a result of the activities of the U.S.A.I.D. officials,
- (c) a regional program being proposed by the U.S.A.I.D. officials and offered to the three countries in this form.

He also stated that an outside organization could not present a regional proposal, nor could U.S.A.I.D. be bound by a country or regional request that a particular contractor be engaged for the task.

It appeared to the visitors the conditions put upon the presentation and form of a regional program could very well delay seriously the present satisfactory development of modern mathematics in Kenya and Tanzania.

UGANDA

Date: July 10 - July 12, 1968

PEOPLE INVOLVED IN MINISTRY DISCUSSIONS

Mr. W. W. Rwetsiba, Permanent Secretary, Ministry of Education
Mr. J. Aryada, Chief Inspector of Schools

OTHER PEOPLE INVOLVED IN DISCUSSIONS

Mr. Senteza Kajubi, Director, National Institute of Education
Mr. C. Manone, Chief of Party, T.E.E.A. Program
Dr. H. P. Adams, Education Adviser, U.S.A.I.D./Uganda
Mr. D. H. Edwards, Assistant Education Adviser, U.S.A.I.D./Uganda
Mr. Yoere Kyesimira, Makerere University

MINISTRY MEETINGS

In Uganda the program has been active mainly in the training colleges. It was reported that most of the colleges are following a syllabus based on the Entebbe Basic Concepts Volumes One and Two. It was not clear however that all colleges do in fact follow this syllabus, and indeed it was acknowledged that many tutors are not yet capable of dealing with "new" topics. The closing down of the experimental activities of the program caused concern because of the need for in-service courses and for continued help for the training colleges and their demonstration schools which use the primary texts. It was felt that the work of the future in mathematical curriculum reform should be the in-service retraining of the college mathematics tutors and the supervised introduction of courses in modern mathematics in the colleges.

There seemed to be an appreciation of the impossibility of obtaining help on a bilateral basis. There was an acceptance of the idea of a regional mathematical curriculum center based outside Uganda which would assist in the implementation of mathematical curriculum reform in Uganda.

In a separate discussion Mr. Senteza Kajubi, Director, National Institute of Education, also accepted the setting up of a mathematical curriculum center outside Uganda.

Dr. Adams and Mr. Edwards of U.S.A.I.D. emphasized the need for some sort of commitment from the Uganda government. They appeared to be satisfied by Mr. Aryada's statement that Uganda would send a representative to discuss a regional program.

The T.E.E.A. program continues to co-operate well with the African Mathematics Program. A continuation of this co-operation should be most helpful in the regional program presently under discussion.

At a later date Mr. Rwetsiba, Permanent Secretary, agreed to attend or send a representative to a meeting in Mombasa on April 24/25, 1968 to discuss with Kenyan and Tanzanian senior officials the development of a regional mathematical program.

TANZANIA

Date: July 17 - July 19, 1968

PEOPLE INVOLVED IN MINISTRY MEETING

Mr. J. D. Mganga, Chief Education Officer
Mr. C. Tarimu, Chief Inspector of Schools
Mr. A. Newa, Inspector (Mathematics)
Mr. W. Whitten, U.S.A.I.D./Tanzania

PEOPLE INVOLVED IN UNIVERSITY MEETING

Professor J. E. Phythian, Head, Department of Mathematics
Dr. A. Beninati, Mathematics, Institute of Education
Mr. R. Z. Mwajombe, Mathematics, Institute of Education
Mr. A. Newa, Inspector (Mathematics)
Mr. W. Whitten, U.S.A.I.D./Tanzania

OTHER PEOPLE

Professor R. C. Honeybone, former Director, Institute of Education
Professor G. K. Kibodya, Director, Institute of Education

At the Ministry meeting Mr. Newa was instructed to prepare a paper stating the case for Tanzania participation in a regional program to implement mathematics curriculum in East Africa. This paper would be read by Mr. Mwingira for possible further consideration at a political level.

The University meeting was concerned mainly with secondary mathematics. The present state of development in modern mathematics in Tanzania secondary schools is as follows:

<u>Entebbe</u>	<u>S.M.P.</u>
Form 1 58 classes	38 classes
Form 2 45 classes	22 classes
Form 3 25 classes	17 classes

Teachers: 30% Tanzanian, 70% Expatriates

Kenya and Tanzania have agreed to work together to produce an adaptation of the modern texts based on their experience in the two experimental programs.

It was felt that external help would be needed to develop suitable material for the decimalization program, for the text adaptation program, for teacher training and for building up local expertise in examination work. Special mention was made about the need for Primary and Secondary Institutes to train teachers to see the experimental classes through the school courses, and about the need for adequate mathematical supervision and finance to deal with the adaptation costs.

At a later date, Mr. Mwingira, Permanent Secretary, offered to attend a meeting in Mombasa on August 24/25, 1968 to discuss with senior officials from Kenya and Uganda the development of a regional mathematical program.

KENYA

PEOPLE INVOLVED IN DISCUSSIONS

Professor Cammaerts, Professor of Education, University College, Nairobi
Mr. Lijembe, Director, Institute of Education, Nairobi
Mr. Herbert Kanina, Chief Inspector of Schools

The talks with Professor Cammaerts have already been reported in the East African section. Mr. Lijembe seemed interested in the possibility of regional co-operation in mathematical curriculum development, but clearly considered the continuation of the present activities in Kenya of prime importance. The plan for implementation involved work with training colleges staff in the colleges. At secondary level the teacher education problem was not so serious, as Kenyatta College and the Science Teachers College, Nairobi, were about to graduate their first students and a reasonable number would be able to teach mathematics.

Mr. Kanina visited the Mombasa Workshop and talked with members of the Secondary Group, the Primary Group and the Testing Group. The Ministry's plans for the spread of "new" mathematics fitted rather well into a regional program. Mr. Kanina prepared a paper for presentation to the Chief Education Officer.

At a later date, Mr. Kyale Mwendwa, Chief Education Officer, agreed to take part in a meeting in Mombasa on August 24/25, 1968 to discuss with Tanzanian and Ugandan senior officials the development of a regional mathematical program.

MALAWI

PEOPLE INVOLVED IN DISCUSSIONS

Mr. Laurence Anthony, Chief Education Officer
Mr. L. Mallunga, Assistant Chief Education Officer (Inspectorate)
Mr. F. Kazembe, Inspector of Schools

This meeting was held in Nairobi, where Mr. Anthony and Mr. Mallunga were attending a UNESCO conference. Mr. F. Kazembe travelled from Mombasa to participate in the meeting. Mr. Anthony asked some detailed questions concerning EDC's place in any continuing program in mathematics in Malawi. He stated his satisfaction with the answers and went on to say that Malawi was most anxious for continuing help and would gladly participate in a regional program. He thought that the improving relations between Zambia and Malawi would make participation in a regional program very possible.

ZAMBIA

Date: July 31 - August 2, 1968

PEOPLE INVOLVED IN MINISTRY DISCUSSIONS

Mr. Domine Mulaisho, Permanent Secretary, Ministry of Education
Mr. David Barker, Chief Inspector of Schools
Mr. Sibson, Former Chief Inspector of Schools
Mr. Bowler, Senior Inspector of Schools
Mr. Aleck Curran, Inspector i/c Teacher Education
Principal, Mufulina Training College
Mr. Stanley Erlwanger, Inspector, Mathematics
Mr. Mbango Mumbwe, Senior Inspector of Schools

OTHER PEOPLE INVOLVED IN DISCUSSIONS

Mr. Scott, Controller, U.S.A.I.D./Zambia
Mrs. Bierman, U.S.A.I.D./Zambia

Early discussions indicated that not all of the Zambians who recently had a one-year course in mathematics in the U.S.A. and finished up attending the ABC Institute in Nairobi had been appointed to training colleges -- or, if appointed, were being allowed to teach mathematics. In general there was a feeling that despite the course, additional help would be needed for some years. There was also a clearly stated dissatisfaction with the Macmillan/Setidisho textbooks. Mr. Bowler and Mr. Erlwanger said the books were unsatisfactory and that the teachers could not teach them. The Teachers Guide for Book 1 was so bad that the printing was stopped by Mr. Bowler. These two made strong representation to the Chief Inspector asking that the books should be withheld from the schools for the present. Later, Mr. Erlwanger spoke especially firmly to the Permanent Secretary. Although not committing himself to the Setidisho issue, Mr. Mulaisho spoke very firmly about the stupidity of accepting texts before they have been written and stated that in the future the Inspectorate must approve texts before the Ministry commits itself to use or supporting publication.

The weakness of the teachers gave rise to useful discussion on the need for strengthening the training colleges so that they could undertake in-service courses across the country. Initially the Chief Inspector said that he thought it would be difficult for Zambia to join a regional program for the improvement of mathematics, but at a later meeting the Permanent Secretary said that a regional program would be welcomed by Zambia -- and Zambia would feel honoured if it became the centre of such a program. He saw no administrative difficulties which could not be overcome. He said that if the visitor (Mr. Bradley) would write a letter to the five Ministries (Botswana, Lesotho, Malawi, Swaziland and Zambia) indicating similarities of their problems in the reform of school mathematics and raising the question of a regional program to solve these problems, he and the other Ministries could then open a correspondence to give further consideration to the matter.

U.S.A.I.D. was fully informed of the outcome of the meeting in the Ministry. Prior to the meeting, Mr. Scott explained that a new U.S.A.I.D. region, consisting of the five countries mentioned above, had just been formed. He suggested that Mr. A. Howard, A.I.D. Affairs Officer, Zambia, who was on safari, might well welcome suggestions for a mathematics program for the region. A promise was made to offer a tentative plan later in the year. However, this

Summary: Travel Report of Mr. John Joanou, Associate Director of the African Mathematics Program to: Malawi, Zambia, Tanzania, Uganda, Kenya and Ethiopia April 5-28, 1968.

Purpose: to visit the Ministries of Education and U.S.A.I.D. offices to discuss book requirements, teacher training institutes and to assure participation in the 1968 Workshop and the ABC Institute at Nairobi. There were further discussions on the change in funding of the program and long terms plans.

Discussions with the Ministries regarding the change in funding were cordial and informative. They agreed to draw up long term plans to be presented to the local A.I.D. missions and were anxious to send participants to the Mombasa Workshop and the ABC Institute.

With regard to implementation, Tanzania and Ethiopia were in the forefront. Tanzania had begun to implement a math program long before the end of the experimental Entebbe program, while Ethiopia is going ahead fully on the Primary as well as the Secondary level.

Excerpts from Ministry visits follow:

Blantyre, Malawi

Present: Mr. Fiddes, Chief Inspector of Schools
Mr. L. B. Mallunga, Assistant Chief Inspector of Schools
Mr. Frank Kazembe, Inspector of Schools

Mr. Fiddes stated that although the Ministry is interested in doing a more thorough evaluation of Entebbe materials up-country, the overall program is doing well. Specifically, aside from the value of the mathematics in itself, the Entebbe books have provided an idea of how to introduce a new mathematics program into Malawi.

A later meeting was arranged with Mr. Anthony, Assistant Chief Education Officer, together with Messrs. Mallunga and Kazembe, during which the general subject of regional funding was discussed at length.

Lusaka, Zambia

Present: Mr. D. Mulaisho, Permanent Secretary of Education
Mr. D. Bowa, Under Secretary of Education - Professional
Mr. S. Erlwanger, Inspector of Schools - Primary and Secondary - Special Subjects

Mr. Mulaisho, who just recently assumed the post of Permanent Secretary of Education, stated that any assistance from EDC would be used towards implementation of new mathematics. Further, he said, "Mathematics is the one thing we are in great need of and we are definitely going towards implementation. There is no question about this." Regarding an adaptation of Entebbe Primary texts by Mr. N. O. H. Setidisho, the Secretary showed preference for a group of writers to adapt the texts as opposed to an individual, spoke emphatically against any profiteering in the adapted texts and said, "I certainly hope the Setidisho text is in the Entebbe tradition."

Kampala, Uganda

Present: Mr. Rukara Inspector of Schools
Dr. R. C. Anderson, T.E.E.A. Appointee, Institute of Education,
Makerere University College

Although it was reliably reported that most of the teacher training colleges in Uganda are using the Basic Concepts of Mathematics texts, there seemed to be a distinct lack of co-ordination between the Ministry of Education and the colleges regarding the use of these texts. The adapted primary Okello mathematics texts are the only ones authorized by the Ministry, and these texts will have to be rewritten within two years to include changes occasioned by the introduction of the metric system.

Dar es Salaam, Tanzania

Present: Mr. Mwingira, Chief Education Officer
Mr. Alfred Newa, Chief Inspector
Dr. A. Beninati, T.E.E.A. Appointee, Institute of Education, University
College

Tanzania has taken a strong and independent course in implementing a mathematics curriculum and printing locally the adapted Entebbe books. Mr. Raphael Mwajombe has been most active in adapting and translating into Swahili Entebbe Primary One through Primary Five texts. All Grade A teacher training colleges have a new mathematics program based on Basic Concepts texts. Two hundred thousand copies each of Primary One and Primary Two have been printed locally with no outside financial assistance. Secondary C One is being revised with an eye towards simple language. Some 800 students should begin Additional Mathematics (0-level) in January 1969.

Mr. Mwingira expressed thanks on the part of the Ministry for the assistance Tanzania has received from the African Mathematics Program and was most anxious to draw up a long-term plan to submit to the local U.S.A.I.D. mission. The co-ordinated effort between the Ministry and University College has been an important factor in the success of the program in Tanzania.

There was great concern about the pending cessation of the African Mathematics Program experimental activities in Tanzania.

Nairobi, Kenya - Curriculum Development and Research Center

Present: Mr. Gilbert Oluoch, Director of the Center
Mr. Sam N. Kagiri, Head, Mathematics Section
Mr. George Edmonds, T.E.E.A. Appointee, Primary mathematics

The Entebbe Secondary experimental classes are doing very well under Mr. Kagiri's direction. The number of classes has gone from 7 to 20 and Mr. Oluoch was assured that enough books would be made available for these Secondary C One classes. Primary I through IV texts of the adapted "Kenya Primary Mathematics" is being used in some 24 experimental schools.

Addis Ababa, Ethiopia

Present: Ato Tadesse Terrefe, Assistant Minister, Ministry of Education
Ato Tilaye Kassaie, Chief Expert, Ministry of Education
Mr. John C. Fitzgerald, Mathematics Curriculum Advisor, Ministry
Mr. Roger Hartman, Peace Corps Volunteer
Messrs. Tom Orum and Phil Thorn, Yale 5-Year B.A. Program

Close co-operation between the Ministry of Education, Mr. Fitzgerald and Messrs. Hartman, Orum and Thorn has contributed greatly to the success of the Program in Ethiopia. A measure of the progress of implementation of the Entebbe Program on both the Primary and Secondary levels is illustrated by the extent of the private publication of the adapted texts undertaken, as follows:

- (1) 15,000 copies each of adapted Secondary C One, Algebra and Geometry are being used in some 350 Grade 9 classes;
- (2) 20,000 copies (10,000 each of adapted Secondary C Two, Algebra and Geometry) were scheduled for September 1968; and
- (3) 25,000 copies of the Grade Seven adapted text;
- (4) Some 150,000 - 200,000 copies of the adapted Amharic translation of Primary One to be introduced nationwide September 1969.

Summary: REPORT ON MODERN MATHEMATICS TEACHER ASSISTANCE PROJECT IN ETHIOPIA

by Mr. R. R. Hartman, Peace Corps
Mr. T. V. Orum and Mr. P. A. Thorn,
Yale University Five-Year B. A. Program

in consultation with Mr. John Fitzgerald,
Ministry of Education

During the 1967-68 academic year, we have been visiting secondary and nearby primary schools. Our purpose has been to assist teachers with developments in Ethiopian mathematics education. This report is a summary of the project.

I. The Ninth Grade Program

A. The general program this year

1. The essentials of C-One Algebra were covered.
 - a. Clock arithmetic was omitted in most schools.
 - b. Either real numbers or graphing will need some review in grad ten.
2. C-One Geometry
 - a. Approximately 40% of the schools have covered the first two chapters.
 - b. Most schools will rely on a two week summary of the essentials.
3. Assistance to the ninth grade teachers
 - a. A pamphlet describing the relationship of the ninth grade material to the tenth and eleventh grade material was written and distributed to each ninth grade teacher.
 - b. Each provincial ninth grade teacher was visited three or four times during the year.
 - c. Each provincial ninth grade class was observed and appropriate suggestions were offered to the teacher.
 - d. Discovery method ninth grade demonstration classes were conducted in nearly every secondary school.
 - e. A four day course for the ninth grade teachers of Addis Ababa was conducted during the Christmas vacation.
4. Course evaluation
 - a. Examinations are being administered to all ninth grade students in the provinces and to a sampling of Addis Ababa students.
 - i. Initial results indicate that the majority of students understand the basic ideas but have trouble in applying these ideas to new situations.
 - ii. A report on the test results will be submitted as soon as all data have been received.

B. Successes in the program

1. Students and teachers have worked for a full year and have completed most of the C-One Algebra material. The system has matured considerably in its outlook.
2. Most non-ninth grade math teachers who didn't know the new ideas and the new approach have been stimulated to learn about them.
3. Teachers who are disposed towards using discovery methods and thought awakening questions in their teaching have been given an environment in which they can easily do this.
4. The thinking ability of students has been challenged.
5. Some of the teachers are now using the discovery method of teaching.
6. Teachers have a source of immediate feedback from their students. Also, the better organization of the material makes it easier for them to help a student.
7. Ninth grade teachers have been more involved in their work since the material is new.
8. With the new curriculum the better teachers have been experimenting with their teaching approaches.
9. Communication has increased among members of the math staff. The new material presented in the seminars has given them something to discuss professionally.

C. Problems and suggested solutions

1. Very few teachers took the opportunity to use teaching aids. This is understandable, as most teachers are not accustomed to doing this. We, therefore, suggest that we introduce teachers to the use of teaching aids as a part of the curriculum - on a limited scale, so that teachers would not feel that too much of their time is spent on the making of aids. Teachers can be supplied with instructions on how to make inexpensive teaching equipment for three or four topics.
2. Book distribution was a problem. Many of the books remained in the provincial, district and school bookstores. It is important that students pay their book rent, or buy their books, before the beginning of the school year. Also, some books should be made available for public sale wherever possible through local bookstores.

Another problem concerning the books is that very few teachers and students know how to use them effectively. Too often the books are viewed as exercise books only. We realize that much of the vocabulary of the C-One tests is difficult for the

A solution to this problem can be partially worked out with the assistance of the English teachers, who could make occasional use of the mathematics and scientific textbooks in their classes, encouraging students to do more technical reading. Also, the mathematics teachers themselves should teach students how to study on their own with the books, helping students learn to read for ideas rather than for words.

3. The curriculum outlined at the beginning of the year was unrealistically long. In recognition of this, appropriate changes were made before the beginning of the second semester. Since then, most teachers have remained on schedule with the revised curriculum. A carefully planned syllabus (based on the experience of this year) will appear in the ninth and tenth grades next year.
4. Some teachers had difficulty in recognizing which topics were important. Teachers should be made aware of the spiral method in which these books were written. This should be done at the beginning of next year. Also, they should be helped to view the book in terms of core material and added material. Some topics should be taught until any further instruction does not significantly improve the understanding of the class; other ideas are best introduced and then reinforced when they relate to new topics. Finally, other topics are included in the text as added materials--things to challenge the thinking of the students, but things which are not essential to their mathematical development.
5. Some teachers have been teaching with little or no reference to what they previously taught or to what they will teach later. This is understandable when one considers that they are teaching these topics for the first time. Ethiopia is fortunate to have many teachers who will teach ninth grade again next year, and it is hoped that they will see topics in a wider context as a result of their experience this year. It is important to continue the in-service workshops next year, and thereby expand the teachers' knowledge of the material that is to appear in grades 11 and 12.

II. Completed In-Service Training Programs

A. The program for primary school teachers

1. Procedure
 - a. Short courses were conducted for 429 primary teachers in 35 provincial centers. Each center was visited twice. The total time spent discussing mathematics in each center ranged from 4 to 8 hours.
 - b. A short pamphlet explaining the basic mathematical concepts was written and copies were distributed to all of the participating teachers. At most centers demonstration classes in the primary grades were given.

2. Evaluation and suggestions

- a. During the second visit a sampling of teachers was tested. The test indicated that although additional training would be helpful, about one-third of the teachers who participated in the course would be able to teach the proposed first and second grade curriculum without further training.
- b. This year we used a low pressure approach in most centers. We suggested that teachers meet with each other to discuss the material, but the planning of such meetings was left up to the teachers. Neither the rate at which the pamphlet was to be read, nor the amount of time to be spent studying was specified. However, in the few centers where the courses were structured more tightly, teachers seemed to appreciate the course more and to gain more from it.
- c. Next year more specific demands should be made of the teacher--perhaps a week by week schedule given them, and a reward offered in the form of certificates, and, for the better teachers, additional reading material in mathematics. Written material used during the course should be designed in carefully graded steps, so that teachers can gradually gain confidence. The material should be written in Amharic so that it can be read with ease. The easiest way to make the material available to every primary school teacher in the Empire would be to publish a pamphlet of about thirty pages.

B. The program for junior and senior secondary school teachers

1. Procedure

- a. Short courses were conducted for all provincial senior secondary school mathematics teachers who did not have a previous knowledge of modern mathematics, as well as for junior secondary school teachers. A pamphlet reviewing the ninth grade material was prepared and distributed to each participating teacher. Classes were observed, suggestions were made, and demonstration classes were conducted to encourage discovery teaching and to show how the ninth grade material related to topics taught in other grades. In addition to these provincial courses, a three day course was conducted during the Christmas vacation for 7th and 8th grade mathematics teachers of the Addis Ababa schools.

2. Evaluation and suggestions

- a. It is felt that all senior secondary school teachers are now capable of teaching the ninth grade material. However, it would be beneficial to have the teachers with a year's experience continue in the ninth grade.

- b. Because this year's in-service training gave teachers added insight into mathematics as well as added interest in their teaching, we feel that it should be continued, but on a modified basis.
- c. Work done with secondary teachers was most effective when it was done on a one-to-one basis, rather than in groups.

III. Plans for the Vacation

- A. The supervisor mathematics institute: We recommend that efforts be directed towards the training of supervisors to engage them in the kind of work that we've been doing with teacher training and assistance in modern mathematics. At such an institute the supervisors could be supplied with materials to distribute in their districts.
- B. Junior-secondary teacher training: With a curriculum change planned for future junior secondary classes, it is essential to train seventh and eighth grade teachers at the beginning of the next school year. It would reduce expenses to do this at the provincial capitals.
- C. In-service training programs: Approximately 2,250 teachers, who have academic qualifications between grades nine and twelve, are expected to participate in a vacation in-service program. Topics in accord with the new mathematics program have already been outlined for these courses. Also, we have prepared some standardized tests to check the progress of these teachers. Materials concerning teaching methods are currently in preparation. It is recommended that representatives of the curriculum department visit some of the sites to check on the progress of the program.

Another in-service vacation course is planned for teachers who have completed the 12th grade. We plan to orient them to the new mathematics program via materials we prepare for them from the Entebbe Teacher's Handbook and from the materials recently prepared by Miss Pow of the Addis Ababa Teacher Training Institute.

- D. The Ethiopian university service program: An orientation for the new EUS students is planned at the university.
- E. New Indian teachers: Last year the new Indian teachers were oriented to the ninth grade material. This year we will again take the opportunity to introduce them to the new math program.
- F. New Peace Corps Volunteers: As in the past few years, in-coming PCV's will have an introduction to EDC materials as a part of their training. Before these teachers begin their work, we will attempt to orient them to the specific adaptations of the EDC materials to the current Ethiopian curriculum.

IV. Recommendations for the Future

A. Curriculum

An outline has been drawn up of the mathematical topics (for Grades 7 - 12) that we feel are important as the program extends into the other grades.

B. Recommendations for future teacher assistance projects

1. As opposed to spending equal time in the schools, it would be better to spend more time in those schools where the teachers need more assistance and are receptive to assistance.
2. Work with supervisors should be continued and extended.
3. Work with primary teachers should receive more attention. A primary in-service course for next year should include programmed materials in Amharic. The secondary course would best be undertaken by correspondence so that time for workshops can be given to primary teachers.
4. Demonstration classes should continue in the ninth grade and extend into the 7th and 10th grades.
5. A major effort should be undertaken to orient teachers to rural science, and some of the methods and materials used in mathematics teaching can be used in science teaching as well. The staff of a teacher assistance project should include people who can assist science teachers as well as mathematics teachers.
6. In the future the Ministry could utilize the availability of team members to undertake other kinds of research besides the testing that we've done this year.
7. A planned series of spot testing would be easier to undertake and control than the nationwide testing that we have done this year.
8. More written feedback should be requested from teachers.
9. We recommend that a future teacher assistance project include the Addis Ababa area.
10. Cooperation should be maintained and extended with university and Teacher Training Institute personnel.

Submitted by: Mr. R. R. Hartman, Peace Corps
Mr. T. V. Orum and Mr. P. A. Thorn,
Yale University Five-Yr. B.A. Program
in consultation with Mr. John Fitzgerald,
Ministry of Education

African Mathematics Program
Work still Outstanding in the
Experimental Program after December 1968

a Testing

Primary

Primary III: Final form available 1969

Primary IV: Test prepared 1968 Workshop. To be pretested 1969. Tests reviewed in 1969/1970

Primary V: Test prepared 1968 Workshop. To be pretested 1969. Tests reviewed in 1969/1970

Primary Leaving Examination: Specimen test prepared in 1968 Workshop. Copies to be sent to Ministries 1968/69

Secondary

Secondary C 1 (1) Pretested and now available

" C 2 (1) Pretested and now available

" C 2 (2) Pretested and now available

" C 1 (2) To be pretested 1968/69, available 1969

" C 3 (1) To be pretested 1968/69, available 1969/70

" C 3 (2) To be pretested 1968/69, available 1969/70

Tests covering the first three years of Secondary school

No. 1 To be pretested 1968/69, available 1969/70

No. 2 To be pretested 1968/69, available 1969/70

Additional Mathematics

Specimen "O" Level Examination Papers prepared in 1968 to be distributed 1968/69

Advanced Mathematics

Pool of questions started in 1968. Specimen paper for "A" level examination to be prepared in 1969 and distributed 1969/70

Teacher Education

Specimen Examinations to be prepared in 1969. The Examination will have two parts. A first paper consisting of essay type questions lasting 2 1/2 hours; the second paper will consist of short answer or multiple choice type questions and will also last 2 1/2 hours.

It is considered that the preparation, publication, distribution, checking results and redistribution of the final tests will be concluded by late 1970.

Note Funds are available in the present contract to cover costs of a summer meeting and tasks required on tests already prepared. It is hoped that these funds will also be sufficient to cover costs arising from the additional tests mentioned above.

b Books

Inventory The inventory presently stored by SRA, Chicago is being distributed to African countries according to their involvement in the experimental program and our estimate of their continuing need of books presently in stock.

New Books The Primary Six Texts will be published in December 1968. The whole stock will be distributed to African countries according to our estimate of needs. The Primary Series Text (Guide for the Use of Entebbe Series) will be published Spring 1969 and distributed on the same basis as the Primary Six texts. The Teachers Handbook will be published in December 1968 and distributed early in 1969 according to our estimate of needs. Additional Mathematics (Four volumes). The first volume will be printed in December 1968 and the final volume by early summer 1969. The whole stock will be sent to Africa satisfying stated needs of the participating countries. Advanced Mathematics (Four volumes). The first volume should be printed by early Fall 1969 and the last volume by February 1970. Distribution should be completed by April 1970.

Note Funds for pre-publication, publication and distribution are available in present contract if suggested amendments are approved.

Institutes

Sierra Leone Two institutes are required to prepare teachers to complete the primary course

Liberia Three institutes are needed at primary level

Ghana Two institutes are needed at primary level. One institute needed at secondary level

Nigeria

Lagos Three institutes needed at primary level

Eastern States Unknown

Mid West Three institutes needed at primary level

West Unknown

North Unknown

<u>Ethiopia</u>	Two institutes required at secondary level. Primary program now involved in a program of implementation.
<u>Uganda</u>	Two institutes needed at primary level.
<u>Kenya</u>	Two institutes needed at secondary level.
<u>Tanzania</u>	One institute needed at secondary level. One institute needed at primary level.
<u>Malawi</u>	Two institutes needed at primary level.
<u>Zambia</u>	Two institutes needed at secondary level.

Note Funds for nearly half of these Institutes are available under the existing contract if the proposed amendments are approved.

The activities described above are the outstanding experimental activities arising from the USAID contract with the African Mathematics Program. It must be noted, however, that it is not our opinion that these activities are, or should be, the conclusion of experiments in mathematical curriculum reform in Africa or that there is no need for continuing experiments of this sort. The final purpose of the African Mathematics Program and of the African Education Program in general is to assist Africans in developing the capability and the facilities to permit on-going efforts which will review curricula in the light of developing knowledge of techniques, substance and the learning process and which will carry out experiments so that these advancements in knowledge can be applied for the betterment of African education.

EAST AFRICA REGIONAL PLANS

REPORT OF THE COMMITTEE ON NEEDS FOR IMPLEMENTATION
OF A NEW MATHEMATICS PROGRAMME BASED ON THE ENTEBBE
MATHEMATICS SERIES FOR EAST AFRICA

MEMBERS OF THE COMMITTEE

George Edmonds, Kenya Institute of Education - Chairman
Justus Mambo, Inspector of Mathematics, Kenya Ministry of Education
Gideon Kimote, Kenya Institute of Education
Senteza Kajubi, Director, Uganda National Institute of Education
Alfred Nawa, Inspector of Mathematics, Tanzania Ministry of Education

The Committee considered those needs related to implementing a modern mathematics programme in East Africa at the primary, secondary and teacher college levels. This programme is to be based on the Entebbe Mathematics Series prepared by the Education Development Center with support from the United States Agency for International Development. It should be emphasized that this report is not a request for aid. The Committee envisioned that the three Ministries of Education concerned would use the needs listed in this report as a basis for making requests for aid from USAID. These requests would have to be made by individual Ministries through the local USAID mission in the country concerned.

I. Assistance Needed at the Primary School Level

Kenya

1. At present Kenya has 65 streams of Standard IV pupils using the Entebbe Mathematics Series in 26 schools. These schools have an adequate supply of books for Standards 1 through 5. Kenya, therefore, needs 65 class sets of the Entebbe Mathematics Series for Standard 6 and 7.

2. Kenya will also need sufficient financial aid to provide these 26 schools with mathematical teaching aids. These aids will consist of a kit of aids which the teachers would prepare at the Kenya Institute of Education under the supervision of K.I.E. staff.

Tanzania

Tanzania will need 30 class sets of the Entebbe Mathematics Series for Standard 1 through 7 for use in English medium schools.

Uganda

Uganda will need 30 class sets of the Entebbe Mathematics Series for Standard 1 through 7 for use in demonstration schools.

II. Assistance Needed by the Primary Teachers Colleges

A. Personnel

Each country will need a mathematics educator who is thoroughly familiar with modern mathematics programmes for both primary and secondary schools. He would be assigned the following duties:

1. Conducting in-service courses for mathematics tutors from the teachers colleges;
2. Organizing and supervising in-service courses for primary teachers (these courses would be taught by college tutors and selected primary teachers who will be given an intensive course in mathematics);
3. Assisting in in-service courses for secondary teachers.

B. Equipment and Books

Each country will need the following:

1. Five sets of the mathematics teaching films prepared by Education Development Center;
2. Five sets of the tapes on the teaching of mathematics prepared by Education Development Center;
3. One set of the Entebbe Mathematics Series, Basic Concepts for each stream in each teachers college;
4. Ten complete sets of the Entebbe Mathematics Series for Primary schools for each primary teachers college and ten complete sets of the Entebbe Mathematics Series for Secondary for each secondary teachers college;
5. Each primary teachers college needs complete sets of the major primary mathematics programmes presently available in the U.K. and in the U.S.A.;
6. Each college and each model (or demonstration) school will need a complete kit of mathematical teaching aids. A sample of this kit is already under preparation at the Kenya Institute of Education. Financing is needed for purchase of materials for colleges to make these kits and to have their students make the kits.
7. Each college needs to be equipped with a workshop adequate for each teacher trainee to reproduce the items in the mathematical teaching aids kit.

III. Assistance Needed by Secondary Schools

A. The three countries plan a cooperative effort to rewrite Entebbe Mathematics Series for Secondary Schools to make them more usable in the secondary schools of East Africa. Financing will be needed to support this project to the following extent:

1. Cost of transportation and per diem for writers to attend writing conferences on a rotating basis among the three countries;
2. Cost of paper and secretarial assistance in producing the pre-publication copies.

B. Each country will need a continued supply of books for the schools now using the Entebbe Mathematics Series, Secondary. This involves 20 streams in Kenya, about 40 streams in Tanzania and 2 streams in Uganda.

IV. Assistance Needed for Institutes and In-Service Courses

The Committee recommends the following institutes and in-service courses:

1. An intensive course of from 6 to 8 weeks for one primary teacher from each education district. This course would be followed up by weekly or fortnightly Saturday courses for one or two terms. Teachers who complete this course would be given certificates and would conduct in-service courses in modern mathematics in their districts under the supervision of the local education officers and Editor-in-Chief for the three countries (see section on General Needs);
2. An annual 2-week vacation course for mathematics tutors from the teachers colleges. This course is to be conducted on a regional basis and the location for the course should rotate from country to country;
3. An annual 2-week course for secondary mathematics teachers. This course would be conducted by each country for its own secondary teachers;
4. Each year each country should conduct at least two courses for inspectors, supervisors and headmasters from primary and secondary schools. These should be familiarization courses and should be of two or three days duration.

V. General Assistance Needed

1. The Committee feels that if the adaptation of the Entebbe Mathematics is to be a success a person is needed to coordinate the efforts of the three countries. We, therefore, recommend that a fulltime editor be obtained. This should be a person who will have a strong background in mathematics and wide experience in education. The duties of this person would be:

- a. To edit all East African adaptations of the Entebbe Series, primary and secondary;
- b. To organise institutes and coordinate the work of the three mathematics educators assigned to the three individual countries;
- c. To assist the East African Mathematics Association in its professional activities.

2. Each Institute of Education should be given assistance in establishing an up-to-date mathematics library which would lend books to the teachers colleges and to secondary schools.

3. Assistance should be sought for providing a library centre and an information retrieval service either at one of the university colleges or one of the Institutes of Education.

Respectfully submitted,

George Edmonds, Chairman

SUMMARY OF MEETING HELD AT NYALI BEACH HOTEL

to discuss a regional program for the implementation of curriculum reform in mathematics in Kenya, Tanzania and Uganda.

Date: August 24, 1968

People Present: Mr. J. Aryada, Acting Chief Inspector of Schools, Uganda
Mr. H. P. Bradley, Director, African Mathematics Program
Mr. H. Kanina, Chief Inspector of Schools, Kenya
Professor W. T. Martin, Chairman, Steering Committee, African Mathematics Program
Mr. P. Mganga, Chief Education Officer, Tanzania

1. It was made clear in the opening discussion that those present did not feel that they were in a position to commit their Ministries to any course of action and that any recommendation of the meeting would be reviewed at educational and political levels in the separate countries.
2. It was agreed to use the report prepared by the Committee on Needs for Implementation of New Mathematics based on the Entebbe Mathematics Series for East Africa as a working paper. This Committee was convened by the East African Regional Mathematics Planning Conference which met in Nairobi on June 26/27, 1968. The paper was used to identify areas where regional co-operation is possible.
3. It was agreed that, even while allowing for the different stages of development in each country, the problems of teacher training could be tackled regionally. It was also felt that the resources requested regionally could be used to satisfy many of the diverse and separate needs of each country. Thus while the problems of pre-service teacher training could clearly be tackled regionally, the resources obtained could be used to deal with the in-service training of secondary teachers, which was so large a task that only country courses could be offered. Similarly, the resources could be directed to helping the diverse approaches to adaptation without necessarily imposing conditions unacceptable to the policies of each country.
4. It was agreed that the report of the Nairobi Committee stated clearly the mathematical needs, with a few minor changes, deletions and additions.

The alterations were as follows:

Item 1 Assistance Needed At Primary School Level

This part of the report was accepted with minor changes reducing the number of class sets (English medium) needed in Tanzania.

Item II Assistance Needed By The Primary Teacher Colleges

This part of the report was accepted. However, under "A" the need for local counterparts was emphasized.

It was also agreed that an important task of the Mathematical Educator would be the initiating and supervising of the introduction of suitable courses in "modern" mathematics into the colleges.

Item III Assistance Needed For Secondary Schools

This part of the report was accepted. However, under "A" assistance to cover publication costs of adapted texts was added.

A further addition, under a new sub-heading "C", was a request for a Mathematics Co-ordinator whose tasks would be the co-ordination, supervision and editing of the work of those concerned with the preparation of adapted texts, while also ensuring that there was no loss of mathematical quality in the adapted books. A request for such a person was included in Item V (a) of the regional report.

Another task of this Co-ordinator would be to organize and participate in in-service courses for secondary teachers.

The figure indicating the number of streams requiring textbooks in Tanzania, given in sub-heading B, was said to be inaccurate.

Item IV Assistance Needed For Institutes And In-Service Courses

This part of the report was accepted with changes. The word "Editor-in-Chief" in sub-heading 1 was changed to "Mathematics Co-ordinator".

In sub-heading 2, it was felt that "3 annual 2-3 week courses," in other words a crash program, would be necessary.

In sub-heading 4, it was felt that supervisors and headmasters could be given their familiarization courses while attending the normal annual conferences which are held for such people. However, at least one two-week course would be necessary for inspectors.

An additional sub-heading was added indicating the need for assistance in running courses for secondary teachers.

Item V General Assistance Needed

The general form of this item was accepted. The following changes were made:

The title "full time editor" was changed to "Mathematics Co-ordinator" in all parts of sub-heading 1.

Sub-heading 1 was changed to read "to co-ordinate, supervise and edit"

Sub-heading 1c was changed to read ".....its professional activities to the extent that his main duties allow."

Sub-heading 3 was omitted entirely.

5. There was considerable discussion on publications. The claims of national presses and the difficulty of dealing with copyright regionally is clearly a matter of concern. While the savings of a common publication were recognized, the need to satisfy national policies was also emphasized.

The following tentative suggestions were made:

- (a) When the same textbook was to be used in more than one country, the pre-publication tasks and the preparation of plates could be a unified effort. The printing of texts could be done on a national basis, if necessary, allowing for different covers to indicate national identity.
 - (b) Copyright could be allocated to a committee of East African Community - each country being allowed its appropriate share in the event of some other country's wanting to use the books.
6. There was also considerable discussion on method of procedure to obtain aid. It was agreed that each representative would prepare for his own Ministry a request for presentation to its local AID mission for assistance on a national basis. (Uganda?). If the AID reacted that only regional help could be given, the individual Ministries should then review the matter with a view towards the presentation of a regional proposal as discussed at the meeting. Under such circumstances the three representatives agreed that if asked by their Ministries, they would be happy to meet again to draw up the regional proposal. They also stated that they hoped that, after they had presented their national proposals, the AID missions would take the initiative in making them aware of the need for such a meeting.

SUGGESTION FOR REGIONAL CO-OPERATION

ETHIOPIA - TANZANIA

October 8, 1968

Mr. W. A. Whitten, Jr.
Education Division
USAID to United Republic
of Tanzania
c/o American Embassy
Dar es Salaam, United
Republic of Tanzania

Dear Willie:

Sometime ago I wrote to Noel Myers to see if we could stimulate interest on the part of Tanzania in joining Ethiopia in a regional mathematics effort. Could you make discreet inquiries there and let us know what the general feeling of the Tanzanians would be regarding this matter.

I suggested to ED that they convene a meeting some place in East Africa to see if we could finalize plans for continuing the math program beyond December of this year. They are contacting AID/W on this matter and I expect that if Tanzania and Ethiopia express interest such a meeting might be possible.

Since the end of the year is fast approaching we will have to move quickly on this or else the program will lag. I would, therefore, appreciate an early response from you.

We are delighted with our assignment in Ethiopia and though there is much work to be done it is interesting and exciting work and thus a pleasure to do. We hope that you are enjoying your assignment in Tanzania and look forward to seeing you at some meeting in the future. Regards to your family.

Sincerely yours,

William P. Saunders
Chief Education Advisor

cc: Hugh Bradley, EDC

Clearance: WReed, DD _____

EDU: WPSaunders:wm

June 1968

PRELIMINARY DRAFT PROPOSAL
MATHEMATICS CURRICULUM PROGRAM
IN
SIERRA LEONE PRIMARY SCHOOLS

The Sierra Leonean Ministry of Education has decided to introduce modern mathematics into all Primary Schools in Sierra Leone. Therefore, it requests USAID/Sierra Leone to engage the African Mathematics Program of Education Development Center as a contractor to cooperate with the Ministry in the Teacher Training activities which this decision has made necessary.

Background

Since 1962, the Sierra Leone Ministry of Education has been deeply involved with the African Mathematics Program administered by Education Development Center. Nationals have been involved in writing the textbooks at all levels, Primary, Secondary, and Teacher Education. Sierra Leoneans have served as members of Steering Committees and as members of the Program Steering Committee. Dr. A. Williams of Fourah Bay College has been chairman of the Secondary Writing Group at the Workshops, has been co-chairman of the overall Workshop activities and has been a member of the Executive Committee since 1965. In the ABC Institute Teacher Education activities, also, there has been full Sierra Leonean representation.

This deep commitment has enabled the Ministry to set up a strong Mathematical Advisory Committee composed of members all of whom have been involved in the pan-African efforts of the African Mathematics Program. This committee in addition to advising the Ministry on mathematical affairs has supervised classes using the Entebbe Mathematics Series experimentally and has organized in-service courses on modern mathematics, sometimes with external assistance from EDC or the Teach Corps and sometimes without external aid.

The Decision to Implement

The decision to introduce modern mathematics into all schools is a result of the early limited experimentation carried out by the committee

and the awareness of its members of the result of the vast experimental activities going on in the other parts of Africa. For more than two years the committee has been pressing very strongly for a much wider spread of the teaching of modern mathematics in Sierra Leone. Initially, a favorable decision was delayed because of shortage of teachers and money and uncertainty that, if started, the country would be able to carry the programme through to the end. Gradually, these inhibiting conditions have been removed. The ABC Institute has made available a cadre of local people capable of assisting in the Teacher Education problem. Also, the recent examination results have indicated the urgency of improving the standard of mathematics instruction and have thereby given mathematics some priority it did not have earlier. The enthusiasm for the changes engendered by the people in the Ministry and the committee now seem to ensure adequate followthrough if a carefully planned programme is developed. Such a programme is possible with external aid, and hence, a commitment is now possible.

Consequences of the Decision

The consequences of this decision are considerable. The demands on personnel and money for training and books will be heavy.

In the long run, new textbooks will be needed in every class, and teachers must be able to teach from these new books. Normal textbook replacement will absorb most of the cost of introducing the new textbooks, but the re-training of the teachers presently in the schools will require much time, some expense, and a training capability which at the moment does not exist. Clearly, the full implementation of the decision to change will take quite some time. This proposal will describe the early steps necessary to create the training capability which is the necessary first step toward final success.

The Training Colleges

The development of the training capabilities has already been started by the work of the ABC Institute organized by the African Mathematics Program. This Institute, in which Sierra Leone fully participated, was planned to make available in each of the ten participating countries a small group of people who could assist in the training of other Training College tutors. It has been clear that the full implementation of curriculum reform will depend on the ability of the Training Colleges to offer good courses in modern mathematics.

This is certainly true of Sierra Leone. In the long run, if all teachers in all schools are to teach the "new" mathematics, the colleges must be prepared not only to turn out teachers able to deal with the matter - but they must be capable of giving in-service courses for the teachers presently in the schools.

Personnel

The ABC graduates will, however, need additional help. None of them is qualified to furnish the local leadership required by an operation of this sort. While they can assist in giving courses, they cannot be required to organize them or be responsible for the preparation, introduction and supervision of the new curricula in the training colleges. Someone of greater mathematical competence and experience is required for such a novel task.

Unfortunately, Sierra Leone does not have many people to cope with such work, and all are in positions of higher responsibilities from which they cannot be released. It is in this area - and in the financial area - that external help is required. A competent expatriate mathematical educator will be required to assume the responsibility of training the college tutors and helping them to introduce new courses in their colleges. Help will also be needed to cover the costs of the courses which train the tutors and the expense of supplying them and their students with the textbooks.

On the other hand, it is certainly necessary that a Sierra Leonean should also be involved in this work, and it is the intention of the Ministry to appoint one of its officers to act as a counterpart and be trained for the supervising work which will prove necessary after the conclusion of the introductory program.

The Method

Four years should be sufficient to complete the full task of renovation and re-training. The colleges in Sierra Leone have either two or three year courses. In the first two years the mathematical educator, his counterpart, and the Sierra Leone Entebbe devotees would run a series of six in-service courses for the tutors which should prepare them for the changes about to take place.

During this period and during the succeeding two years, the mathematical educator and his counterpart would visit colleges, prepare courses, act as visiting lecturers to strengthen the work of the tutors and generally supervise the proper introduction of the new work and method.

Other tasks must necessarily include the introduction of modern mathematics into nearby practicing and demonstration schools and the running of in-service courses for the teachers in these schools - a fine preparation for the tutors for the long series of in-service courses which will prove necessary over the years.

A draft budget for the four years is given below.

Budget Year I

Mathematical Educator

Salary and allowances	\$20,000
Housing, etc.	6,000
Education (2 children)	2,000

Travel

From America (4 trips including family)	2,400	
In Africa	Car	4,000
	Gas and Maintenance	1,400
	Subsistence 120 days @ \$22 p.d.	2,640

Counterpart, Mathematical Educator, Ministry charge.

Institutes

(Sixteen tutors from 8 Training Colleges for Three Two-Week Institutes)

Board and Lodge

Three courses of 20 tutors and staff @ \$2 per tutor per day for 14 days ea.	\$1,680
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<u>Travel</u> - 3 courses of 20 tutors and staff @ \$12 per tutor	720
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<u>Books</u> - Set of 5 books for 20 tutors and staff @ \$10 per set	200
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Course Staff Salary

Mathematical Educator (US) (no additional charge)

Sierra Leone Mathematician 36 days @ \$100 for 6 day week	600
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Counterpart	Ministry charge
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Tutorial Supervisors	" "
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Administrative and Secretarial Staff	" "
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Budget Year II

Mathematical Educator US

Salary and travel as per Year I

Counterpart as per Year I

Course costs as per Year I

Books

Set of two books for each of 400 students @ \$4 per set \$1600

Budget Year III

Mathematical Educator US

as per Year I

Counterpart as per Year I

Books as per Year 2 \$1600

Set of three books for each of 400 students @ \$6 per set 2400

Budget Year IV

Mathematical Educator US

as per Year I

Counterpart as per Year I

Books as per Year 3

The above estimates do not include the cost of the administration of the programme. This figure will be negotiated by EDC with USAID/Sierra Leone in accordance with customary AID practice in contracts of this type.

This proposal has been written on the basis that the mathematical educator would be employed entirely in Sierra Leone. It is appreciated that funding is much more possible in a regional context.