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PROGRESS REPORT
to the
AGENCY FOR INTERNATIONAL DEVELOPMENT
on the
REGIONAL MATHEMATICS PROGRAMS

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June 26, 1970 to January 31, 1971

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Reference Center
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Education Development Center, Inc.
55 Chapel Street
Newton, Massachusetts 02160

March 17, 1971

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AGENCY FOR INTERNATIONAL DEVELOPMENT
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Program A79
Education Development Center, Inc.
55 Chapel Street
Newton, Massachusetts 02160
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PROGRESS REPORT

EAST AND WEST AFRICAN REGIONAL MATHEMATICS PROGRAM

A mathematics program for East and West Africa to implement the work of the African Mathematics Program was funded June 26, 1970 by the Bureau for Africa of USAID/Washington. The East African Program includes Ethiopia and Kenya; the West African Program includes Ghana, Liberia and Sierra Leone.

The purpose of this new program is threefold:

- a) to improve the mathematical background of the maths tutors and/or supervisors and the quality of maths education in the training colleges through institutes and correspondence courses;
- b) In cooperation with local personnel, to review, adapt and produce in Africa suitable common math textbooks based on the Entebbe Mathematics Series and other existing texts;
- c) To give local personnel experience in the preparation, adaptation and trial testing of teaching materials to help to build up a nucleus for ongoing curriculum development and research in mathematics.

In general, the program is intended to make possible the implementation of primary school mathematics curriculum reform by training middle level personnel who will be responsible for pre-service and in-service teacher education and at the same time, to make available suitable local primary materials which will be used in this implementation.

PERSONNEL

- A. With considerable difficulty, due to the timing of the funding, the Program was able to obtain at short notice the services of three well-qualified Mathematics Educators and two local Administrators and thus maintain the proposed schedule. The appointments were as follows:

Mr. John W. Alexander, Jr., of Hull, Massachusetts: His broad mathematical background includes maths teaching, curriculum development, administration of educational programs and industrial mathematics. Mr. Alexander operates from the University of Sierra Leone, Njala campus.

Mr. John T. Norris of Honolulu, Hawaai: former Peace Corps Volunteer was for two years Entebbe Maths Coordinator attached to the Department of Education, Monrovia, Liberia. He organized many in-service courses for teachers and introduced modern mathematics at teacher training institutes in Liberia and has taught mathematics in Liberia and in the United States. Mr. Norris is based at the University College of Cape Coast, Ghana.

Mr. John C. Fitzgerald of Charlestown, West Virginia: served as maths teacher and headmaster in schools in Queensland, Istanbul, Berlin, and Tripoli College, Libya, for 22 years, and during this period he also served as Education Officer in Australia House, London. Most recently he was Mathematics Adviser to Ethiopia and was responsible for drafting and supervising the implementation of a five-year plan for the nationwide use of new maths on both primary and secondary levels. Presently, he is based at the Office of the Inspectorate, Ministry of Education, Nairobi.

Mr. D. A. Brown, recently retired Permanent Secretary, Ministry of Education, Accra, was appointed local Administrator for the West African Regional Mathematics Program (WARMP). This was a most fortunate appointment since his long career in education coupled with a close association with the African Education Program proved a decided advantage in setting up the new program. Mr. Brown, together with Mr. Norris, is based at the University College of Cape Coast and supervises program activities in Ghana, Liberia, and Sierra Leone.

Mr. Makonnen Eunatu, with some twenty years of broad experience in public administration and finance, was appointed Administrator for the East African Regional Mathematics Program (EARMP). He operates from the Ministry of Education and Fine Arts, Addis Ababa and supervises activities in Ethiopia and Kenya.

Responsibilities

The educators are responsible for the training of middle level personnel who will undertake pre-service and in-service training of teachers and they will also assist local personnel in the adaptation and preparation of materials. In West Africa these materials will be used in teacher training colleges and in primary and secondary schools; in East Africa, only adaptations of teacher training college material will be undertaken. The training activities will involve institutes for training college tutors and supervisors and will be linked by correspondence courses supervised by the educators. Materials adaptation will be undertaken at workshops followed by classroom trials of preliminary materials.

The local administrators will provide normal backup for the Mathematics Educators, setting up and handling the logistics of the institutes and workshops, assisting in the preparation and distribution of correspondence courses, maintaining contact with Ministries of Education, informing them of Program activities and insuring necessary cooperation. In addition, the administrators will keep Program records, assist in the preparation of on-going proposals and budgets so that eventually they will become fully responsible for the programs, under Management Committee control.

PROGRAM ACTIVITIES

General

Prior to assuming their post abroad, the three maths educators spent

some two weeks at Newton, Massachusetts familiarizing themselves with EDC educational activities and more specifically, discussing the plans and details of the Regional Program and how they might best approach their new duties. Considerable attention was given to the correspondence courses which would follow the winter institutes. By November 1, 1970 all three had already assumed their new overseas posts. Contact between the East and West African educators is being maintained through correspondence.

The Director and Associate Director visited Africa during October/November 1970 to discuss with the administrators the Program philosophy and objectives and to assist them with their initial tasks: to set up the four winter institutes for tutors and supervisors; to select suitable sites with adequate accommodations; and to acquaint them with proper accounting procedures.

Institutes

The Program experienced some difficulty, especially in West Africa, in setting up the institutes which had been planned for December 1970 and January 1971. These difficulties arose partly from the late appointment of the educators and administrators and partly from the administrative procedures within the Ministries which made it difficult to identify and inform participants in sufficient time. Fortunately, the intensive efforts of the administrators and educators overcame most of these difficulties, but only after a considerable amount of travel and discussions with Ministries in the participating countries.

OUTLINE OF FOUR TUTOR/SUPERVISOR INSTITUTES

1. Date: December 9-23, 1970
Site: Advanced Teacher Training College,
Winneba, Ghana
WARMP Administrator: Mr. D. A. Brown
Participants: 51 Maths Tutors
Staff: Mr. John W. Alexander, Jr.,
WARMP Maths Educator
Mr. S. A. Minta,
Ghana Ministry of Education, Saltpond
Mr. John T. Norris,
WARMP Maths Educator
Mr. Andrew Nyame,
Ghana Ministry of Education, Accra

2. Date: December 7-19, 1970
Site: Kenya Girls' High School,
Nairobi, Kenya
EARMP Administrator: Ato Makonnen Eunatu
Participants: 45 Maths Tutors and Supervisors
Staff: Professor Roy Dubisch,
University of Washington, Visiting
Lecturer
Mr. John C. Fitzgerald,
EARMP Maths Educator
Dr. Edward Jacobsen,
Nairobi University, Lecturer

3. Date: January 4-16, 1971
Site: Yared Music School,
Sidist Kilo, Ethiopia
EARMP Administrator: Ato Makonnen Eunatu
Participants: 67 Maths Tutors and Supervisors
Staff: Professor Ross L. Finney
Associate Professor, University
of Illinois, Visiting Lecturer
Mr. John C. Fitzgerald,
EARMP Maths Educator
Ato Girma Mengistu,
Mathematics Department, Ministry
of Education, Ethiopia

4. Date: January 4-20, 1971
Site: Women Teachers' College,
Port Loko, Sierra Leone
WARMP Administrator: Mr. D. A. Brown
Participants: 56 Primary School Teachers and
Maths Tutors

Staff: Mr. John W. Alexander, Jr.,
WARMP Maths Educator
Mr. John T. Norris,
WARMP Maths Educator
Mr. Andrew Nyame,
Ghana Ministry of Education, Accra
Dr. R. O. Ohuche, Faculty of
Education, Njala University

One-hundred seven participants attended the West Africa Institutes. *
One-hundred twelve participants attended the East Africa Institutes.*

Management Committee Meetings

Management Committee Meetings were held at Accra and at Nairobi in July 1970.** These meetings were concerned mainly with a review of Program plans, discussions on necessary qualifications for Program staff, and the possibility of using the Program to offer training to local editors. Meetings were also held at Port Loko, Sierra Leone and Addis Ababa in January 1971. These meetings reviewed the staff appointments made, and additional appointments required for 1971, reports on activities including the first institutes, workshop plans for July/August 1971 and the details of the mathematics educators' activities.***

Involvement with WACTE and EARCE

The West African Administrator and the Program Director met with Dr. Taiwo Chairman of the West African Council on Teacher Education to discuss the possibility of the Council accepting WARMP as a Council acti-

*See Appendices I, II, III, and IV: Institute Report prepared by local administrators; See Appendices IIa and IIIa: Institute Reports by visiting lecturers Prof. Dubisch & Prof. Finney; See Appendix IVa for speech at Port Loko Institute by Minister of Education, Sierra Leone.

**See Appendices V and VI: Report of the Management Committee Meetings at Accra and Nairobi.

***See Appendices VII and VIII: Report of the Management Committee Meetings at Port Loko and Addis Ababa.

vity and assuming responsibility for its control and financing. This suggestion was given a favorable reception after some misconceptions had been removed and the administrator was invited to speak at the Council's Executive Meeting in Sierra Leone in December. A copy of the paper read to the Council is attached.* The Council Executive reacted favorably to the proposal and further discussions are planned.

A similar meeting took place in Nairobi, attended by the Secretary of the East African Regional Council on Education, the Program Director, Professor W. T. Martin, and Mr. McDonough of USAID. Following a fruitful discussion, a memo describing how association could be achieved was sent to the Council Secretary. He stated that the Council members would consider the matter. Further discussions are planned. A copy of the memo is attached.**

PLANS FOR 1971

Expatriate Staff

In 1971 two full time additional expatriate staff will be appointed: a mathematics educator/editor for East Africa to be located at Addis Ababa, Ethiopia, and an editor for West Africa to be located at Cape Coast, Ghana. These appointees will be responsible for the trial testing and continuing preparation of materials which come from the two workshops and for the final production of camera-ready copy of these materials. The East African educator/editor will also be responsible for the Ethiopian training program.

It is also proposed to appoint a consultant evaluator to the Program. This appointee, averaging four days consulting a month, will guide and advise on the evaluation of the activities of the Program. He himself will

*See Appendix IX

**See Appendix X

visit the participating countries to discuss activities with the mathematics educators and the trainee evaluators. The educators and trainee evaluators will be his local correspondents applying his evaluation instruments and carrying out much of the classroom visits and interviews.

Local Trainee Editors and Evaluators

Each participating country will be invited to appoint a trainee editor and a trainee evaluator if, at this stage, it feels that its manpower needs justify such personnel. The Ministries will be responsible for the salaries of these trainees, but other expenses arising from Program activities or training outside their own countries will be assumed by the Program. The training will be partly "on the job" training, working closely with the Program editors and the consultant evaluator. At a later date, the trainee evaluators will undergo further training at Ibadan and with TEDRO.* The trainee editors will have a three months' experiential visit to the United States which will be organized by Franklin Book Programs.

The trainee editors and evaluators will be closely concerned with the trial use of the preliminary workshop materials. The trainee editors will be involved in the production of the final camera-ready copy of these materials. The trainee evaluators will be closely involved in the ongoing evaluation of the Program acting as correspondents for the consultant evaluator.

Correspondence Courses and Visits

The mathematics educators will continue with the supervision of the correspondence courses and their visits to colleges and participants in the 1970/71 institutes. Travel plans cover the January through June 1971

* Testing and Education Research Organization

period have been prepared.* During this travel, the educators will visit institute participants, discuss correspondence course assignments, and assist the tutors and supervisors in planning their teachers courses - pre-service and in-service. Visits to training colleges will entail working with the tutors in their classrooms and assisting in implementing the approved syllabus through classroom techniques more relevant to the sort of classroom approaches which seem to be desirable.

Workshops

The workshops, one in East Africa and one in West Africa, are planned for July and August 1971. Three African mathematicians and two U.S. mathematicians who were involved in the production of the original Entebbe texts will supervise the workshops. Two of the African mathematicians are also members of the West African Management Committee. The adaptations will be undertaken by local personnel working under the guidance of the mathematicians. In both East and West Africa an adapted training college text tied to local syllabuses will be prepared. The West African workshop will also begin the adaptation of the Entebbe Primary Texts and review the needs at secondary level. In East Africa an additional activity will be a short review of subsidiary mathematics to consider what mathematics is needed at "A" level for the non-mathematician who finds it necessary to use mathematics in his field of speciality.

The texts adapted at the workshops will be given trial use in classrooms in the 1971/72 academic year under the supervision of the educators, the program evaluators and the editors.

*See Appendix XI

Local Direction

There will be continuing discussion with WACTE and EARCE concerning the relationship between the Councils and the Management Committees if the Councils assume responsibilities for the Program. If discussions advance satisfactorily, the Program proposals for 1972 onwards will be prepared in consultation with the Secretaries of the Councils.

STATUS OF THE PROGRAM

Impact

Despite the rather delayed funding of the Program, staff members were appointed in time and the planned institutes took place as scheduled. The anticipated African participation in these institutes was obtained. Over 200 tutors and supervisors attended the four institutes and there appears to be in most areas some enthusiasm for the work being undertaken.

The correspondence courses and visits of mathematics educators have started. Initial reports suggest that these visits are welcomed and, with the possible exception of the Kenya supervisors, the correspondence courses are likely to be well supported. The Program management committees are aware of the difficulty of maintaining interest in such courses when no professional or financial benefit seems likely. The Ministries are being pressed to give some incentives to those who complete the courses satisfactorily.

Commitment

So far Ministry cooperation has been good. Problems which have arisen were occasioned by administrative difficulties rather than lack of good will. Full office accommodation and facilities have been granted in the East African Ministries. In West Africa, accommodation was not requested, but contacts have been good. Facilities for the institutes were quickly

given with full Ministry assistance. The facilities were generally very good, and the institute costs were reasonable. No difficulty has arisen over local travel expenses of participants for which the Ministries are responsible.

There has also been very encouraging assistance from local personnel, both African and non-African. In West Africa, strong African teaching assistance was given at the institutes. In both East and West Africa, much help was given in making arrangements for and in the ongoing administration of the institutes. The willingness of African mathematicians to assist in workshops is of particular interest. This local help at institutes or workshops augurs well for the future.

The Management Committees have discussed at some length the future of the materials produced at the workshops. Further discussions have been held in the Ministries. The methods of preparing, printing, and ordering, and the willingness of the Ministries to purchase the materials were the subject of these discussions. The understanding is that the Program will trial test the workshop materials and finally produce camera-ready copy. The materials will then be reviewed by the national book review committees (or similar type groups) and being accepted as suitable, the Ministries will place printing orders for which they will pay the costs. The Program has undertaken to identify places where printing costs are reasonable and to inform the Ministries accordingly. However, the Ministries themselves will decide if national considerations make it desirable to print locally rather than seek cheaper costs. Present investigations indicate that there is a considerable cost differential between printing in Ethiopia and in the other participating countries.

There appears to be little doubt that all five countries need a good mathematics teacher training text. There is also a strong demand in West

Africa for adapted primary and secondary materials. As these adaptations will be undertaken by local Ministry personnel under good African mathematical direction, the ultimate acceptance by the book review committees seems most probable.

CONCLUSION

Education Development Center and the Program Management Committees are grateful to the USAID officials in Washington and in the field who have helped and advised in the development of the Program and for their sympathetic understanding of the Program's aims and the needs of African school mathematics.

WEST AFRICAN REGIONAL MATHEMATICS PROGRAM
REPORT
on the
FIRST INSTITUTE FOR TRAINING COLLEGE TUTORS

Prepared by: Mr. D. A. Brown

Location: Advanced Teacher Training College, Winneba, Ghana
Dates: December 9 - 23, 1970

1. PLANNING THE INSTITUTES

The First Institute was restricted to Mathematics Tutors from primary Teacher-Training Colleges in South-East Ghana that is, the Volta and Eastern Regions and the Accra Administrative Area; and the second Institute to School Supervisors and Mathematics Tutors from the Colleges in Sierra Leone, Liberia and the Central and Western Regions of Ghana. In effect, it was planned to cover the whole of Sierra Leone and Liberia and the Southern half of Ghana during the first phase of the program, 1970/72.

2. All the Colleges in Sierra Leone and Liberia were included because they were few in number. In Ghana, on the other hand, it was necessary to select Colleges in the same part of the Country in order to cut down travel costs and also facilitate the field operation of the Mathematics Educators who would visit the Colleges to assist the tutors and insure that the correspondence course achieved maximum results. Slightly fewer than half the total number of colleges are covered in Ghana during phase 1 (see map attached).

3. INVITING ATTENDANCE AND INVOLVEMENT

The National Teacher-Training Council of Ghana issued instructions fairly early to the Training Colleges requesting Mathematics Tutors to attend the institute. Nevertheless, due to administrative difficulties within the Ministry of Education itself invitation of participants by the local Administrator as well as the issue of information sheets about the program were unduly delayed. However, in spite of this delay and the fact that Winneba, which was the venue for the Institute, was widely reported to be the worst hit locality in the cholera epidemic, 51 participants turned up out of the 57 that were invited and a successful institute was held.

4. PARTICIPANT ATTENDANCE AND INVOLVEMENT

A participant's representative committee of four was elected which, in turn, elected one of their number as Course Leader. Also, a Librarian and a Games and Entertainment Secretary were elected. The Committee and the Administrator met

frequently to take joint decisions on matters affecting participants and the organization and conduct of the institute generally. There were two meetings with the whole body of participants on the subject of out-of-station and travelling allowances. There were frank exchanges of views at these meetings and the Administrator's explanations were accepted though with some reluctance.

5. HEALTH PRECAUTIONS

In view of the epidemic, movement was restricted, particularly in Winneba township. Participants who had not been inoculated before coming to the Institute were inoculated on the third day. The strictest precautions were enforced particularly in the kitchen against the epidemic. All drinking water was boiled. Fresh napkins or Serviettes were served with every meal, and a high standard of cleanliness was maintained. Dispensary facilities were available

6. ENTERTAINMENT

There was an excursion to Accra and there were also film-shows to provide relaxation. The staff canteen was opened daily for one hour and drinks other than spirits were obtainable at reasonable prices. Both the sleeping accommodation and the catering services were excellent, and participants seemed generally satisfied.

STAFFING

The following instructors were used on a full time basis for the full two week period, December 10 - 23, 1970.

1. Mr. Jack Alexander - EDC Mathematics Educator
Njala University
2. Mr. S. A. Minta - Ghana Ministry of
Education, Saltpond
3. Mr. John Norris - EDC Mathematics Educator
University College, Cape Coast
4. Mr. Andrew Nyame - Ghana Ministry of
Education, Accra

In addition to the full time staff, we were fortunate to have the help of the following qualified people on a part time basis:

1. Mr. E. B. Dogbe, Curriculum Research and Development Unit, Accra
2. Mr. M. L. Johnson, Curriculum Research and Development Unit, Accra
3. Mr. S.W.A. Risvi, Advanced Teacher Training Institute, Winneba
4. Miss Silver, Advanced Teacher Training Institute, Winneba

DAILY SCHEDULE

7:00 - 7:30	Breakfast
7:30 - 8:30	Small Class Instruction
8:30 - 9:30	" " "
9:30 -10:00	Coffee
10:00 -11:00	Small Class Instruction
11:00 -12:00	" " "
12:15 -12:45	LUNCH
1:00 - 2:30	Rest and Study Time
2:30 - 4:00	Lectures on special mathematical topics
4:00 - 4:30	Tea
4:30 - 6:00	Free or Study Time
6:00 - 6:30	Dinner
6:30 - 7:30	Free or Study Time
7:30 - 8:30	Additional mathematics topics (optional)

DETAILS OF MORNING SESSIONS

Because the varied mathematical backgrounds of the participants made grouping them into one large group potentially wasteful, the staff devised a system whereby each participant had some choice as to how fast and to what depth he could cover several different mathematical topics. This arrangement might be called a 4-4-4 system. In other words, we had four instructors, four broad areas of the training college curriculum, and four classes going on simultaneously in each of the four areas of the curriculum. The National Teacher Training Council Syllabus in the New Mathematics for the Training Colleges which the Mathematics Educators had helped to finalize was discussed in detail with participants and this enabled them to decide which classes they needed most to attend.

What this meant for the participants was that at the beginning of each class hour in the morning, they could choose any one of the four broad areas in the training College curriculum. For example, a participant "A" might decide to spend the first hour in the class on sets and numbers, the second hour in the class on number systems, the third hour in the class on number relations, and the fourth in the class on geometry. In this way, he would move through all four classes in the other areas at about the same rate.

However, Participant "B" might be strong in geometry but very weak in sets and number. He could then choose to spend two, three, or even four class hours on the same morning in classes on sets and number. An added advantage for him would be that each class on that one day would be taught by a different instructor. However, this would mean that he would have to forgo classes in the other areas that morning.

Another way to describe this system would be to point out that in one morning there were in fact sixteen classes, four in sets and number, four in number systems, four in mathematical relations and four in geometry. At any one class hour there was one class from each of these four broad groups. Therefore, a participant could choose to go to any four of these classes out of the sixteen.

KEY: The number "1" designates a class on sets and number
The number "2" designates a class on number systems
The number "3" designates a class on mathematical relations
The number "4" designates a class on geometry

Hour	Alexander	Minta	Norris	Nyame	(Instructors)
7:30 - 8:30	4	3	2	1	
8:30 - 9:30	1	4	3	2	
10:00 -11:00	2	1	4	3	
11:00 -12:00	3	2	1	4	

ADVANTAGES OF EARLY MORNING CLASS SCHEDULE

1. Each participant could choose those classes that he thought could benefit him the most.
2. Each participant could stay in one subject area as long as he wished until he was satisfied he really understood the mathematical concepts.
3. No participant was forced to go over material which he already felt competent in (although he had to attend four hours of classes).
4. Each mathematical concept was taught by each instructor so that if a participant didn't understand one instructor's presentation, he could see that same topic presented slightly differently by another instructor.
5. Class size was small enough to allow the group of participants present to direct the instructor to the precise mathematical points needed to be covered in almost seminar fashion, with active participation.

DISADVANTAGE OF EARLY MORNING CLASS SCHEDULE

1. The teaching load on each instructor was great and each instructor had to be prepared to teach over a broad range of topics.

2. Participants with very poor modern mathematical backgrounds or those who did not use the library facilities to formulate questions prior to classes, felt at a loss when asked what area they wished to cover.
3. Evaluation of what was actually gained by any single participant was impossible to measure since each attended a different set of classes.

PRELIMINARY EVALUATION OF SCHEDULE

At this stage it is hard to evaluate the effect of this system upon the participants. However, a lot of mathematics was gone over in the classrooms as well as in group-work on measurement and transformation geometry outside the classroom. The outward appearances seem to be that the participants received a general overall introduction to the full scope of modern mathematics for the training colleges. With the visitations by the mathematics educators and careful individual evaluation through the correspondence course, the long term effects of this type of 4-4-4 system can be better evaluated. This system probably will not be used for these participants at next year's institute, since their backgrounds will be well known by them and a more structured course of study can be worked out in advance.

AFTERNOON AND EVENING SESSIONS

The afternoon sessions were devoted to specific mathematical topics which included probability, matrix algebra, three dimensional geometric constructions, and a geometric approach to algebra. These classes were larger (except of the matrix algebra class which consisted of five sessions attended by a small advanced group) and were more of a lecture type class with activities such as making of geometric figures or calculating probabilities in the classroom. It was with these sessions that the additional staff was most helpful.

The evening sessions were optional, although, a fair number of participants came regularly. These classes consisted of interesting mathematical patterns and topics not found in the usual text books. Mr. Alexander used these sessions to introduce some of the material he has written which strengthen the mathematical reasoning ability of those involved. However, mostly, it was just having fun with mathematics.

OTHER POINTS RELATED TO INSTRUCTION

Library - A library was set up consisting of one complete set of all the Entebbe mathematics books, an adequate number of the four volumes of the Basic Concepts as well as Secondary C One Algebra and Geometry books. During the second week, we borrowed from the Curriculum Research and Development Unit of the Ministry of Education copies of the JSP. It would have been preferable to give to each participant his own set of books at the beginning of the institute, but the shipment of Teacher's Handbooks and Syllabus Sourcebooks did not arrive in time for the Institute.

Films - We were sent the three EDC Films made in Ghana, but they did not arrive. However, we were able to borrow a set and these were shown at the institute. In addition, we had some other films mostly for entertainment.

Testing - A pretest designed by EDC was given during the first few days to all the participants. This test will help in determining the effectiveness of the program and this testing program will continue in order to mark the progress of this set of participants. (It might be noted that shipping difficulties made it necessary to reproduce the tests locally, with some minor effects on visual clarity).

Correspondence - An adequate quantity of books were received to allow the distribution of enough texts to each participant and/or college to give each participant access to the books necessary to start the correspondence course in January 1971. However, there will still have to be some minor distribution of books to those participants who did not receive a complete set.

Individual attention - Mr. Norris scheduled a minimum of 15 minutes (during the free and study times) with each participant. At this time the pretest was gone over with the purpose of identifying the areas that each participant should attempt to cover during the Institute. This also gave Mr. Norris some information on each participant which will be valuable in shaping the correspondence course to individual needs.

CONCLUDING REMARKS

The Winneba Institute December 1970 provided for its participants a general overall introduction to the mathematics necessary to carry on a truly "modern" mathematics program in the teacher training colleges. There was a sincere attempt on the part of the staff to teach in a "modern" way knowing that people teach the way they have been taught. New subjects such as sets, bases, transformation geometry, matrix algebra and topology were introduced to those who had been unaware of the mathematics involved in these topics.

It would be a gross overstatement to say that this one two-week course prepared the training college tutors to be competent in the teaching of the modern mathematics. However, a good foundation was laid and there is a real awareness on the part of the participants about what areas of mathematics they need to work on in order to achieve real competence as teachers of modern mathematics. Indeed, the very recent graduates of the Winneba Advanced Teacher Training College seemed very well versed in most of the modern mathematics syllabus.

With the continuation of the program and the correspondence course, and with the visits to the training colleges by the mathematics educators, the goal of having a cadre of tutors fully competent to teach any modern mathematics syllabus at the teacher training colleges seems like a reasonable and achievable objective.

EAST AFRICAN REGIONAL MATHEMATICS PROGRAM
REPORT
on the
FIRST INSTITUTE FOR TRAINING COLLEGE TUTORS
AND SUPERVISORS

Prepared by: Mr. Makonnen Eunatu

Location: Kenya Girls High School, Nairobi, Kenya
Dates: December 7 - 19, 1970

1. PREPARATION

In the first week of November Mr. Hugh P. Bradley, the Director of African Mathematics Program, EDC, Mr. John Joanou, Associate Director, Mr. John Fitzgerald, the Mathematics Educator, East African Regional Mathematics Program and myself Makonnen Eunatu, Program Administrator were all in Nairobi for general program activities. Mr. Bradley and Mr. Joanou arranged the transfer of funds and the site was decided with the assistance of Mr. Isaac Hunja. Mr. Fitzgerald was preparing the books and the subject matter while I was back in Addis discussing the Addis Institute. When I was back to Nairobi on December 4 with some 118 Basic Concept Books for the Institute everything was set and ready for the Nairobi Institute to start.

2. SITE

The site was Kenya High School for Girls. Full board was provided for all participants. We had all facilities including administrative ones such as offices, a typewriter, duplicating machine, telephone services, etc., at our disposal. The school authorities were very cooperative and highly efficient in supplying our requirements even at short notice.

3. PARTICIPANTS

Of the expected 50 participants, 45 were present: 24 supervisors and 21 college tutors. A few of them did not appear for the first couple of days and a couple of them were able to attend from the end of the first week. Their explanation was that the invitation reached them late.

Ato Girma Mengistu from the mathematics department of the Ethiopian Ministry of Education attended for the first week as an observer.

4. INTRODUCTION

A registration form was completed and name tags were distributed as the participants came in. All the necessary books and note books were distributed (Annex 1 Time-Table).

Mr. Isaac Hunja, Senior Education Officer, Ministry of Education, Nairobi and member of the Regional Management Committee made a short address. This

was followed by a comprehensive explanation of EDC, The Regional Program and of the Institute activities for the next two years by Mr. John Fitzgerald, the Mathematics Educator.

5. STAFF

The lecturing staff was composed of the following three members:

1. Professor Roy Dubisch, University of Washington, Visiting Lecturer.
2. Mr. John Fitzgerald, East African Regional Mathematics Program, Mathematics Educator, Lecturer.
3. Dr. Edward Jacobsen, Nairobi University, Lecturer.
(Dr. Jacobsen offered his assistance of his own free will. We paid only his transport expenses.)

The Administration was taken care of by myself, Makonnen Eunatu, Program Administrator and assisted by a part-time secretary Mrs. Eileen E. Bowman.

6. DURATION OF THE INSTITUTE

The Institute was designed to begin on the 7th day of December and to be completed on the 19th. However, December 12 was Kenya's Independence day and the participants had to be free. Since almost all of the participants came from outside Nairobi they strongly wished to have a shopping afternoon free on the last morning the 19th of December. Thus the Institute was run two mornings and one afternoon shorter than planned. Nevertheless the lecturers felt that the syllabus was substantially covered.

7. SUBJECT MATTER

A Lecture Syllabus (below) was prepared beforehand and it was anticipated that lectures based on the syllabus should be given to the group to be followed by work sessions of two or more groups. This was, in fact, done for the first two days. It was discovered, however, that all participants had no similar degree of understanding of modern mathematics. It was decided, therefore, to group them into two; the tutors and some of the advanced supervisors as one group and the rest of the supervisors as another. A time table (Annex 1) was prepared and followed since then. Generally, the tutor group was taken up by Professor Dubisch and the supervisors by Mr. Fitzgerald, both sometimes assisted by Dr. Jacobsen. Sometimes there were joint sessions led by one of the lecturers in which the two lecturers participated in the discussions.

Lecture Syllabus - (Minimum Background) For Supervisors

1. Sets and sets of Numbers

Meaning of set member, describing sets, empty set, subsets, comparing set, $>$, $<$, equivalent and equal sets, disjoint sets. Operations on sets-union, separation, mixing, intersection. How sets generate

counting and whole number system.

Fractions (common, decimal and percent), integers, rationals.
Odds, evens, multiples (skip counting), factors, primes powers.

Use of sets to find H.C.F. and L.C.M.

Use of number line and ordering of sets. Truth sets for sentences.

2. Numeration and Place Value

Numeration, many names (renaming).

Decimal numeration, place value, expanded form.

Other base numeration, place value, expanded form and practical applications as in computers.

3. Operations on Numbers and Properties of Operations

Meaning of operations, addition as union of sets, subtraction as inverse of addition, multiplication as mixing of sets, division as inverse of multiplication.

Operation machines, operations on number line and using dot and region arrays.

Properties - closure, commutative, associative, distributive, properties of zero, one, opposites, reciprocals.

Clock Arithmetic and structure of systems.

Estimation.

4. Techniques - examples using properties.

5. Arithmetic Relations

One to one correspondence.

True and false sentences, open sentences, equations and inequalities in 1 variable, 2 variable, Domain, truth set, ordered pairs.

Concept of function (related also to geometric transformations).

Work problems in general.

6. Geometry

Study of objects, straightness and roundness, vertices, edges, surfaces. solids, shapes --- geometric figures as sets of points, line segment, plane, space figures - paths.

Ray, line angle, triangle, quadrilateral, polygon - including special cases.

Congruency: Relationship between lines, planes, space figures - intersections, parallelism, perpendicularity.

Measurement of line segment, angle, area (regions) and volumes.

7. Movement Geometry

Rigid Parallel === Translations
Motions Turning === Rotations
 Folding === Reflections
Non-rigid motions = stretching and shrinking.
Movements on number line, number plane, vectors.

8. Data, Graphs and Probability

Additional Topics (for tutors)

Real Numbers, Modular Arithmetic, Functions, Transformation
Geometry, Matrices.

Common for all Participants

Survey of T.T.C. Syllabi, Aids, School Leaving Examination and "our"
Examination, Films, Panel Discussion.

STAFF

(1) Professor Roy Dubisch
University of Washington
Lecturer

(2) Dr. E. Jacobsen
Lecturer

(3) Mr. John Fitzgerald
East African Regional
Mathematics Program

E.D.C. Mathematics
Educator
Lecturer

(4) Mr. Makonnen Eunatu
East African Regional
Mathematics Program
Administrator

8. PANEL DISCUSSION

One afternoon was devoted to the showing of three films each followed by comments and discussions.

A panel discussion was arranged for one afternoon and fifteen persons concerned with the program were invited to attend. Only three of those invited were able to come. However the pane' discussion was successfully carried on.

At the panel and on previous occasions, the participants raised the question of incentives after their successful completion of the Institute. The Staff was not in a position to say "yes" or "no", but were told that the proper authority, the Ministry of Education, would be informed about this question.

9. CORRESPONDENCE COURSES

The first fifteen assignments of the correspondence courses are ready for dispatch including those for the Addis Institute. In fact, the Nairobi Institute participants have taken them the first two assignments.

10. GENERAL IMPRESSION OF PARTICIPANTS

It was generally believed by the staff that the participants were satisfied about the arrangement and the subject matter of the Institute. Representatives of each group, tutors and supervisors, expressed in brief that they had substantially benefited from the Institute.

It was generally agreed, however, that all of the participants were not devoted to modern mathematics since they are required to handle other subjects as well in their normal work.

11. COMMENTS

Late comers, disinterested participants and frequent absentees are not likely to gain much from such brief courses. On the other hand, it does not seem wise to adhere to a strict discipline by an independent body such as ours with such mature adults as the participants are. Though our problem in this respect was not so serious this time, it could get worse during the next two years unless some constructive step is taken. In my opinion, their Ministry should be advised to encourage them in a positive way to be more diligent.

Closely related to the above problem is the question of incentives often expressed by the participants. This demand is not bad in itself; those who put up more effort should be rewarded accordingly. Their Ministry should be advised, therefore, to think of incentives seriously without prejudice to their regular functions. In addition, the Ministry should be advised to use them intensively and as early as possible in in-service training courses.

Annex 1

EAST AFRICAN REGIONAL MATHEMATICS PROGRAMME

INSTITUTE DEC. 7-19TH, 1970

TIME-TABLE

	8:15 - 10:00	10:30 - 12:45	2:00 - 4:00
Wednesday	Survey of T.T.C. Syllabi (J)	Real Numbers (J)	Modular Arithmetic (D)
Thursday	Real Numbers (J)	Modular Arithmetic (D)	* Aids (F)
Friday	Functions (D)	do.	X
Monday	do.	do.	* School Leaving Examination and "Our" Examination
Tuesday	Transformation Geometry (F)	Functions (D)	* Films (F)
Wednesday	do.	Matrices (D)	X
Thursday	do.	do.	* Panel Discussion (F)
Friday	do.	Miscellaneous (D)	Miscellaneous (D) Concluding Remarks (Staff and Participants)

* Joint sessions with Inspectors.

D - Dubisch, F - Fitzgerald, J - Jacobsen

PROFESSOR ROY DUBISCH'S REPORT

KENYA INSTITUTE FOR TUTORS
AND PRIMARY SCHOOL SUPERVISORS

December 7-18, 1970

The Institute was for tutors and primary school supervisors and was held at Kenya Girls High School in Nairobi. It was organized by Mr. Isaac Hunja of the Kenya Ministry of Education and Mr. John Fitzgerald and Ato Makonnen Eunatu of the EDC staff.

The teaching staff included Mr. Fitzgerald of EDC, Dr. Edward Jacobsen of the Department of Education of the University of Nairobi (UNESCO), and myself. Mr. Fitzgerald was largely responsible for the program for the supervisors and I was largely responsible for the program for the tutors; Dr. Jacobsen helped with both groups.

There were about 45 participants. Attached is a list of tutors and their program; Mr. Fitzgerald will report on the details of the program for the supervisors.

The first day sessions with the entire group had made it clear that a split of the group between supervisors and tutors was needed and so, after some general remarks by Mr. Fitzgerald and me on Tuesday morning, we did so. As the attached schedule shows, I worked mainly with the tutors but I did handle two sessions with the inspectors and also assisted in the joint sessions in the afternoons.

As for the tutors: As you know, I have had considerable experience working with tutors. But this was the first time I had met with a considerable group of them that already had some experience teaching some modern mathematics (e.g. Basic Concepts or S.M.E.A.). So we needed some discussion to find out what their problems and interests were before developing the attached program.

I should emphasize that all of the topics listed were discussed with maximum attention to their relation to the tutor's own teaching problems -- and with many side remarks -- rather than as formal mathematics topics. For example, in connection with functions I pointed out why we have $\sqrt{x^2} = x$ rather than $\sqrt{x^2} = |x|$ (a new point to most); during the discussion of modular arithmetic I defined a field, related this concept to their previous work on the rational and real numbers, and we had guesses as to when J_m was a field. (The first guess, of course, -- based on J_3 and J_5 -- was the condition that m be odd; the next day a correct guess was given.); in discussing matrices (mainly 2×2) we also considered the field concept and saw where some of the field properties failed; we considered various subsets of matrices such as those isomorphic to the real numbers and those isomorphic to the

complex numbers , etc. (Also, John used matrices in discussing transformation geometry.)

Throughout we emphasized discovery procedures and the idea of a spiral approach to topics.

On the last day I gave a non-trivial test (use of notes allowed) which covered the material I had discussed with them. The results varied greatly -- from a perfect paper to very poor. Indeed, three of the tutors turned out to be very deficient in elementary algebra (e.g., $(3x-1)^2 = 9x+1!$) -- although the same students had learned how to multiply 2x2 matrices!

On the whole, I thought that the sessions with the tutors went off well. It is quite clear, however, that the Institute next year should provide more for the variation in background and ability of the group -- possibly having the better tutors help the poorer ones in study sessions.

As for the supervisors: They proved to be an entirely different cup of tea! (I met with them for two sessions and was present at two others in addition to the joint sessions with the tutors.) It was very hard to hold their interest; there was much newspaper reading and leaving of the class. (None of the tutors ever left a class while it was in session; on the average, three inspectors left per hour. I conjectured the possibility of a physiological difference -- supervisors have weaker kidneys than do tutors!)

I am not at all sure what might be done with the inspectors next year -- indeed, I question whether or not the inspectors should return for a second session. Much will depend on the correspondence lessons (and the idea of these was not well received by the supervisors!).

I hope that you will convey the thanks of EDC to Dr. Jacobsen. With the necessary splitting of the group it would have been very difficult for John and me to have handled the work alone. Ed helped a great deal and he is certainly a fine teacher.

We all felt the need for the full participation of a Kenyan in staffing the Institute. Mr. Isaac Hunja was there only on the first day (being on leave) and Mr. Gideon Kimote was there now and then but that wasn't enough. The presence of a Kenyan on the staff would have had a desirable psychological effect (especially on the supervisors) and he would have been better prepared to answer questions concerning government policies and plans than we were. (Or at least, his words would convey greater conviction to the group!) One persistent question which none of us Wazungu could answer at all: Will the participants who finish the course get some form of material recognition for their efforts?

The top participants among the tutors were D. K. Mwangi, S. Agesa, W. A. Juma, G. Kiambi, S. N. Bakhda, and J. T. O. Okoth.

Professor Roy Dubisch
January 1, 1971

EAST AFRICAN REGIONAL MATHEMATICS PROGRAM
REPORT
on the
SECOND INSTITUTE FOR TRAINING COLLEGE TUTORS
AND SUPERVISORS

Prepared by: Mr. Makonnen Eunatu

Location: Yared Music School, Sidist Kilo, Ethiopia
Dates: January 4 - 16, 1971

1. PREPARATION

It was decided in early November that the Addis Ababa Institute should take place from January 4 - 16, 1971. Ato Bekele Getahun of the Ethiopian Ministry of Education sent invitation letters to the Provinces and to the Teacher Training Institutes. It was stated in the letters that participants should arrive on January 3, 1971 for registration.

2. SITE

Though it was preferable to have a residential site, this idea was abandoned because of the unavailability of proper residence with reasonable cost in Addis. It was therefore decided that the Yared Music School should be utilized for lectures and discussions and that participants should be paid per diem of Eth.\$8.00 for Tutors and Eth.\$7.00 for Supervisors.

We used the Theology College Hall of the H.S.I. University for film shows.

3. PARTICIPANTS

Though about 50 participants were expected, 67 participants came in for registration. The Ministry asked us to register them all since 17 of them (one an observer) were from Addis and were to be paid only Eth.\$2 each per day for lunch allowance. Besides the lecturers ascertained that the participants would not be too many to hinder lectures and discussions. Moreover, the cost was within the allotted budget and we accepted them all.

The participants were composed of 12 Teacher Training Institute Tutors (4 nationals and 8 expatriates), 2 Teacher Training Institute Model School Tutors (nationals) and 53 supervisors (all nationals). There were two female participants, one expatriate Tutor and one supervisor. All Tutors but two, who did not specify qualifications, have at least their first degrees. The two Model School Tutors are Teacher Training Institute graduates. Almost all of the supervisors have 12th Grade plus one year College work. Ato Abera Wakjira of the Mathematics Department attended as an observer also.

4. REGISTRATION & INTRODUCTION

To save time registration was done on Sunday Morning, January 3, 1971. A registration form was completed and name tags and the Lecture Syllabus were distributed. A comprehensive explanation of the program and the role of EDC was given by the Program Administrator.

On January 4, 1971 the Institute went into full session after a brief address by Ato Bekele Getahun, Director General of Curriculum and Materials Production.

5. STAFF

The Lecturing Staff was composed of the following members:

- a. Professor Ross L. Finney, Associate Professor, University of Illinois, Visiting Lecturer.
- b. Mr. John Fitzgerald, Mathematics Educator, East African Regional Mathematics Programme, Lecturer.
- c. Ato Cirma Mengistu of the Mathematics Department, Ministry of Education of Ethiopia came in to discuss Primary One materials. which he is preparing for the coming academic year.

The Administration was taken care by the Programme Administrator actively assisted by Ato Cirma Mengistu and by a part time secretary, Woizere Tsehai Shibesh.

Ato Yohannes Menkir of the H.S.I. University was approached by Ato Bekele Getahun to lecture at the Institute. However, he did not show up and later said that his understanding was that the Institute would take place at a later date. I did not put extra effort to get him because I was not then sure whether he should be paid and how much for his services.

The supervision and the Library Departments of the Ministry asked us to give orientations on their respective fields to the supervisors during the Institute. We could not agree to this since the time was allotted beforehand but we did not object to their coming in after Institute hours. Therefore, the Supervision Department had two afternoons and the Library Department one afternoon after 4:30 PM. These were strictly extra institute activities.

5. DURATION OF THE INSTITUTE

The Institute was run full time as planned from January 4 - 16, 1971 with the exception of January 7, 1971 which was the Ethiopian Christmas Day.

6. SUBJECT MATTER

The same lecture Syllabus used in Nairobi was followed in the Addis Institute also. A Time Table (Annex 1) was drawn and all participants were given lectures as a group. Many of the lectures were given by the visiting lecturer, Professor Ross Finney and the rest by Mr. Fitzgerald. After lectures, the participants went into group sessions. There were six groups of participants, each group led by a couple of tutors. Since the tutors in almost all cases had a definite superiority over supervisors, they were indeed

real leaders in that they clarified certain doubtful cases raised during lectures and thus gained respect of the supervisors. The lecture-discussion sessions were carried in this manner throughout with the exception that Professor Finney now and then enlightened the tutors on more advanced work.

Members of the Management Committee visited the Institute in session during their meeting in Addis Ababa.

Evaluation tests were given in the second week.

The following three films, also shown at the Nairobi Institute, were shown and followed by comments and discussions.

1. Assigning Fractions to Points on a Number Line
2. Folding and Turning Symmetries
3. New Mathematics in the Primary School

Some of the tapes were also heard.

The films and the tapes interested many of the participants to the extent that they requested for the possibility of borrowing the films and for the reproduction of the tapes for use in the Teacher Training Institutes and in in-service courses.

On the closing date of the Institute, a panel discussion was arranged to which twelve persons concerned with the program were invited to attend. Only three of these were able to come. The discussion became more of expressions of impressions of the program and of participants and of future hopes in favorable terms, rather than a panel discussion in the true sense of the phrase.

7. CORRESPONDENCE COURSES

Due to unavailability of Basic Concept Books volumes I & II, the first assignments of the correspondence courses could not be given. However, assignments 12 & 13 were given with return addressed envelopes and stamps. Eleven of the participants have already (beginning of February) sent back their assignments for correction. Assignments 14 and 15 shall be sent and by the time these are in for correction, we hope to send them the two missing books for the first assignments.

8. GENERAL IMPRESSIONS OF PARTICIPANTS

Generally they were satisfied about the subject matter of the Institute and showed keen interest to share, what they have got, to others. Representatives of tutors and supervisors expressed this at the closing discussion.

Some of the supervisors expressed that they had a problem of getting to the teachers of their district because of lack of funds. This, they said, would curb their desire to get the new idea introduced to as many teachers as possible. They hope, however, they would be able to be used in in-service courses.

The tutors were somewhat unhappy about the per diem paid. They claimed they deserved Eth.\$10 instead of the Eth.\$8 actually paid.

9. COMMENTS

The fact that there are very few boarding schools in Ethiopia has made it difficult to find appropriate residence for our Institute participants. Moreover the Program Administrator was advised that participants preferred per diem payments rather than being taken into residence. Though the participants had no complaints on this, the per diem complaints could have been avoided had they been taken into residence arrangement.

On the date the Institute started schools had yet three days to be closed. It was not easy, therefore, to find enough rooms and even blackboards for the group discussions. If the Institute was started after the closing date of the schools, then the schools could have started again before the institute was completed. An improvement on this has to be found for the next Institute.

The participants had high spirits about the Institute and future activities related to it. Consequently the Ministry should be advised to exploit this favorable situation and keep up their morale in every way possible.

The lectures, I felt, were too much for the staff, especially for Professor Finney though he was very energetic and highly interested in the participants. A third lecturer was, therefore, necessary to give not only breathing time to one lecturer but also to insure that they could actively participate in at least some of the group discussions.

Annex 1

EAST AFRICAN REGIONAL MATHEMATICS PROGRAM

ADDIS ABABA INSTITUTE JANUARY 4-16, 1971

TIME TABLE

1st Week	8:30-9:30	9:30-10:30	11:00-12:00	12:00-13:00	14:30-15:30	15:30-16:30	16:30
Monday	Lecture	Group session	Lecture	Group session	Lecture	Group session	
Tuesday	"	"	"	"	"	"	
Wednesday	"	"	"	"	"	"	
Thursday	ETHIOPIAN		CHRISTMAS DAY				
Friday	Lecture	Group session	Lecture	Group session	Lecture	Group session	
Saturday	"	"	"	"	"	"	
2nd Week							
Monday	Lecture	Evaluation paper	Lecture	Group session	Lecture	Group session	
Tuesday	"	Group session	Lecture - Advanced	"	"	Film	
Wednesday	"	"	"	Group session (Correspondence courses & follow up)	Primary one Materials (Ato Girma Mengistu)		Supervision Dept. (Ato Makonnen Pelai)
Thursday	"	"	"	Programme & running of institutes	Lecture	Group session	"
Friday	"	"	"	EDC tapes & films	"	Group & college program	Libraries (Ato Arefaine)
Saturday	"	Panel & closing session					

PROFESSOR ROSS FINNEY'S REPORT

ADDIS ABABA MATHEMATICS INSTITUTE FOR SUPERVISORS
AND TEACHER TRAINING INSTITUTE TUTORS

January 4-16, 1971

1. Type and Level of Course Held

A course to prepare 55 provincial and capital school supervisors and 14 teacher training institute mathematics staff members for the Ministry's introduction of its adaptation of the Entebbe Primary Mathematics Programme into all Ethiopian Primary I classes in October, 1971 (the beginning of the Ethiopian school year).

2. Duration and Dates

Two weeks, six days a week, Monday through Saturday, January 4-16, 1971. Thursday, January 7, the Ethiopian Christmas, was a vacation for the participants, but not for the principal lecturer, who spent the day studying the Ethiopian new mathematics texts, preparing appropriate lectures, and conversing with Ato Bekele Getahun, Director General of the Curriculum Department of the Ministry of Education and Fine Arts.

3. Location

The Institute was held at the Yared Music School, Addis Ababa, Ethiopia.

4. Organizer and Sponsor

The Institute was sponsored by the Curriculum Department of the Ministry of Education and Fine Arts, and organized jointly by Mr. John Fitzgerald, Ato Girma Mengistu and Ato Makonnen Eunatu, with Ato Makonnen Eunatu in over-all charge.

5. Lecturers

Principal Lecturer: Professor Ross L. Finney, Department of Mathematics,
University of Illinois at Urbana-Champaign

Mathematics Educator: Mr. John Fitzgerald, East African Regional
Mathematics Program

6. Number of Participants: 69

Of the 45 supervisors invited 55 came. In addition, there were 13 mathematics teacher training tutors (each of Ethiopia's teacher training institutes was represented) and one mathematics teacher from the Harar Teacher Training Institute Model School. A copy of the final register is appended, complete with affiliations and addresses.

7. Content of Lectures

Professor R. L. Finney: The Mathematics of Primary I - III

Symmetry, mathematical problems with many correct answers, Africa's role in the worldwide movement to change mathematics teaching, where numbers come from, order, why $2 + 2 = 4$, numeration, the abacus, algorithms for addition in bases 2, 5, 10 and 12, symmetry under translation and rotation, properties of addition, three views of multiplication and division, properties of multiplication, division by zero, the distributive law and its consequences, algorithms for multiplication and subtraction in bases 2, 5, and 10, negative numbers, why -1×-1 equals 1.

Professor R. L. Finney: Advanced Lectures

Cantor's diagonal proof and three definitions of the real numbers, the transformation proofs of Laisant, et al., the theorems of Ceva and Miquel, the Schoenflies theorem in the plane, Kuratowski's embedding theorem for graphs.

Mr. John Fitzgerald: The Mathematics of Ethiopia's New Primary Programme

Introduction to transformation geometry, special vocabulary and techniques for the early primary years.

8. Evidence of Success

a) The fourteen province groups of supervisors were interviewed separately by Mr. John Fitzgerald and asked what plans they had to further the program. All groups had already been working out what to do when they returned to their provinces. Those who had the clearest plans usually included at least one supervisor who had attended the August, 1968 Institute for District Supervisors. Those who had attended in 1968 had already done much to orient Junior Secondary teachers prior to the introduction of modern mathematics into grade 7 in October, 1968 and grade 8 in 1969. A few had also run orientation courses for primary teachers to prepare for the introduction of Primary I in 1971. Plans for future activities included conducting after-hours orientation sessions for primary school teachers in county and provincial capitals, and visits by district supervisors to the more remote towns.

b) The lectures were fully attended, even on the two Saturdays.

c) The participants frequently stated appreciation of the lecture program.

d) A favorable statement by Ato Bekele Getahun to the Vice-Minister of Education, in my presence, about the quality and reception of my lectures.

e) Public thanks to EDC, AID, Mr. Fitzgerald and me both at the closing ceremony and at the farewell party given in Mr. Fitzgerald's and my honor by Ministry officials several days earlier.

f) Mr. James A. Turman, AID, attended the closing ceremonies and said that he had heard good things said about my lectures.

g) Ato Bekele Getahun was interviewed by press and radio reporters about the Institute.

9. Other Parts of the Course

a) Three hours were devoted to EDC films and tapes.

b) Ato Girma Mengistu, of the Ministry's Department of Mathematics, who is in charge of producing the Amharic versions of the primary texts and teachers' guides, spoke to the participants about the Ministry's plans, his current progress, and the special Amharic vocabulary that will be introduced with the new mathematics program.

c) Ato Makonnen Belai, Supervision Department, spoke to the participants about the Ministry's plans for supervising the introduction of the new mathematics program in October 1971.

d) Mr. John Fitzgerald spoke to the participants about the correspondence course that would follow the Institute, and about his March and April schedule for visits to training colleges and supervisors' areas.

10. Comments on the Organization of the Course

On the first day of the Institute, the Director of the Yared Music School informed us politely that the lecture room and class rooms that we had been counting on would not be available. The problem was quickly solved by importing large blackboards from a nearby secondary school, and placing them in the assembly hall where all the lectures and most of the recitations thereafter took place. Ato Makonnen Eunatu proved to be an able administrator, and you may count on his doing a first-rate job for future courses.

11. Outstanding Participants

All of the supervisors proved to be attentive, and most of them quick. Of the tutors, the Ethiopians showed the most sensitivity to and rapport with their classes and seemed best to understand the difference between guidance and command.

Report on the
SECOND INSTITUTE OF THE WEST AFRICAN REGIONAL MATHEMATICS PROGRAM
Held at the
WOMEN TEACHERS COLLEGE, PORT LOKO, SIERRA-LEONE

January 4-20th, 1971

Prepared by: Mr. D. A. Brown

1. The Second Institute was planned to be held in Sierra-Leone from the 4th to the 18th of January, 1971. Owing however to unexpected changes in flight times of the Airways, participants from Ghana and Liberia had to travel to Sierra-Leone on the 2nd of January instead of the 4th of January as originally planned.

2. SELECTING THE PARTICIPANTS

Selection of participants proved difficult in Liberia and Sierra Leone. In both countries, there were no ready records of local personnel teaching Maths in the teacher training colleges and it turned out that the subject was being taught largely by expatriate personnel. In both countries, it became necessary in order to maintain the international nature of the program to admit to the institute primary school teachers who had made a mark and were likely to be upgraded to teacher-training work. Twenty-two of the twenty-nine from Sierra Leone and six of the fifteen from Liberia were selected from this category - also from Sierra Leone expatriate staff on long term contracts were admitted for similar reasons.

3. In view of these difficulties Liberia was originally allocated only ten places, Sierra Leone twenty places, and Ghana twenty places on the Second Institute. Even so, Liberia was able to give only eight names and Sierra Leone nineteen after two visits each to Monrovia and Freetown. Sierra Leone completed its list on the third visit but Liberia never did in spite of repeated requests. The problems could probably have been minimized if the Administrator had been able to travel in Liberia and Sierra Leone to meet and make the acquaintance of educational authorities and in particular the Heads and personnel of the teacher training institutions. In Ghana, where Maths tutors in the training colleges were practically hundred percent Ghanaian and the Administrator was able to meet the staffs of the colleges, there were no problems of the kind which arose in Liberia and Sierra Leone.

4. TRAVEL ARRANGEMENTS

Travel arrangements including the getting of passports and entry visas which in West Africa are difficult enough in normal times were complicated by the outbreak of a Cholera epidemic in all three countries. In the event attendance was poor initially, only a few of the Ghanaian participants succeeded in obtaining foreign exchange for their personal petty expenses, and of the six Liberian participants who turned up at the Airport on the 2nd of January, three were new faces who had not been listed for the Second Institute. Thus at the

time of the Management Committee meeting on the morning of January 5, 1971 only 34 of an expected total of 50 participants had registered. Of this number, 20 were Ghanaians, eight Sierra Leonians, and six Liberians.

The Management Committee expressed concern about the failure of the Sierra Leone and Liberian participants to turn up punctually for the Institute and the Minister of Education, Sierra Leone, did not hide his displeasure. As a result, Dr. Abeodu Jones of Liberia undertook to recruit additional participants from Liberia on her return to Monrovia the following day and the Secretary of the Institute of Education, Freetown, also renewed his efforts to recruit more Sierra Leone participants. Eventually, a total of 31 were enrolled from Sierra Leone and 15 from Liberia, an excess of 16 over the number allocated to these countries.

5. PARTICIPANT ATTENDANCE AND INVOLVEMENT

i) A participants' committee was elected on the first day of the Institute, also a Course Leader, Mr. Abbiw from Ghana, a Games and Entertainment Secretary, Mr. Bockarie from Sierra Leone, and a Librarian, Sister Kehoe from Sierra Leone. A Library was set up and several games were provided by the Principal of the Womens College.

ii) More so than at the First Institute participants' representatives were consulted in all matters affecting the conduct of the Institute. The perennial agitation for payment of allowances was also encountered and settled. A participant delegation made representations to the Management Committee on the subject at its meeting at Port Loko on January 5th, and some adjustment was made to allow for the supply of a few personal requirements of participants.

6. HEALTH

The College dispensary and nurse were placed at the disposal of the Institute and more serious cases of which there were two were seen by the Government doctor in Port Loko hospital. One Education Officer (Sierra Leone) withdrew from the course for health reasons and one course lecturer, Mr. Nyame, and one participant from Ghana had to be seen by the doctor twice or thrice.

7. ENTERTAINMENT

On January 4th, a visit to Freetown was arranged for the Ghanaian and Liberian participants who had arrived at Port Loko on January 2. The group visited Milton Margai Training College enroute. On January 6, the Institute was entertained by the final year students of the Port Loko Women Teachers College. Again on January 9, the participants went on excursion to Fourah Bay College and on January 16, they visited the Marampa Iron Mines. A cultural display was staged by participants on January 13, featuring the music and dance of the three countries - Ghana, Liberia and Sierra Leone. The College Canteen was placed at the service of the Institute and drinks were obtainable from there at reasonable prices.

8. VISITORS

Apart from the Minister of Education and the Minister of External Affairs of Sierra Leone and the Principal Secretary and other high ranking officers of the Sierra Leone Ministry of Education, visitors to the Institute included also the following personalities:

Prof. W. T. Martin who addressed the Institute on the subject of the African Education Program, Mr. Hugh P. Bradley, Dr. Abeodu Jones of Liberia, Prof. and Mrs. Green of Fourah Bay College, Mr. Noah of the Institute of Education, Freetown, and Dr. Drew of Njala University College who conducted a workshop for all the participants with color rods that he and the Science Centre of the University College had produced.

9. At approximately 11:00 A.M. on January 5th, the Permanent Secretary of the Ministry of Education, Sierra Leone officially opened the Institute. He read a speech (Appendix 1) prepared for the minister who was detained in transit from Freetown. The speech assured all the Sierra Leone was fully committed to the program. Later the minister himself showed up to give his blessings.

10. At 2:00 P.M. that same day, we began work by administering our pre-test (Indicator). While participants were taking the test, the Maths Educator (Njala) put on the board a tentative schedule for work during the Institute. The instructors were:

John Norris	-	(Maths Educator - Ghana)
Andrew Nyame	-	(Ministry of Education, Ghana)
Dr. R. O. Ohuche	-	(Faculty of Education - Njala University College)
John Alexander	-	(Maths Educator - Njala University College)

Dr. Ohuche had to attend a meeting in Accra-Ghana during the second week of the Institute, therefore, our schedule had to be altered. This worked out quite well because the student committee that was elected the first day wanted more flexibility to accommodate some of the primary school teachers.

11. Below are the two main schedules that we employed:

JANUARY 5 - JANUARY 8

7:00	Breakfast				
	<u>Alexander</u>	<u>Norris</u>	<u>Nyame</u>	<u>Ohuche</u>	
7:30	Year 1	Year 2	Year 3	Year 4	
8:30	Year 2	Year 3	Year 4	Year 1	
9:30	tea	tea	tea	tea	
10:00	Year 3	Year 4	Year 1	Year 2	
11:00	Year 4	Year 1	Year 2	Year 3	
12:00	Lunch				
2:00	Probability & Statistics - Norris				
3:00	Explorations in Mathematics - Alexander				
4:00	Individual sessions to discuss pre-test - Alexander				
8:00	Dinner				

JANUARY 11 - JANUARY 14

7:30 - 9:00	Primary Maths - Nyame Ideas on Teaching Maths - Alexander Transformation Geometry - Norris
9:00 - 10:00	Breakfast
	<u>Alexander</u> <u>Norris</u> <u>Nyame</u>
10:00 - 11:00	Year 1 Year 2 Year 3&4
11:00 - 12:00	Year 2 Year 3&4 Year 1
12:00 - 1:00	Year 3&4 Year 1 Year 2
1:00 - 2:30	Lunch
2:30 - 3:30	Probability & Statistics - Norris
3:30 - 4:30	Exploration in Mathematics - Alexander
4:30 - 6:30	Individual Session - Alexander
7:30	Dinner

12. On the 15th of January, Mr. Nyame was admitted to the hospital, therefore, Messrs Norris and Alexander kept their schedules from 7:30 to 11:00. A few minutes earlier, Dr. Drew from Njala paid us a visit with the color rods that he and the Science Centre had produced. Therefore, from 11:00 to 1:00, he conducted a workshop with all the participants.

13. We resumed our afternoon schedule as above after lunch. Again on Monday, we had an altered schedule because Mr. Nyame was back on campus but still ill. The schedules for Monday the 18th and Tuesday the 19th were as follows:

MONDAY, JANUARY 18TH

7:30 - 9:00	Ideas on Teaching - Alexander Transformation Geometry - Norris
9:00 - 11:00	Breakfast
	<u>Alexander</u> <u>Norris</u>
10:00 - 11:00	Year 1 Year 2
11:00 - 12:00	Year 2 Year 3&4
12:00 - 1:00	Year 3&4 Year 1
1:00 - 2:30	Lunch
4:00 - 7:00	Individual Sessions - Alexander

TUESDAY, JANUARY 19TH

9:00 - 10:00	Breakfast
	<u>Alexander</u> <u>Norris</u>
10:00 - 11:00	Year 1 Year 2
11:00 - 12:00	Year 2 Year 3&4
12:00 - 1:00	Year 3&4 Year 1
1:00 - 2:00	Lunch
2:00 - 6:00	Individual Session - Alexander Final dinner and presentation of certificates.

14. Since we had more participants from Sierra Leone and Liberia than we had planned for, it was arranged for Mr. Alexander to have individual conference with only the people that he would be visiting and priority was given to those that were actually teaching. All told, Mr. Alexander had at least 15 minutes with each of 56 people. The institute, for the most part, was quite successful. The accommodation and meals were excellent. Most of the participants worked very hard and got a great deal out of what was presented to them.

15. The one difficulty was the late arrivals of some of the Liberian and Sierra Leone participants. We had some catching up to do for them. We also did not have materials for 56 people. We had planned for 50. The (Basic Concept, Vol. 1, 2, 3, 4) were not available for students. It had been planned to have these for the participants to take back with them. These books are lost somewhere between Njala and the United States. They were supposedly sent to the Maths Educators, Njala, in September 1970.

16. It is imperative that we get these "Basic Concept" to students as quickly as possible since they will require them for the correspondence courses.

In conclusion, I would say that there is a great deal of work that needs to be done with this particular group of participants. Some of them have glaring gaps in their mathematical background. Almost all need to do a great deal of work in the areas of Algebra, Transformation Geometry, Probability and open-ended types of problems. In almost every case, the participants were very eager to work and they seemed willing to put forth the effort required.

SPEECH DELIVERED BY THE MINISTER OF EDUCATION
THE HONOURABLE J. BARTHES WILSON
at the formal opening of the
SECOND INSTITUTE OF THE WEST AFRICAN REGIONAL MATHEMATICS PROGRAMME
WOMEN TEACHERS' COLLEGE, PORT LOKO, at 10:00 A.M.
January 5, 1971

Mr. Chairman,
Principal,
Administrator of the West African
Regional Maths Programme,
Organisers of this Institute,
Distinguished Guests.

It is for me both an honour and a privilege to be invited to open formally this second Institute of the West African Regional Mathematics Programme and I wish to thank the organisers of this Institute for their kind consideration.

I note that among the audience there are a number of distinguished educationists from various West African countries as well as from Sierra Leone. May I now on behalf of the Government and people of Sierra Leone as well as my Ministry extend a hearty welcome to all of you present at this ceremony particularly our overseas visitors.

I have not been informed of the considerations which went into the selection of the Women Teachers' College, Port Loko as the venue for this Institute, but I should like to say how pleased my Ministry is that this Institution of which we are justly proud has been privileged to host this meeting. The Women Teachers' College is one of our new Institutions which has been constructed partly with the aid of generous international finance donated by the Government of Sweden and partly by contribution from the Sierra Leone Government. It stands as a symbol of the emancipation of our womanhood, as well as our hopes and aspirations for the future.

We are all familiar with the expression, "Educate a man and you educate a single individual; educate a woman and you educate a family." We in Sierra Leone are deeply conscious of the important role our women could play in the development of our nation and we are determined to give them every opportunity of enjoying the benefits of a good education, knowledge and enlightenment. In so far as our country is concerned, our women folk enjoy equal pay for equal work as well as equal opportunities for advancement in all fields of endeavour. This Institution, therefore, stands as a symbol of the importance we attach to education and our desire to extend these benefits to as many of our people as possible.

This is the second institute of the West African Regional Mathematics Programme, and I understand the purpose of this Programme is to train enough tutors over a period of four to five years to teach modern mathematics in all primary teacher training colleges in the region. I am told the Programme will run two institutes yearly each for a minimum of fifty teachers and supervisors each for a minimum duration of two weeks. It is further understood that over a two year period the same participants will attend the institute and also take a correspondence course provided by the Programme and that certificates of attendance will be issued at the end of each institute.

It is no doubt pertinent to recall that in 1962, the E.D.C., an American Educational Corporation, launched an African Mathematics Programme and beginning from that year held several briefing courses and workshops in East Africa to which several African countries including Sierra Leone, Liberia, and Ghana sent representatives. The African Mathematics Programme prepared several volumes of pupils texts and teachers guides all of which have been printed and distributed to the participating African countries. According to reports, after experimenting with the New Mathematics in their own schools and colleges for a number of years, Sierra Leone and other participating

countries have decided to replace the traditional mathematics with the New Mathematics Program covering Liberia, Sierra Leone and Ghana, set up and funded by USAID for this purpose.

The Programme is under the management of a regional committee comprising the representatives of national Ministries and Departments of Education, Institutes of Education and University mathematicians of the participating countries and the administration of EDC. There is a similar arrangement in East Africa and I am told that proposals are under consideration for other parts of Africa. This measure of international cooperation is to be commended. I am happy to note that Sierra Leone teachers and officers of my Ministry have been actively participating in the Entebbe Maths Programme since its inception in 1962. And I would here like to pay tribute, firstly to the Education Development Centre for its organisation, interest, drive and guidance and fund-seeking; secondly to the USAID for providing funds over the years to make possible the holding of workshops, writers conferences, in-service training, etc.; and thirdly, a really heartfelt tribute to that dedicated body of officials and teachers who have over the years taken part in various workshops in East and West Africa. The Sierra Leoneans involved in these workshops have not been as many as we would have desired, but as you are all aware there is a world-wide shortage of mathematics teachers; our participants have ranged through the University, Secondary Schools, Inspectors of Schools and Primary Schools.

After experimenting with the modern mathematics programme for a number of years, I am glad that the participating countries have agreed to replace the traditional mathematics programme by the modern mathematics. I hesitate to say "new" mathematics, for "There is nothing new under the sun"; all knowledge is there waiting for mankind to discover and apply it for his own good, and towards a better life. In Sierra Leone a local committee

has for the past eight years organised in-service courses and seminars in various parts of the country, and today the experimental programmes embrace fifty-three primary schools, seven secondary schools and seven teacher training colleges.

My Ministry has co-operated in this programme with all the resources that we can spare, for as you are only too well aware, there are many competing claims; but I am happy to state that all those concerned, my Ministry officials, the Peace Corps, principals, headteachers, teachers, pupils and even hesitant parents have played their part; and it was with a deep sense of satisfaction and pride that I noted that a girl in one of the secondary schools participating in this modern mathematics programme achieved a distinction in Entebbe Maths in the last school certificate examination.

When the Anglophone West African Colonies started achieving independence, many projects in which there was regional co-operation under the colonial regime were broken up -- the West African Airways Corporation, the West African Institute for Oil Palm Research come readily to mind. It is, however, most gratifying to note that co-operation in the field of education has flourished. The West African Examination Council has served us for many years and has expanded its spheres of activity (although having overcome its teething problems it is now facing the problems of adolescence). Co-operation is now firmly established in teacher-education, the African Primary Science Programme, now the Science Education Programme for Africa, the Social Science Programme, and last but not least your Mathematics Programme. All these go to show that our continent is stirring vigorously and moving in the right direction, and I pray that all our peoples, and particularly our educators will not lose their enthusiasm, but will go on from strength to strength.

All our countries wish to move forward in the fields of science and technology and we need teachers of calibre to train our pupils in these subjects. We are all however short of teachers in these fields, and we cannot wait until we have the teachers before we move forward. We therefore have to guide, and when necessary retrain the teachers already in the field, and I am glad to note that your programme is in the forefront of such measures, not only in retraining teachers in the field, but also in seeing to it that the teachers now coming from colleges go into the classroom equipped to tackle modern maths. Mathematics has often been the "bete noire" of many students, with a consequent flight from the subject. With the new approaches to its teaching that you are making, it is my fervent hope that many more of our young people will grow to understand and like mathematics and so contribute to the development of our countries in the fields of science and technology. The case of the girl who scored the distinction that I referred to earlier should serve as an example and an incentive to those who would flee from mathematics.

Mr. Chairman, I would be remiss in my duty if I do not extend my thanks to the organisers of this Institute. I hope their endeavours will prove successful, and that much will be gained from this Institute that will help in the running of future Institutes. I would also like to thank the participants and all who have contributed in any way - great or small - in organising this Institute. I hope you will have a successful fortnight and it gives me great pleasure to declare this second Institute open.

Management Committee Meeting
of the
West African Regional Mathematics Program

Date: July 8, 1970

Location: Curriculum Resource Centre, Accra, Ghana

Present: Ghana Mr. D.A. Brown - Ministry of Education

Mr. T.J. Powell - University College of Cape Coast
(Department of Education)

Liberia Mrs. Theodora Ward Jackson - University of Liberia
(Department of Education)

Sierra Leone Dr. A.T. Thomas - Ministry of Education
Dr. Romanus Ohuche - University of Sierra Leone
(Institute of Education)

Dr. Abbiw-Jackson, University of Science and Technology,
Kumasi, Ghana

Mr. Hugh P. Bradley, Program Director, EDC

Prof. W.T. Martin, Massachusetts Institute of Technology

Dr. A. Williams, University of Sierra Leone, Fourah Bay

Mr. T. Bai Sherman, Department of Education, Liberia, was
unable to attend. Mrs. Ward Jackson and Mr. Seeley
had difficulty in finding the location of the meeting
and arrived late.

The following observers were present:

Mr. I.B. Boye-Doe, Deputy Education Officer, Inspectorate, Ghana

Mr. I.N.K. Atiase, Deputy Chief Education Office, Ministry of Education,
Accra, Ghana

Mr. E.B. Dogbe, Senior Education Officer (Math) CRDU, P.O. Box 2739,
Accra, Ghana

Miss Eleanor Gilliat, USAID, Ghana

Miss Dixie Lippincott, USAED, CWAORAR/Regional Education Advisor
Dakar, Senegal

Mr. John R. Metcalf, Adviser, CRDU, Accra, Ghana

Mr. George H. Sealey, Jr., USAID, Liberia

It was agreed that Professor Martin should be chairman of the meeting.

An agenda covering discussions on the following was approved:

1. Mathematics Educators
2. The December Institute
3. Identification of participants
4. Plans for the Workshop
5. Correspondence Courses
6. Local Administrators

It was noted that the contract signed with USAID/Washington was based on the Proposal for the West African Regional Mathematics Program which was sent to the Ministries of Education in Ghana and Serria Leone and to the Department of Education in Liberia.

Mathematics Educators

A short description of the tasks of the Educators, as outlined in the Proposal, was given. During the school year they would be spending nearly three weeks out of four on the road visiting colleges and working with the tutors who had attended the Winter institute. Their main task was to improve the mathematical background of the tutors and supervisors and the quality of the mathematics education in the training colleges.

Recruiting was likely to prove difficult as most of the possible candidates had probably already made commitments for 1970/71. It seemed likely that appointees would be relatively young as married persons with families would not be able to undertake the heavy travel which the work necessitated.

Accommodation and use of facilities at Cape Coast seemed to be possible for one Educator. Accommodation might prove difficult at Njala, but it was agreed that the Educator should have his base up-country - possibly at Bo - if no housing was available at Njala. Plans were made for Professor Martin and Mr. Bradley to visit Cape Coast in the company of Dr. Abbiw-Jackson and Njala with Dr. Ohuche to discuss the availability of accommodations and facilities.

(Full agreement was reached at Cape Coast. At Njala the authorities said they would do their best to find accommodations. If the Educator was a bachelor, arrangements, living in a "Mess", might be possible. Fall-back arrangements were made with the Teacher Training College at Bo where the principal said he would welcome the Educator on his campus.)

It was pointed out that in Ghana there is a Faculty of Education at Cape Coast not an Institute of Education and that the Institute of Education in Sierra Leone was located in Freetown, not at Njala where there is a Faculty of Education.

The Institutes

A difficulty arose about the timing of the winter institutes. Finally it was agreed to try to hold the first Institute in Ghana from December 9 to December 23. The second Institute in Liberia or Sierra Leone should be

held immediately after Christmas if possible. Some adjustment of college timetables or freeing of college tutors for a few days before the beginning or after the end of vacations may be necessary if both Institutes are to operate at maximum effectiveness. Further discussions with national education authorities are needed in Liberia, Sierra Leone and Ghana. In Sierra Leone the Institute of Education has a Mathematics panel which includes examiners of Teacher Training College examinations. The panel meets once every two months. A trial syllabus, available in outline, is being introduced into the colleges in September 1970. There is also a Mathematics panel of the Ghanaian National Teacher Training Colleges. The Secretary of the Ghana Mathematics Association and the Ghana Mathematics Research groups are involved in this panel in reviewing the mathematics syllabus for Training Colleges.

A request was made for copies of these revised syllabuses.

A common Teacher Training College text for all three countries could reduce considerably the cost per unit. Sierra Leone already has an approved plan for the preparation of a three part text, one for each year of primary teacher training.

Identification of Institute Participants

The selection of participants to attend the Institutes would be the responsibility of the national education authorities. However, in order to reduce the travel of the Educators, it would be necessary that all the mathematics tutors in any one institution should be invited. In this way the tutors can reinforce each other and the Educator in his visits can work with them as a group - including local supervisors who are involved. In this same

connection it was felt that rather than selecting tutors from all over the country (e.g. Ghana), a concentrated effort by regions or provinces would reduce travel time thus allowing more time to be spent working with the participants.

The Staff of the Institutes would be the two Mathematics Educators working with other competent people already working in the countries. It is hoped that the national authorities will direct education officers and others who have been involved in the Entebbe and other programs to staff the institute. It was felt generally that the Educators and the program in general must do their part to cooperate with and obtain cooperation from people concerned with other mathematical activities in the region. Already through the work of the Joint School Project and the African Mathematics Program there exists a sizeable nucleus of local people who could assist as lecturers and seminar leaders.

Incentives

Institute participants who successfully complete the two year course to be run by the program should be offered some incentives. Ministry representatives were asked to find out what incentives could be offered by their own Ministries. Some suggestions were;

- (a) Credit towards an advanced professional qualification
- (b) Advancement within the profession, e.g.
 - Increase in salary scale or
 - Improvement in status

"Successful completion" could be recognized on the basis of the level of work done and involvement in the correspondence course and, possibly, satisfactory results in a terminal examination.

Plans for the Workshop

The tasks for the Workshop are outlined in our Proposal to USAID, copies of which have been distributed.

Participants would be invited as follows:

Type of Participants:	(a) African University Mathematicians	(b) Visiting Consultants	(c) Local officials Teachers & ex- perienced writers	Total
Teacher Training Texts		1	6	7
Primary Texts		1	12	13
Secondary Texts	3		9	<u>12</u>
				32

The two Mathematics Educators, an expatriate editor and his local counterpart will also be in attendance. Thus the total number of participants will be thirty-six people, not including the necessary administrators and office staff.

The Local Administrator and the Mathematics Educators in consultation with national education authorities should identify the people in class (c) in the months before the Workshop. Participation in this classification will be evenly spread on a national basis.

Evaluation personnel required for the long-range plans of the program will be selected from the Workshop participants. Three such persons, one from each country, will be required. It is intended, therefore, that when selecting workshop participants some of them will be suitable for this task. If two or three possible candidates of this type were sent by each country some choice, based on performance at the Workshop will be possible.

Editors. A program editor will be appointed in time to attend the Workshop. His task will be to undertake the main prepublication tasks of the accepted texts which the Workshop will produce. The meeting recommended that a local counterpart also be appointed to this position, that he work with the expatriate editor for a year and that in the following year he be sent to the United States on a training course. Discussion will be held with Franklin Book Programs to find out if a suitable training course can be planned. Additional funding will be necessary for the counterpart editor scheme.

Timing. It seems probable that the Workshop will last from mid-July to mid-August.

Correspondence Courses

The correspondence courses developed by the ABC Institute project of the African Mathematics Program will be used as a basis for the correspondence course to be used in this program. The ABC Institute courses will require review and adaptation by the Mathematics Educators. The program will supply the text books necessary for the correspondence courses. The courses will be based on the work tackled at the Institute and will be initiated shortly after the first Institute. It is expected that participants will be able to undertake 6 hrs. per month private study in mathematics in addition to the normal tasks related to their regular responsibilities.

The Mathematics Educators, who will be visiting colleges three weeks out of four during the school year, will endeavor to use these visits to assist participants in their correspondence course work. District supervisors involved in the program will be asked to make contact with the Mathematics Educator when he is at a college in their vicinity.

Local Administrator

The local Administrator and the Mathematics Educators will be expected to work in close cooperation with the national Ministries and the officers of the Ministries who are concerned with mathematics education. The Ministries must be kept fully informed and approve the activities and movements of the Mathematics Educators.

Duties of Administrator

The Administrator, with the Program Director's guidance, will be responsible for the planning and organization of the Institute, the Workshop, and the despatch and receipt of correspondence course assignments. He will be responsible to EDC and to the Management Committee. He will control local funds, under the direction of the Program Director, rendering statements to EDC accountants.

Location

Initially he will be located at University College of Cape Coast, Ghana, if the Principal of the College approves. At some later date relocation might be considered. The Principal at Cape Coast said that he would welcome both the Administrator and Mathematics Educator, provide accommodations and offer membership of the Senior Common Room.

Terms of Service

If possible secondment terms will be obtained if an official of a national Ministry is appointed. In such case the program would refund the Ministry for the continuation of the normal fringe benefits. If an independent person is appointed fringe benefits will be equivalent to those offered to government officials at the same salary level in the country of location.

Long Term Developments

Under the contract the program has to investigate methods of having the Management Committee recognized as a legal entity to which funds can be passed directly. At such time, and hopefully within two years, EDC will withdraw as manager of the program but will continue to be available to offer professional assistance if the new legally recognized Management Committee should desire such assistance.

When the Management Committee is acting independently the Administrator will be its executive officer and the Program Director and will be fully responsible for activities, and for the preparation of proposals for financing such activities. During the interim period experience in dealing with these responsibilities will be provided under the guidance of the Program Director at EDC.

In further discussion it was noted that the independent Management Committee could, and should if necessary seek funds from many sources - not just USAID. The Committee could consider regional activities other than these presently being undertaken and seek financial assistance from many organizations - including possibly the national ministries of the region. If suitably constituted the committee might also be in a position to consider educational programs in other subject areas.

It was noted that experience with other multi-national educational groups indicated that possibly political approval, the passing of bills through parliament, would be necessary. The Program Director and the local Administrator would endeavor to find out what steps are necessary in this direction.

Salary

The salary of the local administrator was reviewed in the light of the projected independent status of the Management Committee and the tasks which would be required of its executive officer. It was decided that to obtain a person of suitable calibre a salary of \$5,500 should be offered.

A subcommittee was appointed to draw up an advertisement for a local administrator and take further action. The members of the subcommittee were: Mr. H. P. Bradley, Mr. D. A. Brown, Professor W. T. Martin, Dr. R. Ohuche, Mrs. Theodora Ward Jackson.

It was agreed that for the coming year the program should have two co-chairmen. Mr. D. A. Brown and Professor W. T. Martin were appointed co-chairmen.

THE MEETING FINISHED

Report of the Local Administrators Subcommittee

The subcommittee met very briefly in the afternoon (Mr. D. A. Brown was not in attendance). Professor Martin reported that after the morning meeting a letter had been received from Mr. D. A. Brown stating that he was intending to retire from the Ghana Public Service and wished to be considered for the post of Local Administrator.

There was some discussion on the need for an advertisement during which the following emerged:

- (a) It was most unlikely that anyone else of equal calibre and experience would apply for the post at the salary which was being offered.
- (b) His experience and background (Degree with Mathematics, teaching experience, mathematics administrative experience and deep knowledge of the Ghanaian mathematical and educational situation) seemed likely to be unique.
- (c) Normally notice of resignation of six months is required for his present position but apparently there would be a strong possibility of three months being accepted. This would enable him to take up the position by October 1 as would be necessary for the program requirements.
- (d) Advertising would cause a delay of a month and might very well mean that Mr. Brown would be excluded because he could not put in his notice of resignation until after the months delay and he would not be free until November or December which would be too late for the program requirements.

In the light of all these considerations the subcommittee agreed that Mr. Brown be offered the post of local administrator.

(Subsequent to the meeting Dr. Thomas of Sierra Leone was informed of the subcommittee's decision and he stated that he was very pleased with this development. An offer of appointment to the post of local administrator was made to Mr. D.A. Brown and he accepted.)

THE MEETING CONCLUDED

Management Committee Meeting
of the
East African Regional Mathematics Program

Date: July 20, 1970

Location: Kenya Institute of Education, Nairobi, Kenya

Present: Ethiopia Ato Bekele Getahun - Ministry of Education
Ato Gabeyehu Kumsa - Ministry of Education

Kenya Mr. Isaac Hunja - Ministry of Education

Mr. Gideon Kimote - Kenya Institute of Education

Mr. Hugh P. Bradley, Program Director, EDC

Prof. W.T. Martin, Massachusetts Institute of Technology

Prof. J.E. Phythian, University of Dar es Salaam, Tanzania

Ato Bisrat Dilnesahu of the University of Haile Selassie I
was not present

The following observers were present for part of the meeting:

Dr. T. McDonough, EAORA, USAID, Nairobi, Kenya

Mr. Dilbagh Singh Phull, Kenya Institute of Education

It was agreed that Professor Martin would chair the meeting.

An agenda covering discussions on the following was approved:

1. The operation of the Management Committee
2. Future action with regard to Tanzania and Uganda
3. Present activities
4. The Institutes
5. The Mathematics Educator
6. Correspondence Courses
7. The Workshop 1971
8. The Local Administrator
9. The Chairman for the coming year.

It was noted that the contract signed with USAID/Washington was based on the Proposal for the Eastern Africa Regional Mathematics Program which was sent to the Ministries of Education in Ethiopia, Kenya and Tanzania. A copy had also been sent to the Uganda Ministry of Education.

The Management Committee

The function and operation of the Management Committee was discussed briefly. Members were referred to two papers which had been sent to the Ministries (copies are attached). Under the contract the program has to investigate methods of having the Management Committee recognised as a legal entity to which funds can be passed directly. At such time, and hopefully within two years, EDC will withdraw as prime mover in the program but will continue to be available to manage the operations of the program, or to offer professional assistance if the new legally recognised Management Committee should desire such assistance.

When the Management Committee is acting independently the local Administrator will be its Executive Officer and the Program Director and will be fully responsible for activities and for the preparation of proposals for financing such activities. During the interim period experience in dealing with these responsibilities will be provided under the guidance of the Program Director at EDC.

In further discussion it was noted that the independent Management Committee could, and should if necessary seek funds from many sources - not just USAID. The Committee could consider regional activities other than these presently being undertaken and seek financial assistance from many organizations - including possibly the national ministries of the region. If suitably

constituted the committee might also be in a position to consider educational programs in other subject areas.

It was noted that experience with other multi-national educational groups indicated that possibly political approval, the passing of bills through Parliament, would be necessary. The Program Director and the local Administrator would endeavor to find out what steps are necessary in this direction.

Future Action with Regard to Tanzania and Uganda

The absence of Tanzania and Uganda representatives from the meeting was regretted. Tanzania has informed EDC that at the moment it feels it does not need further assistance in its mathematics programs, and thus will not participate in the activities planned under the regional program. Uganda has not responded to correspondence and thus activities in Uganda are not funded under the present program. Additional copies of correspondence summaries of proceedings and the proposal were sent to Uganda at the end of June 1970.

It was agreed that the Management Committee should look favourably on any request for cooperation which may be received from Tanzania at a later date. It was felt that a sharing of experience would be useful - especially at Secondary level. Contacts already initiated should not be broken off by any action of this program. It was also agreed that a Uganda application to join the program in the coming year should be looked on favourably and, if approved, additional funds should be requested.

Present Activities

A brief summary of the existing status of mathematical curriculum reform in Ethiopia and Kenya was given.

In Ethiopia classes 1 through 6, the Primary classes, are taught in Amharic. Classes 7 through 8, the Intermediate classes, are a transition period for learning through the medium of English. Classes 9 through 12, the Secondary classes are taught in English.

Modern mathematics is taught in all classes 7 through 12. Translations of the Entebbe texts into Amharic are not yet available at Primary level. It is proposed to introduce the new texts into all classes 1 by September 1971.

There are five teacher training colleges with enrollment ranging from 550 to 1,000 students. The total enrollment is 3,500 students. The colleges average about four mathematics tutors each. There is a far-reaching scheme for school supervisors who work closely with the teachers in the classes. Three new colleges will be opened within three years, raising the total enrollment by 350.

In 1968 there was an institute for over 100 supervisors. The supervisors run seminars, at local level, for the 13,000 primary teachers. Teacher-pupil ratio ranges from 1 to 42 up to 1 to 50 maximum. There are quite a few untrained teachers. A six week course is given to all untrained teachers. There are fifteen education provinces.

In Kenya the primary classes are Standards 1 through 7. Secondary classes are Forms 1 through 4 (or years 8 through 11 of schooling). A level classes are years 12 through 13 of schooling.

The Entebbe texts have been used in 25 primary schools in and around Nairobi. As from January 1, 1971 modern mathematics will be introduced to

all Standard 1 classes. Local adaptation of Books 1, 2 and 3 of the Entebbe series have been prepared. There is urgent need for Standard 1 teachers to cope with the proposed change. Some 8,550 teachers will be required. Teacher training colleges have been giving some modern mathematics courses. From now on all students in training colleges will be given modern mathematics, using the Entebbe Basic Concepts texts and the first two books produced by the School Mathematics for East Africa Program. Few college periods are allocated to mathematics - four periods a week for two years.

College entry is possible after Standard 7. Most of these applicants have served as untrained teachers. They become P3 teachers. Entry is also possible after nine years schooling (Form 2). Such students become P2 teachers. Some students enter college after the O-level examination. Such teachers become P2 or P1 teachers. The normal primary teacher training course is three years.

Selected P1 teachers are people who have passed A-level examinations teach in the lower secondary forms. They are called S1 teachers. Other secondary teachers are graduates.

P3 teachers usually teach in the first three years of the primary school i.e. up to Standard 3. P2 teachers can teach in the lower or upper primary. P1 teachers teach in the upper primary classes.

In Ethiopia teacher training tutors are mostly expatriates usually with a minimum of a B.A. degree or an India B.A.B.T. or a B.Ed. degree. There are now a few Ethiopians with degrees becoming available for teacher training work.

Junior colleges train teachers for grades 7 and 8. Students at these colleges have finished grade 12 and received two years of training. They are specialists in two subjects.

•

In Kenya teacher training tutors are graduates or S1's. In some colleges upgraded P1's are teaching. A crash upgrading course for P1's was held some time ago. There are twenty-three colleges. With an estimated output of 3,000 teachers per year. Mathematics tutors number somewhere between 50 and 60.

In 1969 there were 18 primary school supervisors. In 1970 the number increased by 8. Plans envisage the appointment of 42 assistant supervisors immediately while long term plans require a total establishment of 205 assistant supervisors and 39 supervisors servicing 41 districts. A preliminary two month course is planned for August 1970. The supervisors and assistant supervisors will be generalists but the supervisors will be selected from the S1 grade. Assistant supervisors may be from the P1 grade.

The Kenya Secondary system including the problems of incorporating the Harambee schools into the system and the improvement of the quality of education offered in such schools was discussed briefly.

It was noted that this year 60 to 70 schools will have completed the SMEA course up to Form 4.

In the following discussion some reference was made to the Tanzanian condition as far as it was known. The Entebbe Primary texts have been adapted and translated into Swahili. These adapted texts are being used in all Standards 1 through 4. Some classes in Standard 5 and 6 are also doing modern mathematics (Entebbe texts). District Supervisors have given some courses for teachers. The 12 teacher training colleges are geared to cope with "new" mathematics. The 25 to 30 tutors in the colleges are Tanzanians - some with degrees and some upgraded primary teachers. These tutors are usually well experienced but their knowledge of "new" mathematics is not known. At secondary level, graduates teach in the upper classes. Under

the five year plan all secondary teachers will be graduates.

Tanzanian secondary students took the O-level examination in modern mathematics for the first time in 1969. Graduates included students who had followed the Entebbe course and those who had followed the SMEA course. Results were not likely to encourage teachers or students, and there have been major official protests and complaints made to the examining boards. It was reported that Kenya, which follows the SMEA course has also filed complaints.

The Institutes

The Ethiopian winter vacation lasts from January 5 to January 20. The Ethiopian Christmas is January 7. Kenya colleges close somewhere between the 5th and 10th of December, re-opening towards the middle of January. Recommended dates for the institutes were: in Kenya, before Christmas but finishing early enough to permit tutors to return home for December 25. The Ethiopian institute should be held as soon after the Ethiopian Christmas as possible. Some adjustment of college timetables or the freeing of tutors for a few days before the beginning or after the end of vacations may be necessary if both Institutes are to operate at maximum effectiveness. Further discussion with national education authorities are needed.

Selection of Institute Participants

The selection of participants to attend the Institutes would be the responsibility of the national education authorities. However, in order to reduce the travel of the educators, it would be necessary that all the

mathematics tutors in any one institution should be invited. In this way the tutors can reinforce each other and the educator in his visits can work with them as a group - including local supervisors who are involved. In the same connection it was felt that rather than selecting tutors from all over the country, a concentrated effort by regions or provinces would reduce travel time thus allowing more time to be spent working with the participants.

Institute Staff Members

The staff of the Institutes would be the mathematics educator assisted by two visiting consultants and other competent people already working in the countries. It is hoped that the national authorities will direct education officers and others who have been involved in the Entebbe and other programs to staff the Institute. It was felt generally that the educators and the program in general must do their part to cooperate with and obtain cooperation from people concerned with other mathematical activities in the region. Already through the work of the SMEA and the African Mathematics Program there exists a sizeable nucleus of local people who could assist as lecturers and seminar leaders.

It is hoped that selected particularly competent people from Ethiopia will be able to assist in the Kenya Institute and vice-versa.

Incentives

Institute participants who successfully complete the two year course to be run by the program should be offered some incentives. Ministry representatives were asked to find out what incentives could be offered by their own

Ministries. Some suggestions were:

- (a) Credit towards an advanced professional qualification
- (b) Advancement within the profession, e.g.
 - Increase in salary scale or
 - Improvement in status

"Successful completion" could be recognised on the basis of the level of work done and involvement in the correspondence course and, possibly, satisfactory results in a terminal examination.

The Mathematics Educator

A short description of the task of the educator, as outlined in the Proposal was given. During the school year he would be spending nearly three weeks out of four on the road visiting colleges and working with tutors who had attended the winter institute. His main task is to improve the mathematical background of the tutors and supervisors and the quality of mathematics education in the training colleges. It was anticipated that until the second mathematics educator was appointed he would spend half his time in Kenya and half his time in Ethiopia.

Recruiting was likely to prove difficult as most possible candidates had already made commitments for 1970 - 71. It seemed likely that the appointee would be relatively young as a married person with a family would not be able to undertake the heavy travel which the work necessitated.

Despite this, however, the appointee should be well qualified and of sufficient maturity to be received with respect in the colleges. The possibility of appointing a former Peace Corps Volunteer who had returned to the United States and completed further study was mentioned. It was felt that in such a case great care should be taken to ensure that a suitable person was appointed and that he must be approved by the national ministries. It was

agreed that the members of the Management Committee in the United States should do the initial selection and send their recommendations to other members of the Management Committee for approval.

The location of the Mathematics Educator would be Nairobi, possibly the Kenya Institute of Education. The Kenya Institute of Adult Studies was mentioned as another possible base. This agreement was reached on the understanding that the Mathematics Educator would spend half his time in Ethiopia and that on the appointment of a second educator in July 1971, one educator would be located in Ethiopia. Ethiopia agreed to make office facilities available while the educator was visiting in Ethiopia. The Government cooperation would be given in seeking out housing - but housing is difficult in both countries.

Correspondence Courses

The correspondence courses developed by the ABC Institute project of the African Mathematics Program will be used as a basis for the correspondence course to be used in this program. The ABC Institute courses will require review and adaptation by the Mathematics Educator. The program will supply the text books necessary for the correspondence courses. The courses will be based on the work tackled at the Winter Institute and will be initiated shortly thereafter. It is expected that participants will be able to undertake six hours per month private study in mathematics in addition to the normal tasks related to their regular responsibilities.

The Mathematics Educator, who will be visiting colleges three weeks out of four during the school year, will endeavor to use these visits to assist

participants in their correspondence course work. District supervisors involved in the program will be asked to make contact with the Mathematics Educator when he is at a college in their vicinity.

The Workshop

The tasks for the Workshop are outlined in the Proposal to USAID, copies of which have been sent to the Ministries. It was agreed that the subsidiary mathematics group should meet despite the withdrawal of Tanzania from the program. The University of Dar es Salaam has an interest in this matter and at an appropriate time the Tanzanian Ministry could be invited to send an observer/participant.

Participants would be invited as follows:

TYPE OF PARTICIPANT:	African University Mathematician	Visiting Consultants	Local Officials, Teachers & Experienced Writers	TOTAL
	A	B	C	
TEACHER TRAINING TEXTS (6 weeks):		1	6	7
SUBSIDIARY MATH- EMATICS (5 days):	5		5	$\frac{10}{17}$

The two Mathematics Educators, an expatriate editor and his counterpart will also be in attendance. Thus the total number of participants will be twenty-one people, not including the necessary administrators and office staff. Ten of these people will remain for one week only.

The local Administrator and the Mathematics Educator in consultation with national education authorities should identify people in class (C) in the months before the Workshop. Participation in this classification will be evenly spread

on a national basis - one observer/participant being invited from Tanzania.

Evaluation personnel required for the long-range plans of the program will be selected from the Workshop participants. Two such people, one from each country, will be required. It is intended, therefore, that when selecting workshop participants some of them will be suitable for this task. If two or three possible candidates of this type were sent by each country some choice, based on performance at the Workshop will be possible.

Editors. A program editor will be appointed in time to attend the Workshop. His task will be to undertake the main prepublication tasks of the accepted texts which the Workshop will produce. The meeting recommended that a local counterpart also be appointed to this position, that he work with the expatriate editor for a year and that in the following year he be sent to the United States on a training course. Discussion will be held with Franklin Book Programs to find out if a suitable training course can be planned. Additional funding will be necessary for the counterpart editor scheme.

Timing. August appears to be the best time for the Workshop. For a six week Workshop there would be an overlap into the end of July and the beginning of September.

Local Administrator

The local Administrator and the Mathematics Educators will be expected to work in close cooperation with the national Ministries and the officers of the Ministries who are concerned with mathematics education. The Ministries must be kept fully informed and approve the activities and movements of the Mathematics Educators.

Duties of Administrator

The Administrator, with the Program Director's guidance, will be responsible for the planning and organization of the Institute, the Workshop, and the despatch and receipt of correspondence course assignments. He will be responsible to EDC and to the Management Committee. He will control local funds, under the direction of the Program Director, rendering statements to EDC accountants.

Location

The Local Administrator will be either a Kenyan or Ethiopian and will be located in his country of origin. If a Kenyan, he will be located at the same place as the Mathematics Educator. If an Ethiopian, the Ministry will provide office accommodations.

Terms of Service

If possible, secondment terms will be obtained if an official of a national Ministry is appointed. In such case the program would refund the Ministry for the continuation of the normal fringe benefits. If an independent person is appointed fringe benefits will be equivalent to those offered to government officials at the same salary level in the country of location.

Salary

It was decided that to obtain a person of suitable calibre a salary of K ₧2,000 or E \$14,000 should be offered. It was agreed that Ato Ekele and Mr. Hunja could arrange to have the post advertised in local papers. A subcommittee consisting of Ato Bekele, Mr. Hunja and Professor Phythian would review the applications and that if necessary interviews would be held in Addis Ababa and Nairobi which should be attended by all members

of the subcommittee. On the other hand it might be more economical if applicants were given travel expenses so that one interviewing session on one site (Nairobi) were held.

Appointment of Chairman

It was decided not to appoint a permanent chairman of the Management Committee, and that on the occasion of a meeting the senior government official present should occupy the chair.

THE MEETING FINISHED

R E C O M M E N D E D

ADVERTISEMENT

FOR

A LOCAL ADMINISTRATOR

Regional Mathematics Program for Eastern Africa:

A mathematics program aimed at improving the quality of mathematics instruction in primary teacher education in Ethiopia and Kenya has been initiated.

Qualifications

At least a good BA or BS from a recognised university, preferably with a mathematics background. Only nationals of Ethiopia or Kenya will be considered.

Experience

Teaching and some administrative experience will be required.

Age

30 to 45 years.

Salary

K £2,000 per annum or E \$14,000 per annum.

Location

Addis Ababa if an Ethiopian is appointed.

Nairobi if a Kenyan is appointed.

Date of Appointment

October 1970 on an initial contract of two years with a possibility of extension.

Terms of Appointment

A government officer will be appointed under secondment and will continue to be covered for normal government benefits.

Applications should be sent to:

- (a) Chief Inspector of Schools
Ministry of Education
Box 30426
Nairobi, Kenya
- (b) Mr. Tadesse Tereffe
Program, Planning and Research Dept.
P. O. Box 1367
Addis Ababa, Ethiopia

MANAGEMENT COMMITTEE MEETING
of the
WEST AFRICAN REGIONAL MATHEMATICS PROGRAM

Place of Meeting: Women's Teachers' College,
Port Loko, Sierra Leone
Date of Meeting: January 5, 1971

People Present

GHANA

Mr. T. J. Powell, University College of Cape Coast
(Faculty of Education)

LIBERIA

Dr. Abeodu B. Jones, Dept. of Education, Monrovia

SIERRA LEONE

Prof. T. L. Green, Institute of Education, Freetown

Mrs. Elizabeth P. Hyde, Ministry of Education, Freetown

Dr. Abbiw-Jackson, University of Science and Technology, Kumasi, Ghana

Dr. Romanus Ohuche, University of Sierra Leone, Institute of Education

Mr. Hugh P. Bradley, Program Director, EDC

Prof. W. T. Martin, Massachusetts Institute of Technology

Mr. D. A. Brown, Administrator, WARMP, Secretary

Dr. Thomas joined the meeting after the discussions on item 16.

The following observers were present for most of the meeting:

Mr. John W. Alexander, Jr., Mathematics Educator, University College
of Njala, Sierra Leone

Mr. John Totten Norris, Mathematics Educator, University College of
Cape Coast, Ghana

Mr. C. E. Noah, Secretary, Institute of Education, Sierra Leone

SUMMARY OF PROCEEDINGS

USAID, Accra, notified their inability to attend owing to staffing stringencies.

1. It was agreed that Professor Martin should continue to be Chairman up to July, 1971 by which time it was expected that an African Chairman would have been elected. It was further agreed that the position of Chairman should be filled in rotation by nominees of the Ministries/Depts of Education of Ghana, Liberia and Sierra Leone. It was understood that in Sierra Leone the nomination would be made by the Institute of Education which was responsible for in-service training. The Management Committee should meet twice yearly and the venue should be the locations of the January Institute and the July Workshop.

2. The following agenda was approved:

a) Report on Activities

- (i) Appointment of Mathematics Educators
- (ii) Appointment of Local Administrator
- (iii) Institutes (Mr. D. A. Brown)
- (iv) Visits to Colleges (Mr. D. A. Brown)
- (v) Correspondence Courses (Mr. D. A. Brown)
- (vi) Evaluation (Mr. Hugh P. Bradley)

b) Plans for 1972/73

- (i) Appointment of Editors
- (ii) Workshops
- (iii) Post Workshop Activities
- (iv) Correspondence Courses
- (v) Institutes
- (vi) Radio
- (vii) Evaluation: Professional Guidance
Involvement of trainee editors
and evaluators.

c) Possible Association with West African Council on Teacher Education

d) Activities in other Regional Programs

3. Appointment of Mathematics Educators

There had been some concern about finding suitable candidates for appointment as Mathematics Educators since most of the likely candidates were committed for 1970/71 by the time funding of the Program by USAID was confirmed. However, as it turned out, the program was fortunate in its search and it secured the services of Messrs Norris and Alexander just in time to send them out to Ghana and Sierra Leone to start work in October, 1970.

4. Appointment of Local Administrators

The circumstances leading to the appointment of D. A. Brown as Local Administrator and the reasons why the post was not advertised were explained to the meeting.

5. The December and January Institutes

The Local Administrator reported briefly that time available for making arrangements for both Institutes had proved to be inadequate particularly in Liberia and Sierra Leone due to lack of ready and reliable information about location of the personnel required for the Institutes in these countries. In Ghana the Minister of Education, Culture and Sports had readily accepted an invitation to perform the opening ceremony at the first Institute. In spite of short notice due to administrative difficulties and complications arising from the outbreak of a cholera epidemic in which Winneba, the venue for the Institute was widely reported to be the worst hit locality in the country, 51 participants turned up and a very successful institute was conducted. Mr. John Norris, Mathematics Educator, Ghana, spoke to a report he had submitted on the conduct of the institute.

6. The Second Institute was due to be opened that morning by the Minister of Education, Sierra Leone, at the Women's College where the Committee was meeting. At the time of the meeting 34 of an expected minimum of 50 participants were known to have arrived and the meeting expressed concern about this.

7. The local Administrator said that in Ghana he obtained a full list of Mathematics Tutors in all the colleges on request but not in Liberia or Sierra Leone and it took two visits to Monrovia and Freetown to get firm but still incomplete lists of tutors and supervisors to be invited to the second Institute. He said that a letter from the the Ministry/Department of Education requesting the Tutors to attend the Institute would have been far more effective than one from him. But to his knowledge no such letters were issued in Sierra Leone or Liberia. The meeting was assured that the Ministry of Education, Sierra Leone accepted its commitment to the Modern Mathematics Program but reasons were given why the Ministry could not, at the present stage, directly instruct the tutors to attend the Institutes. There would shortly be a meeting of the Academic Board of the Institute of Education and Dr. Ohuche would have the opportunity to drive home to Principals, the need for more active cooperation with the program.

8. It was agreed on the suggestion of the Institute of Education, Freetown, that in the future, the local Administrator should deal direct with the Colleges and copy his letters to the Ministry and the Institute who would then follow-up. It was also suggested that tutors who failed to attend the institute could still take the correspondence course provided they could be given the pretest in time.

9. Visits to Colleges

A draft program of visits to be made by Mr. Norris to colleges involved in the first institute was accepted for implementation when it has been approved by the Ministry of Education, Ghana. A similar program would be prepared for the colleges involved in the second institute before the end of the institute. Tentatively, it was planned that Mr. Alexander should work in Sierra Leone in February and March, in Liberia in April and in Ghana in May and June.

10. Correspondence Course

Each Mathematics Educator was preparing 15 lessons. These were based on the Entebbe Course and Mr. Fitzgerald has completed the first 15 assignments in East Africa and sent copies to Cape Coast though these had not yet been received. Concern was expressed about possible postal delays in the operation of the correspondence course. It was suggested that the papers might be sent in bulk to selected centers such as District Education Offices for distribution. This would be feasible provided it would not involve posting the same package twice. The administrator agreed to examine the proposal further and apply it if possible.

11. Evaluators

USAID would pay the stipend and operation cost of one Consultant Evaluator for the program. It would be recommended to each participating country to nominate one of its workshop participants for training in evaluation and this should be borne in mind when countries made their nominations for the workshop. The program would pay the operation costs of the counterpart evaluators but the respective countries would pay their salaries. It would be the work of the evaluators to determine to what extent the texts which the workshops would prepare meet the requirements of the Schools and Colleges in their respective countries. Arrangements would be made for them to train at Ibadan and to work with TEDRO on the job. The program would bear the cost of the training.

12. It was pointed out that the appointment of a local evaluator raised the question of status and salary as well as that of avenues of progression within the service, and that Ministries would need to be properly structured to accommodate an appointee to the post of Evaluator.

13. It was agreed that the Administrator should address a letter to the Ministries of Education on the subject of the appointment of Evaluators at an early date.

14. The meeting discussed housing for the Mathematics Educators and the Administrator. Housing for Mr. Alexander at Njala was reported to be very unsatisfactory. It was intimated, however, that he would be given better accommodation by the end of the month. Mr. Alexander was to report on February 1st if nothing happened. Meanwhile, the Administrator should write to Njala and copy his letter to Mr. Ohuche

expressing the hope that something would be done quickly for Mr. Alexander. The program staff in Ghana had adequate and satisfactory accommodation.

15. There was an inquiry about the appointment of a Mathematics Educator for Liberia. It was explained that account had to be taken of numbers and that in the face of the current figures, a good case could not be made for the appointment.

16. A member wanted to know why a lecturer was not selected from Liberia for the second Institute which included Liberian participants, particularly since one had been selected from Ghana. Mr. Snow was mentioned as a possible choice. It was explained that the four lecturers included the two Mathematics Educators, Messrs Alexander and Norris, and Dr. Ohuche. The choice of a fourth lecturer, therefore, lay between Mr. Nyame and Mr. Snoh. The latter might be suitable as regards content but he lacked practical knowledge for meeting classroom situations in which the former excelled. Further more, Mr. Nyame had established his suitability at the first institute held shortly before in Ghana. At this point, there was a recess to enable members to participate in the opening ceremony and on resumption Dr. Thomas and Mr. Noah of Sierra Leone joined the meeting.

17. Appointment of Editors

In addition to one experienced editor to be appointed and paid from program funds, it was intended also to propose to each participating country to appoint and pay the salary of a counterpart editor. The operation costs of such counterpart editors would be borne by the program, and the program would also arrange a 2 - 3 months' visit to publishing houses in the United States for them, but they would be trained on the job in their own countries and the training would not be limited to editing in Mathematics only but would cover other subjects as well. The Secretary was asked to write to the Ministries of Education of the participating countries on the subject at an early date.

18. Workshop - July/August 1971

Dates - The period Mid-July to end of August 1971 was agreed; the actual dates to be fixed by the local administrator.

19. Appointment of Chariman for the Workshop

This was discussed at some length and it was unanimously agreed that Prof. Awadagin Williams of the University of Sierra Leone and Dr. D. K. Abbiw Jackson of the University of Science and Technology, Kumasi, both of whom served as Co-Chairmen at the workshops in East Africa should be invited to be Co-Chairmen. It was agreed also to include an associate director of the workshop from Liberia provided a suitable candidate with the necessary mathematics background could be nominated.

20. Location of the Workshop

After some discussion, the meeting decided that the venue for the workshop should be determined on the following principles, namely, cost and suitability of facilities. The chairman expressed the hope that it would be possible to locate the workshop in Liberia and that an offer from Liberia would satisfy the required conditions. The Secretary was asked to make inquiries in all the three countries.

21. There would be three subgroups at the workshop, namely, Teacher-Training, Primary and Secondary groups, and the aim would be to adapt the Entebbe Texts to meet the requirements of the participating countries at these levels. It was clearly necessary that each country should submit well in advance, for use at the workshop, its syllabuses in the modern mathematics for the Teacher-Training, Primary and **Secondary levels**. The Secondary sub-group would look also at other texts e.g. the J.S.P. in addition to the Entebbe Texts.

22. Sub-groups would be constituted as follows:

Group 1 (Teacher-Training)

1 Entebbe T-T Text Writer
6 (two from each participating country - key persons
in teacher training appointed by Ministries on advice
of mathematics educators)
2 Mathematics Educators
9

Group 2 (Primary)

1 Entebbe Primary Text Writer
6 (two from each Ministry)
6 (two tutors or Primary School Teachers
from each country)
13

Group 3 (Secondary)

2 Entebbe Secondary Text Writers
(Dr. Abbiw-Jackson and Prof. Williams)
9 (three from each country)
11

In addition to the above, there would also be the Editor and three counterpart Editors and the local Administrator making a total of 38.

23. Workshop Finances

The workshop would be financed on the same terms as the institutes. Board and lodging costs as well as travelling costs outside participants' country would be borne by the Program. No regular stipend would be paid except to University Staff excluding those engaged in Teacher Training. The meeting disagreed with the terms which excluded University Staff engaged in Teacher-Training from receiving stipend and asked the Director of the African Mathematics Program to re-open the matter with USAID and inform members of the out-come.

24. Radio

The meeting discussed a suggestion to use the radio to supplement the correspondence course work. It was understood that the East African Program was already using the radio for this purpose. The Mathematics Educators would record discussions on selected topics on tape which would then be relayed by national Broadcasting stations to tutors. It was intimated that Broadcasting Departments might be reluctant to allocate radio time for this because of the small numbers involved. Nevertheless the Secretary was asked to investigate.

25. Association with W.A.C.T.E.

The Local Administrator reported on a presentation he had made on the subject to a meeting of WACTE held on December 17, 1970 at the Department of Education, Fourah Bay College, Freetown. He stated that his paper was considered in committee the same day and he was later informed verbally by the Chairman of WACTE that the request had been granted in principle pending settlement of the details of association. It was stressed that the articles of association should be clearly spelt out in order to avoid inconveniencing either side. The meeting was assured that WACTE was not likely to try to exert undue control over the committee and the program. A preliminary meeting of representatives of WACTE and the Management Committee was necessary. The meeting appointed a committee comprising Prof. Green, Mr. Hugh Bradley and the local Administrator to study the subject.

The meeting ended.

MANAGEMENT COMMITTEE MEETING
of the
EAST AFRICAN REGIONAL MATHEMATICS PROGRAM (EARMP)

Place of Meeting: Ministry of Education
Addis Ababa, Ethiopia

Date of Meeting: January 11, 1971

People Present

Ato Bekele Getahun, Ministry of Education, Ethiopia

Ato Getachew Mekuria, Ministry of Education, Ethiopia

Mr. Isaac Hunja, Ministry of Education, Kenya

Prof. W. T. Martin, Massachusetts Institute of Technology

Mr. H. P. Bradley, Director, African Mathematics Program, EDC

Prof. J. E. Phythian, University of Dar es Salaam, Tanzania

Dr. Turman from USAID and Mr. Fitzgerald, The Mathematics Educator attended part of the meeting.

Ato Makonnen Eunatu attended almost all of the meeting as a secretary.

Ato Bekele Getahun chaired the meeting as decided in the previous meeting.

The agenda was approved with an addition at the end of item 1. g) Management Committee.

1. REPORT ON ACTIVITIES

a) Appointment of Mathematics Educators

It was reported that the first Mathematics Educator, Mr. John Fitzgerald had been appointed for a term of two years on the understanding that he would be stationed in Nairobi for the first year. A second Mathematics Educator/Editor was due to be appointed in July 1971.

Professor Roy Dubisch from the University of Washington had expressed interest in this vacancy. It was stated that part of the interest was probably in the probable location in Kenya. After considerable discussion, it was decided that (1) Mr. Fitzgerald should complete his two year term in Kenya. (2) Professor Dubisch should be informed that the new Mathematics Educator/ Editor would be located in Ethiopia. (3) If Professor Dubisch did not wish to be located in Ethiopia, other candidates should be considered.

Basic qualifications for the part were:

- i) A Masters in Mathematics
- ii) Experience in Teacher Education
- iii) Preferably unmarried

There was some discussion about a one year appointment. It was pointed out that in general such appointments were unsatisfactory and uneconomical. However, if an especially suitable candidate appeared and could only serve for one year, inquiries would be made at USAID/Washington.

b) Appointment of Local Administrator

The appointment of Ato Makonnen Eunatu as administrator and his terms of service were discussed. The Committee approved the appointment.

c) Institutes

The report of the Nairobi Institute was submitted and the questions of incentives to keep the participants interested was considered. It was agreed that outstanding participants should be pointed out to Mr. Isaac Hunja for consideration. It was emphasized that evaluation of participation during the Institutes and correspondence courses was important.

d) Visits to Colleges

A time-table of visits to the Kenya colleges by the Mathematics Educator was submitted and it was reported that a similar time-table would be prepared for the visits of the Ethiopian Teacher Training Institutes. The Committee agreed that a more detailed program stating how tutors and supervisors should be helped to run Institutes for teachers in their vicinity should be included. The two representatives from the Ministries, Ato Bekele Getahun and Mr. Isaac Hunja agreed to give guidance to the Mathematics Educator on the nature of the visits.

e) Correspondence Courses

Mr. Fitzgerald gave a brief account of the content and procedure of the correction of correspondence courses. The Committee anticipated that the correction may be difficult for one man and explored whether college tutors would be able to assist. As this was also found to be difficult it was decided that the Mathematics Educator should try his best until the second Mathematics Educator should be appointed.

f) Evaluation

It was reported by Mr. Bradley that funds for a Consultant Evaluator had been requested and the request was being considered by USAID. The two Ministries were to be invited to appoint two local evaluators to work with the program, to be given "on the job" training in the program and to undergo training for one semester outside the region. During the period of training outside the region, the program would be responsible for their training and residence costs. The Ministries would pay their salaries. It was decided that the Administrator should inform the two Ministries of this project.

g) Management Committee

The absence of the two members, Mr. Gideon Kimote and Ato Bisrat Dilnesahu was raised and a solution for insuring the committee members' regular attendance was sought. Mr. Isaac Hunja explained that Mr. Kimote may have had problems in completing his travel formalities in time and assured that he would be present in the future. As to Ato Bisrat, the Administrator was asked to contact him, and if he is unable to continue as a member Ato Yohannes Menkir should be approached and considered to be a member.

The second item raised concerned subsistence costs arising from attendance at Management Committee meetings. It was suggested that a flat rate be paid for subsistence on these occasions. It was felt that the present arrangement sometimes encouraged attendance at the best and most expensive hotels, and finally gave rise to additional expense to the program and to the individual concerned. It was agreed that if the participants so desired, they could claim a per diem in lieu of hotel expenses and that the per diem amounts would be controlled by the local USAID maximum rates.

2. PLANS FOR 1971/72

a) Appointment of Editors

The Ministries are each expected to appoint a local trainee editor to work with the program. These two local trainee editors may be selected from the workshop participants.

b) Workshop

The adaptation of the Teacher Training College Texts will be based on the Entebbe Basic Concept Volumes and the syllabuses of the two countries. The workshop will last six weeks, from July 26 to September 4, 1971. The workshop participants will be:

- i) Training College Texts
 - (1) 4 people: Local Training College Tutors or Mathematics Supervisors; two from each country.. These people may eventually be selected to be the local trainee editors and evaluators.
 - (2) 2 people: The Mathematics Educator and the Mathematics Educator/Editor
- ii) Secondary Mathematics
 - (1) 5 people: University Mathematicians
 - (2) 5 people: Secondary School Math Teachers (Form 5) or Mathematics Supervisors
- iii) Chairman/Consultant

1 person: USA Mathematician who will be professional consultant at the workshop and be in general control.
- iv) Administrators

1 person: Workshop Administrator
1 person: Workshop Secretary

The Secondary Group will meet for three days to review papers on subsidiary mathematics at Form 5 level which were prepared by the Regional African Mathematics Program. They will evaluate these papers and consider what additional activity is possible and desirable.

The other participants will meet for six weeks to prepare adapted material for use in training colleges.

Professor Martin was asked to seek out the best available person to be Mathematics Consultant/Chairman for the workshop.

Although travel and residence costs shall be borne by the program, the Ethiopian members had a problem with the arrangement. It was stated that the possible candidates for the workshop are on vacation during this time and are even re-employed by the ministry to teach in-service courses. Therefore, it is impossible to force them to participate in the workshops without a payment of a minimum of Eth.\$10 per day dislocation allowance. After a lengthy discussion, the committee agreed to pay the amount for the participants of both countries as long as the daily residence cost and the dislocation allowance does not exceed U.S.\$10 per day.

c) Post Workshop Activities

This was postponed for next meeting.

d) Institutes

Postponed for next meeting.

e) Radio

A 10 - 15 minutes radio program per week to reach supervisors and teachers was suggested and accepted. It was decided to explore possibilities in both countries.

f) The involvement of trainee editors and evaluators, evaluation and correspondence courses will be given further consideration at the next meeting.

3. POSSIBLE ASSOCIATION WITH REGIONAL COUNCIL FOR EDUCATION

The requirement by USAID for the Regional Program to have a legal status has posed a difficult problem. To seek its own legal status as a regional program would take a longer time than expected by USAID. It was, therefore, suggested that the program should be associated with the Regional Council for Education. As the Council has applied for and is likely to receive recognition as a legally constituted body, the program could operate under the council auspices and thus funding directly through the Council would be possible. However, the committee had limited knowledge of the Council's activities, composition and even the nature of its legal status. It was, therefore, deferred for further study. Mr. Bradley, Mr. Hunja and Ato Makonnen were asked to investigate the nature of the Council and report to the committee.

4. ACTIVITIES IN OTHER REGIONAL PROGRAMS

Prof. Martin and Mr. Bradley who had just left West Africa gave a brief account of the activities there (West African Regional Mathematics Program).

5. PLACE OF NEXT MEETING

The next meeting shall be in the capital of the country where the workshop shall take place.

MEMORANDUM TO THE WEST AFRICAN COUNCIL
for
TEACHER EDUCATION

Subject: Incorporation of the West African Regional Mathematics Programme into WACTE

In 1962, after a period of activity including two conferences with African Mathematicians at Legon and Ibadan, Educational Development Centre, Massachusetts, U.S.A. launched an African Mathematics Programme. For about six years thereafter, the African Mathematics Programme organized annual workshops and prepared several volumes of pupils' texts and teachers' guides for the primary, secondary, and teacher-training levels of education. These have all been printed and distributed free of charge to the participating African countries. The Workshops achieved in large measure the main purpose of popularizing among the African countries the many new ideas that had crept into mathematics teaching and the new changes that have, as a result, taken place in both the content and the method of teaching mathematics in schools.

After experimenting with the new or modern mathematics for a number of years, several of the participating African countries decided to introduce it into all their schools and colleges and applied to USAID for assistance for this purpose. For reasons of economy, the USAID decided that any scheme for introducing the new mathematics into the participating African countries should be operated on a regional basis. Accordingly, two Management Committees were set up in East and West Africa comprising representatives of national Ministries or Departments of Education, Institutes or Faculties of Education, and university mathematicians of participating countries and the administration of EDC.

In July 1970, USAID provided funds for two regional mathematics programmes, one in the east for Ethiopia and Kenya, the other in the west for Ghana, Liberia and Sierra Leone. These were countries which after a period of experimentation had decided to replace the traditional mathematics with the new and had thereafter sought assistance from USAID for this purpose. The Regional Management Committees which had been set up in East and West Africa and which were to operate the Regional Mathematics Programmes had no legal status and consequently, could not receive funds direct from USAID. For the current year, therefore, all programme funds are paid by USAID to EDC, Massachusetts, which therefore appoints staff to the West African Regional Mathematics Programme and, as a result, directs and controls the operation of the programme.

The present arrangement does not accord with the views and wishes of USAID which would like to deal with an African organization that is free to direct and control its own affairs. WACTE is such a body and

USAID has suggested that the possibility of the West African Regional Mathematics Programme being operated under the wing of WACTE be explored. Under this arrangement, the West African Regional Management Committee would presumably become a sub-committee of WACTE through which USAID would then fund the West African Regional Mathematics Programme.

As stated earlier, the Regional Mathematics Programmes operate only in countries whose governments through their Ministries or Departments of Education have welcomed the new mathematics and approved the programme. Opening the first Institute of the Programme in Ghana on December 10, 1970 the Minister of Education, Culture and Sports reiterated his government's support of the WARMP and commended the work of the Management Committee and EDC. Clearly, the incorporation is not being sought in order to obtain Ministry of Education recognition of the WARMP; for the programme already functions on the authority of the Ministries of Education of the participating countries.

Secondly, the application for incorporation is only in respect of the West African Regional Programme. The East African Regional Programme is making its own separate arrangements in East Africa. The request is not for WACTE to incorporate the programmes throughout Africa, but only the West African Programme.

Thirdly, although the WARMP is regional in structure, yet this does not preclude separate and specific programmes being undertaken for individual member countries. For example, arrangements for the programme workshops, which will prepare material for textbooks, and the appointment of editors and selection of evaluators are all being made with a view to achieving separate texts suited to the needs of each individual country. WACTE could undertake programmes which affect only some of the countries in the programme, if it wished.

The need to avoid asking Ministries to sponsor several projects at the same time is one reason in support of this application for incorporation into WACTE.

Secondly, it is probably, educationally desirable, particularly at the primary level to co-ordinate and integrate as much as possible all the various activities in Science, Mathematics, Social Studies and Teacher Education.

Thirdly, it is better for purposes of funding to deal with one organization rather than with many.

The alternative course to follow would be for the Regional Mathematics Programme to seek legal status separately in each member country. This would require the passing of legislation through the parliaments of all the countries involved and is bound to be a long process.

The only other possibility is for the Regional Mathematics Programme to seek incorporation with SEPA*. But this is a remote possibility since there will be no meeting of SEPA for the next three years.

For the reasons stated above and on behalf of the West African Regional Management Committee, the Council is respectfully asked to reconsider favorably the Management Committee's application and admit the West African Regional Mathematics Programme under its wing and incorporate it into its framework.

(Sgs.) (D. A. Brown)
Administrator
WEST AFRICAN REGIONAL MATHEMATICS
PROGRAMME

*Science Education Programme for Africa

Possible Working Relationships
between
Regional Council for Education (RCE)
and
East African Regional Mathematics Program (EARMP)

What follows is some very preliminary thinking about the proposed assumption of responsibility for EARMP by the RCE. The contents reflect my own personal feelings at this time and have not been discussed at EARMP Management Committee Meetings. They may change at a later date after further reflection and after discussion. They are offered as a basis for early discussion about the relationship between RCE and EARMP.

1. EARMP Management Committee. After EARMP becomes an RCE program, the management committee would consist of the present committee plus two representatives of RCE, one of whom would be the RCE Executive Secretary. The present EARMP Management Committee is composed of one representative each from the Ministries of Education in Ethiopia and Kenya; one representative each from the most senior educational institutions in Ethiopia and Kenya which is responsible for primary teacher training; one university mathematician from each country who has shown an interest in school education -- if such a person exists; Professor Pythian of the University of Dar es Salaam, Professor Martin of M.I.T. and Mr. H.P. Bradley.
2. All policy matters about school mathematics education or about the mathematics education of teacher training college tutors and school supervisors would be decided by the EARMP Management Committee.
3. The RCE might hire an Administrative Officer whose primary responsibility would be to service the EARMP Management Committee.
4. The Administrative Officer, in consultation with the RCE Executive Secretary and the Chairman of the EARMP Management Committee, would prepare detailed proposals, prepare budgets, and make possible the implementation of the Management Committee's policy decisions.
5. The RCE Executive Secretary would, when necessary, seek funds from funding agencies to support the activities recommended by the Management Committee.
6. The RCE would negotiate the contract for the EARMP, and would therefore be the fiscal and contractual agent for the program. As such the RCE would be entitled to an overhead charge to cover its expenses arising from the preparation of proposals, seeking funds and supervision of expenditures.

7. The EARMP Management Committee would meet at least twice a year in either Kenya or Ethiopia.

8. Decisions of the Management Committee would be by majority vote except that Ministry representatives have the power of veto on activities affecting their own country.

9. The Chairman of the EARMP Management Committee would become -- ex-officio -- a member of RCE with, at least, the right to speak at RCE meetings.

Hugh P. Bradley
January 16, 1971

PROGRAMME OF VISITS TO COLLEGES AND SCHOOLS
BY
MR. JOHN W. ALEXANDER, JR., MATHEMATICS EDUCATOR

SIERRA LEONE

Participants	Location	Date
Messrs. Tucker, Manu, Kamara,) Misses Cummings, Tumaku, Taylor,)) Mrs. Macauley)	Freetown	Feb. 1 - 12
Mr. Ndanema	Moyamba	" 15 - 16
Messrs. Harding & Bockarie	Bo	" 17 - 19
Base	Njala	" 22 - 28
Mr. Gbondo	Njala	March 1 - 2
Messrs. Turner & Aruna	Koidu	" 3 - 5
Mr. Komeh-Navo	Kenema	" 8 - 9
Messrs. Caulker and Massaquoi	Yengema	" 10 - 12
Messrs. Spaine-Young, Kamara, Koroma	Makeni	" 15 - 19
Mr. Kanu	Lunsar	" 22 - 23
Base	Njala	" 23 - 28
Ngebeh	Lungi	" 29 - 30
To Monrovia		" 30

LIBERIA

Messrs. Elliott, Dennis, Sherman,)) Maximore, Flahn, Bertie, Carr,)) Kiamber, Paasewe, Misses Thompson)) and Yaney)	Monrovia	March 31 - April 17
Mr. Johnson	Lofa County	April 19 - 20
Mr. Snoh	Kakata	" 21 - 22
Mr. Cleon	Harbel	" 23 - 24
Mr. Diggs	Robertsport	" 26 - 27
Arrive Accra		" 28

GHANA

Messrs. Ameyaw, Oduro & Ampofo	Adukrom	" 30 - May 4
To Cape Coast		May 5
Messrs. Badu Prah & Arthur	Cape Coast	" 5 - 8
Continue to Takoradi		
Mr. Augustus Oguah (St. Mary's)	Takoradi	" 10 - 11
Mr. Quansah & Sister McDonald	Takoradi	" 12 - 14
Return to Cape Coast		

Participants	Location	Date
Messrs. Asare Afful, Kofie, Amoh & Kumi	Foso	May 17 - 22
Mr. Micah & Mrs. Afful		" 24 - 26
Mr. T. V. Yarbey	Cape Coast	" 27 - June 2
Messrs. Adjei, Ampah & Martinson	Nyarkron	June 3 - 4
Messrs. Abbiw & Sagoe		" 7 - 11
		" 14 - 16
Return to Njala		" 19

PROGRAMME OF VISITS TO TRAINING COLLEGES
BY
MR. JOHN T. NORRIS, MATHEMATICS EDUCATOR

GHANA

Training College		Location	Date
Dzodze	(1)	Volta Region	Feb. 1 & 2
Akatsi	(3)	Volta Region	" 3, 4, & 5
Anloga	(2)	Volta Region	" 8, 9, & 10
Ada (Accra)	(1)	Volta Region	" 11 & 12
Accra	(4)	Volta Region	" 15, 16, 17, & 18
Aburi Methodist	(3)	Eastern Region	" 19 - 22, & 23
Cape Coast			" 24 - March 2
Aburi Presbyterian	(3)	Eastern Region	March 3, 4, & 5
Adukrom	(3)	Eastern Region	" 8, 9, & 10
Akopong Presbyterian	(2)	Eastern Region	" 11, 12 - 15
Anum Presbyterian	(2)	Volta Region	" 16 & 17
Peki	(1)	Volta Region	" 18 & 19
St. Theresa's	(3)	Volta Region	" 22, 23, 24, & 25
Cape Coast			" 26 - April 1
College Holidays			April 2 - 25
Asokore SDA	(2)	Eastern Region	" 26, 27, & 28
Tafo	(1)	Eastern Region	" 29 & 30
Amedzote	(1)	Volta Region	May 3 & 4
Anfoego	(2)	Volta Region	" 5, 6, & 7
Jasikan	(1)	Volta Region	" 10 & 11
St. Francis	(2)	Volta Region	" 12, 13, & 14
Mt. Mary	(3)	Eastern Region	" 17, 18, & 19
Begoro	(1)	Eastern Region	" 20 & 21
Cape Coast			" 24 - June 1
Abetifi	(3)	Eastern Region	June 2, 3, 4 - 7
Nkwatra	(2)	Eastern Region	" 8, 9, & 10
Obo	(2)	Eastern Region	" 11 - 14, & 15
Juabeng	(1)	Ashant	" 16, 17 & 18
Kibi Mens	(1)	Eastern Region	" 21 & 22
Cape Coast			" 23

PROGRAMME OF VISITS
BY
MR. JOHN C. FITZGERALD, MATHEMATICS EDUCATOR

KENYA

Province	Location	Dates
Western Province	- P.E.O., then Kaimosi, Eregi and Butere in that order.	Feb. 1-6
Nyanza Province	- P.E.O., then Siriba, Kisii, and Asumbi in that order.	Feb. 8-13
Central Province	- P.E.O., then Kagumo, Kamwenje, Mathara in that order.	Feb. 15-20
Rift Valley Province	- P.E.O., then Kericho, Mosoriot, Kitale in that order.	Feb. 22-27
Eastern Province	- P.E.O., then Egogi, Meru, Kigari in that order.	March 1-6
Eastern Province	- Machakos, Kiteta, Mutune, Mbooni in that order.	March 8-13

Colleges near Nairobi - Highridge, Kilimanbogo, Kiambu, Thogoto - will be visited from Nairobi, but possibly not until my return from Ethiopia about the end of April. The same applies to Shanzu.

Any variations to the time-table will be notified in advance and as far as it is possible to do so.

ETHIOPIA

Location	Dates
Jimma area	March 22-28
Harar area	March 30-April 5
Dessie to Asmara	April 7-13
Asmara to Addis	April 15-21
Addis and Shoa	April 23-30