

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

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Batch 59

1. SUBJECT
CLASSI-
FICATION

A. PRIMARY

B. SECONDARY

TEMPORARY

2. TITLE AND SUBTITLE

African mathematics program; progress report, Dec. 1965-April, 1966

3. AUTHOR(S)

(101) Education Development Center, Newton, Mass.

4. DOCUMENT DATE

1966

5. NUMBER OF PAGES

49p.

6. ARC NUMBER

ARC

AFR370.712.E24ab

7. REFERENCE ORGANIZATION NAME AND ADDRESS

EDC

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
(Activity summary: CSD-1567 Res. and RES-21 Res.)

9. ABSTRACT

(Education R&D)

10. CONTROL NUMBER

PN-AAD-612

11. PRICE OF DOCUMENT

12. DESCRIPTORS

13. PROJECT NUMBER

14. CONTRACT NUMBER

CSD-1567 Res.

15. TYPE OF DOCUMENT

AFK
370.912
EFC ab

IN-001-02

PROGRESS REPORT
to the
AGENCY FOR INTERNATIONAL DEVELOPMENT
on the
AFRICAN MATHEMATICS PROGRAM
April 30, 1966
under
AID Contract RES-21, Amendment 3

Dec. 1965 - Apr. 1966

A.I.D. HISTORICAL AND
TECHNICAL REFERENCE
ROOM 1806 NS

Educational Services Incorporated

Newton, Massachusetts 02158

May 31, 1966

A.I.D.
Reference Center
Room 1806 NS

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PROGRESS REPORT

The following is a progress report to the Agency for International Development on the African Mathematics Program of Educational Services Incorporated for the period December 1, 1965 to April 30, 1966. Activities during the period under AID Contract RES-21, Amendments 1, 2 and 3 included 1) planning and organizing the 1966 Workshop to continue the preparation of mathematics texts for Tropical Africa, 2) organizing courses in Tanzania, Zambia, Nigeria, Liberia and Sierre Leone, to train teachers of trial classes and/or teacher trainers and ministry officials to use the Entebbe Mathematics Texts, 3) arranging for completion of publication of the manuscripts written at the 1965 Workshop and for the distribution of the Entebbe Mathematics Series to African schools using the material on an experimental basis, 4) planning and securing support for the widespread training and retraining of African mathematics teacher trainers and teachers, 5) following-up on the syllabus submitted to the West African Examinations Council and Cambridge Examinations Syndicate.

Planning and Organizing Continuing Preparation of Texts at 1966 Workshop

Planning for the 1966 Mathematics Writing Workshop began immediately after the close of the 1965 Workshop. At Steering Committee meetings 2nd October 1965, tentative lists of U.S. and African invitees were drawn up.

By early March 1966 an outstanding group of U.S. university mathematicians and mathematics educators had agreed to participate in the preparation of Primary Five, Secondary Five and Secondary texts in geometry for years two and three of a four year School Certificate course for use in East and Central Africa, and additional testing material. Invitations have also been issued to African educators to participate in this work. Replies

received indicate that a satisfactory balance of participants will be obtained.

A sub-committee of the Steering Committee met at Boston, Massachusetts on April 2 & 3, 1966, to consider the work to be undertaken at the Workshop and to prepare tentative plans for the Secondary Writing Group. These plans were later discussed and, in general approved by the Executive Committee of the Program which met in London from April 22 to April 24, 1966. Another sub-committee of the Steering Committee met in Chicago May 7 thru May 8, 1966, to make tentative plans for the Primary Writing Group. These plans will be approved in Mombasa before the beginning of the Workshop. (Lists of the African invitees, Appendix A and of the U.S. participants, Appendix B are attached.)

Courses for Tanzania, Zambia, Nigeria, Liberia and Sierre Leone

Earlier reports to AID (September 30, 1965 and December 30, 1965) described five courses held in the participating countries to train teachers and supervisors of experimental classes.

Requests for courses continue to be received. In the period covered by this report, seven courses have been held under the auspices of the program and there was participation and cooperation with a Conference/Institute organized by the Harvard University Team at the Comprehensive School at Aiyetoro in Western Nigeria.

The following courses were held.

Tanzania (Primary Course)

Site: Dar es Salaam Teachers College (Chang'ombe)

Directors: Dr. A. Beninati, Institute of Education,
University College Dar es Salaam
Mr. M. Kinunda, Ministry of Education, Tanzania

Tanzania - Continued

Lecturers: Professor J. B. Roberts, AID Visiting Professor of
Mathematics, University College
Dar es Salaam

Mr. M. Kinunda, Ministry of Education, Tanzania

Mr. A. Nawa, Teacher Training Tutor, Tanzania

Mr. Spencer Swinton, T.E.E.A. Teacher, Tanzania

Demonstrators:

Participants: Forty Tutors, Inspectors and Lecturers

Dates: December 1 thru 13, 1965

Tanzania (Secondary Course)

Site: University College, Dar es Salaam, Tanzania

Directors: Mr. E. Phythian, Reader-Mathematics, Head of Dept.
University College, Dar es Salaam

Mr. D. Woodhouse, Lecturer-Mathematics,
University College, Dar es Salaam

Professor J. B. Roberts, AID Visiting Professor,
University College, Dar es Salaam

Dr. A. Beninati, AID Visiting Professor of Mathematics
Institute of Education
University College, Dar es Salaam

Mr. C. Pratt, Institute of Education, University
College, Dar es Salaam

Lecturers: Professor Paul Johnson, U.C.L.A.

Professor Bryan Thwaites, University of Southampton

Dr. Morton Kenner, Nairobi Math Centre

Directors as above

Participants: Secondary Teachers and Training College Tutors

Dates: January 2 thru January 15, 1966

Zambia

Site: Kitwe Training College, Kitwe, Zambia

Organizers: Mrs. Mary Neville, Education Officer AID, Zambia

Lecturers: Professor B. Pettis, University of North Carolina,
at Chapel Hill, N. C., U.S.A.

Mr. Robert Walsh, UNESCO Education Adviser
Zambia

Miss Nancy Green, Mathematics Tutor,
David Livingstone T.T.C.,
Livingstone, Zambia

Participants: Thirty-eight primary teachers, headteachers, inspectors
and teacher training college tutors

Dates: January 3 thru January 14, 1966

Nigeria

Site: Yejide Girls School, Ibadan

Organizers: Ministry of Education, Western Region
Ministry of Education, Mid-Western Region

Lecturers: Professor D. L. Kreider, Dept. of Mathematics,
Dartmouth College,
Hanover, New Hampshire, U.S.A.

Dr. Grace A. Williams, Dept. of Mathematics and Education
University of Lagos, Nigeria

Dr. J. Battle, USAID, Federal Advanced T.T.C.
Lagos, Nigeria

Participants: Forty-eight teachers and ten inspectors - Western Region
of Nigeria
Five teachers and one tutor - Mid-Western Region of
Nigeria

Dates: January 2 thru January 15, 1966

Liberia

Site: University of Liberia

Organizers: Department of Education, Liberia
University of Liberia
Mr. John Norris (Peace Corp)

Lecturers: Mr. Joseph Bettie, Laboratory School
Mr. Aloysius Farrak, University of Liberia
Mr. John T. Norris, Peace Corp, Dept. of Education
Mrs. Virginia Sherman-Boyd, University of Liberia
Mr. H. L. Thompson, Cornell Team at University of Liberia
Mr. Henry Walker, Zorzor Lutheran Mission
Mr. Bennie Warner, Gbarnga Methodist Mission

Participants: Fifty-two primary and secondary teachers

Copies of the reports on the above Institutes are included in Appendix D.

Sierra Leone

Site: Freetown, Sierra Leone

Organizer: Ministry of Education
Mr. Dyke Harding, Milton Langai T.T.C.

Participants: Primary teachers, Head teachers, Inspectors

Date: April 12 thru April 19, 1966

Report not yet received

Nigeria

Site: Aiyetoro Comprehensive School, Aiyetoro, Western Nigeria

Organizers: Ministry of Education, Western Nigeria
Harvard Team, Aiyetoro Comprehensive School

Nigeria - Continued

Participants: 31 Secondary teachers

Dates: April 21 thru May 14, 1965

Copy of above conference report is included in Appendix E, Report 7

Ghana, Eastern Nigeria, Tanzania and Liberia are presently planning Institutes to be held in the next nine months. Basutoland, which is not a country participating in the program, has shown much interest in the materials and has asked for assistance in running an Institute to introduce "Modern Mathematics" in June 1965. This request had to be refused.

Publication and Distribution of the Entebbe Mathematics Series

As indicated in the report of November 30, 1965, Science Research Associates have taken over from the Silver Burdett Company the **publishing and distributing** of the Entebbe Mathematics Series. The sub-contract mentioned in this report is still under negotiation but it seems probable that agreement will be reached in the near future and the contract will be signed. The delay in approving the appointment of a new publisher caused some delay in the publication of the books and once again it has been necessary to send reproductions of early chapters of books to schools ^{by air,} in Africa/ so that schools would not discontinue their participation in the program. At the time of writing, Secondary C-1 Algebra, Secondary C-1 Geometry and Primary 4 with the accompanying Teachers' Guides have been published and are being distributed. Secondary 4 Algebra and Secondary 4 Geometry and Basic Concepts 4 are at the publishers.

During the report period there was a significant increase in experimental use of the series. By the end of the period the texts were being used in 566 primary classes and 283 secondary classes, a total of 851 classes. Detailed country-by-country information indicating use at successive levels is indicated in Appendix C.

Interesting developments in the use of the Entebbe materials have been the appointment of local people to supervise the experimental work and the general acceptance in Africa that "Modern Mathematics" should be taught in the schools. Mr. John T. Norris, a Peace Corp volunteer, has been appointed by the Liberia Department of Education to supervise the Entebbe experiments in Liberia and to organize the teacher training necessary for the experimentation. Miss Lucy L. Addy has been appointed by the Ghana Ministry of Education to perform the same functions and there is a possibility of a similar appointment in Sierra Leone. Kenya has used its Mathematics Centre to supervise the experiments, and Tanzania supplies supervision through a cooperative effort of the Ministry and the University College of Dar es Salaam. A report by Miss Addy on the Primary work in Ghana is included as App. E, Rep.1.

Related Program

Arrangements for the Nairobi ABC Mathematics Institute financed by the Ford Foundation are well advanced. This part of the program is a natural consequence of the USAID supported book production and experimentation activities of the tutors and teachers who will bring about the widespread use of "Modern Mathematics" material in Africa.

A list of the staff and A, B & C participants is appended. (Appendix F)

Examinations

The West African Examination Council has informed Nigerian Ministries of Education that an O level Examination in Mathematics will be offered in November 1967, for students who have followed Secondary School Mathematics courses based on the Entebbe Mathematics Series. The letter also states that this type of examination will be offered for 1968 onwards (Copy of letter appended).

The Chief Examiner of the Cambridge Overseas Examination Syndicate which sets O level examinations for East and Central Africa has accepted an invitation to attend the 1967 Workshops. The Cambridge Overseas Examination Syndicate has also stated verbally through Mr. Garbutt, a Deputy Director, that O level examinations suitable to the Entebbe Mathematics Series will be offered when they are needed in East and Central Africa.

Mr. Christopher Modu, a representative of the West African Examination Council has agreed to act as Co-chairman of the 1966 Workshop.

Evaluation

There has been much discussion in the last few meetings concerning wider aspects of evaluation of the work of the program. Professor J. Kagan of Harvard University, who is also concerned with the evaluation of the S.M.S.G. program has agreed to become involved in the program and it is hoped to obtain approval of the initiation of this type of evaluation this year.

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

in Tropical Africa. An invitation has been issued to these representatives to visit the Nairobi ABC Institute in the third or fourth week of July to have discussions with representatives of the program and the participating countries on the plans for the continuing development of mathematics education in their area of responsibility.

1966 AFRICAN MATHEMATICS WORKSHOP

Appendix A

AFRICAN INVITEES

- Mr. D. K. Abbiw-Jackson, University College of Science and Tech., Kumasi, Ghana
- Dr. Iya Abubakar, Ahmadu Bello University, Zaria, Northern Nigeria
- Miss Lucy Addy, Ministry of Education, P.O. Box M.45, Accra, Ghana
- Mrs. Adegoke, Abadina School, University of Ibadan, Ibadan, W. Nigeria
- Mr. T. A. Agbaje, Ibadan Grammar School, Ibadan, Nigeria
- Professor Howard W. Alexander, University College, Nairobi, Kenya
- *Mr. Theophilus Q. Armar, West African Secondary School, P.O. Box 1830, Accra, Ghana
- Mr. Barnabas Avinyia, Arua Teacher Training College, P.O. Box 63, Arua, Uganda
- * Mr. Muhamed A. Bashrahell, Bububu School, Zanzibar, Tanzania
- Professor Albert Beninati, University College, Dar es Salaam, Tanzania
- ** Mr. Desmond Broomes, Inst. of Education, P.O. Box 64, Bridgetown, Barbados, W. Indies
- Mr. F. B. Dyck Harding, Milton Margai Training College, Goderich, Freetown, S.L.
- Mr. Julius E. Jonah, Prince of Wales School, Freetown, Sierra Leone
- Mr. M. B. Jones, Christ's Hospital, Horsham, Sussex, England
- Mr. Herbert Kanina, Ministry of Education, Nairobi, Kenya
- Mr. Frank Kazembe, Ministry of Educ. and Social Dev., Box 685, Blantyre, Malawi
- Mr. Michael Kinunda, Ministry of Education, Dar es Salaam, Tanzania
- Mr. Christopher Modu, West African Exam. Council, P.O. Box 917, Lagos, Nigeria
- Mr. Wilson Mwaringa, Education Department, P.O. Box 7301, Mombasa, Kenya
- Mrs. Mary Neville, USAID, Lusaka, Zambia
- Mr. Robert L. N. Offurun, King's College, Lagos, Nigeria
- Mr. Cyril N. Okosi, Government Secondary School, Owerri, Eastern Nigeria
- Professor Adegoke Olubummo, University of Ibadan, Ibadan, Nigeria
- Mr. J. E. Modupe Taylor-Pierce, Secondary Tech. School, Tech. Inst., Freetown, S. L.
- Dr. Onyerisara Ukeje, Inst. of Education, University of Nigeria, Nsukka, Nigeria
- Mr. Robert Walsh, UNESCO, Ministry of Education, Ndola, Zambia
- Dr. Awadagin Williams, Fourah Bay College, Freetown, Sierra Leone

* Withdrawn, May 31

** This participant is being financed by West Indies funds.

1966 AFRICAN MATHEMATICS WORKSHOP

UNITED STATES PARTICIPANTS

Professor Robert Dilworth, California Inst. of Technology, Pasadena, California
Miss Donna Doyle, Educational Services Incorporated, Newton, Massachusetts
Dr. E. G. K. Lopez-Escobar, M.I.T., Bldg. 2-155A, Cambridge, Massachusetts
Professor George Freeman, Williams College, Williamstown, Massachusetts
Professor Ross Finney, Princeton University, Princeton, New Jersey
Professor Robert Fisher, Ohio State University, Columbus, Ohio
Professor Vincent Haag, Franklin and Marshall College, Lancaster, Pennsylvania
Professor Clarence Hardgrove, Northern Illinois University, De Kalb, Illinois
Professor Shirley Hill, University of Missouri, Kansas City, Missouri
Professor William Houston, Antioch College, Yellow Springs, Ohio
Professor Paul Johnson, University of California, Los Angeles, California
Professor Peter Lappan, Michigan State University, East Lansing, Michigan
Mr. Ransom Lynch, Phillips Academy, Exeter, New Hampshire
Professor William Ted Martin, M.I.T., Cambridge, Massachusetts
Professor Donald Ostberg, Indiana University, Bloomington, Indiana
Professor Alfred Putnam, The University of Chicago, Chicago, Illinois
Professor Merrill Shanks, Purdue University, LaFayette, Indiana
Mr. Henry Swain, New Trier Township High School, Winnetka, Illinois
Professor Paul White, University of Southern California, Los Angeles, California
Professor Izaak Wirszup, University of Chicago, Chicago, Illinois
Professor Paul Young, Reed College, Portland, Oregon

EDUCATIONAL SERVICES INCORPORATED

Appendix C - Sheet 1

NUMBER OF EXPERIMENTAL CLASSES USING ENTEBBE PRIMARY MATHEMATICS SERIES

AS OF MAY 1, 1966

<u>Country</u>	<u>Primary One</u>	<u>Primary Two</u>	<u>Primary Three</u>	<u>Primary Four</u>	<u>Total</u>
Ethiopia	12				12
Ghana	28	25	14		67
Kenya	62	62			124
Liberia	14	12	5		31
Malawi	11	6	5		22
Nigeria	68	35	21	6	130
Sierre Leone	10	/	3		20
Tanzania	49	29	17		95
Uganda	20	3	2		25
Zambia	<u>21</u>	<u>13</u>	<u>5</u>	<u>3</u>	<u>42</u>
	<u>295</u>	<u>192</u>	<u>72</u>	<u>9</u>	<u>568</u>

NUMBER OF EXPERIMENTAL CLASSES USING ENTEBBE SECONDARY MATHEMATICS SERIES

AS OF MAY 1, 1966

<u>Country</u>	<u>Five-year course</u>			<u>Four-year course</u>	<u>Total</u>
	<u>Secondary One</u>	<u>Secondary Two</u>	<u>Secondary Three</u>	<u>Secondary C One</u>	
Ethiopia	10				10
Ghana	1	1			2
Kenya	1	1			2
Liberia	9	9	2		20
Malawi	3	3	3		9
Nigeria	55	28	22	12	117
Sierre Leone	6	5	3		14
Tanzania	14	14		29	57
Uganda	30	4	4	4	42
Zambia	<u>9</u>	—	—	<u>1</u>	<u>10</u>
	<u>138</u>	<u>65</u>	<u>34</u>	<u>46</u>	<u>283</u>

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Appendix D

WEST AFRICAN EXAMINATIONS COUNCIL

SCT/1C
L.2991

P.M.B.1022,
YABA (Lagos)
NIGERIA

4th May, 1966

Dear Sir or Madam,

"MODERN" MATHEMATICS SYLLABUS

You may be interested to know that the Council has agreed to provide special papers at the School Certificate level, beginning in November, 1967, for candidates who have been using the Entebbe Mathematics texts.

A copy of the experimental syllabus is enclosed herewith for your information. It is hoped that specimen questions on the syllabus will be circulated to schools in 1967. As the Secondary V textbooks of the Entebbe series are not likely to be published before May/June, 1967, schools intending to present candidates for the 1967 examination are advised to ensure that satisfactory arrangements are made for their pupils to cover the syllabus.

Special papers will also be set as from 1968 for school certificate candidates using the experimental syllabus of the Joint Schools Project (Ghana). This syllabus will also be circulated in due course to the schools concerned.

Yours faithfully,

C. Modu (signed)
SENIOR DEPUTY REGISTRAR

THE ENTEBBE MATHEMATICS EXPERIMENT PROGRESS
REPORT ON THE PRIMARY EXPERIMENT
IN GHANA

Appendix E
Report 1

In September, 1965, the Ministry of Education appointed a full time officer (Miss Lucy L. Addy) to take complete responsibility for supervising the Entebbe Experiment being carried out in some selected Primary Schools in the City of Accra.

In all twenty-one schools are engaged in the Experiment. They are:-

- (1) Accra Anglican Bishop Boys' Primary
- (2) Accra Derby Avenue Roman Catholic Primary
- (3) Accra New Town (1) A.T.C.C. Primary
- (4) Accra Salvation Army Primary
- (5) Achimota School, Primary Department
- (6) Adabraka Roman Catholic Primary
- (7) Independence Avenue (1) Girls' Primary
- (8) Adabraka Castle Road Methodist Primary
- (9) K. G. Kitson-Mills A.T.C.C. Primary
- (10) Korle-Bu St. Mary's Roman Catholic Primary
- (11) Labadi St. Paul's Anglican Primary
- (12) Labadi Presbyterian Primary
- (13) La-Bone Presbyterian Primary
- (14) Mamprobo Methodist Primary
- (15) Mamprobo Ebenezer A.T.C.C. Primary
- (16) Nungua Anglican Primary
- (17) South Labadi Road Estate Primary
- (18) Station Road Methodist Primary
- (19) Teshie Presbyterian Primary
- (20) Christiansborg Presbyterian Boys' Primary
- (21) Christiansborg Presbyterian Girls' Primary

Sixty-seven classes from these schools are at present using the Entebbe Primary materials. There are 23 Primary I classes
25 Primary II classes
14 Primary III classes

Total: 67 Primary Classes

UNITS COVERED BY THE VARIOUS CLASSES AT THE END OF THE SECOND TERM

From the end of term reports (ie. end of April '66) which the Headteachers of the schools concerned submitted, it was evident that only the Primary one classes may complete the work for the year (ie. by August '66). Only about two Primary two classes may be able to complete the work planned for the year. Unless extra time and effort are put into the Mathematics lessons, the Primary three classes may not also complete the exercises planned for them.

THE CHILDREN'S REACTION

On the whole, the children are responding well to the instructions being given them by their teachers. It is obvious that when a lesson is well planned, the children enjoy every minute of it. Since each activity has its own novelty, the children anxiously await each day's Mathematics lesson. It is interesting to listen to a class where lessons have been well delivered and the children have learned to use the words introduced during the teaching of that particular unit. With such classes, the children use the vocabulary very accurately. In a few classes, however, the teacher herself uses the words in the wrong context; and consequently, the children also misuse them.

DIFFICULTIES

At the beginning of the current school year, some Primary two classes and all the Primary three classes were without Pupils' Text Books. This was a serious handicap to the teachers as they had to copy exercises on the blackboard and in some cases draw sets as shown in the only reference books available. There was also the question of language difficulty which retarded the progress of the Mathematics lessons in some schools.

Reports from and discussions with the teachers show that if the Experiment is to progress satisfactorily, they should be supplied with materials such as Indian Ink and coloured cardboards etc. for making the required teaching aids. Another very important point raised by the teachers is that much time is wasted when the children have to copy exercises from the text books into their exercise books. They hold the common view that much could be achieved within a reasonable time if the children are allowed to use the books as workbooks.

Having compared the existing Mathematics syllabus being used in all the Primary schools in Ghana with the syllabus prepared by the Entebbe Primary Writing Group one could readily see that the Entebbe Mathematics embraces all that there is in the traditional Maths syllabus in addition to the varied new concepts that we normally find being taught at the secondary school level. This additional knowledge for the children at the Primary school level is well appreciated by many of the teachers. But, on the other hand, quite a number of them feel they are being asked to do extra work such as extra reading and extra preparation of teaching aids and apparatus for use by the children. As one teacher rightly remarked, "Our classes are fairly large and this makes it difficult for us to supervise each child's work especially when the books are not used as 'workbooks'".

SUPERVISION

The officer-in-charge of the Entebbe Mathematics Experiment makes it a point to pay an official visit to each class at least once a term. At the end of such visits, an official report is sent to the Headteacher of the school with recommendations and general remarks. Copies of the report are sent to the Regional Education Officer, The District Education Officer, The Principal Education Officer in charge of Curricula and Courses and a copy is also sent to the General Manager of the school for necessary action to be taken on the recommendations of the officer-in-charge of the Experiment. Other visits are arranged to enable the officer to discuss problems and to check the supply of

Text Books in the various Entebbe classes. During some of these official visits, the officer gives demonstration lessons for the benefit of the teachers who have difficulty in understanding the activities as suggested in the Teachers' Manual.

IN-SERVICE-TRAINING

It became necessary after the first term to organize briefing courses for some teachers who had newly joined certain schools trying the Entebbe Experiment without a prior briefing course at Legon. These teachers had been appointed to replace teachers who were either on sick leave or on maternity leave. This weekly In-service-training is now a permanent feature of the Entebbe Primary Mathematics Experiment. Tuesdays from 2:30 to 3:30 for Achimota; Fridays from 2:00 to 3:30 for others at central location (teachers pay own expenses for travel).

GENERAL COMMENT

The majority of the teachers at present using the Entebbe Primary material are really devoted to their work. They take pains to read the instructions in the teachers' guide and try to impart the ideas in an effective manner to the children. Their general impression is that they have been given the privilege to broaden their outlook on Modern Mathematics and, therefore, they are determined to make an effort to help the children in their charge, to maintain interest in the subject and to understand the basic concepts in Mathematics.

In order that the children should not have a break between the end of one year and the beginning of another, the following suggestions are being made:

- (1) The Text Books be forwarded well in advance of the beginning of each academic year.
- (2) If possible, materials suitable for making teaching aids should be made available to the Ministry for distribution to the teachers.

GRATITUDE

The Ministry wishes to put on record its appreciation of the generous supply of some teaching aids which it received from the sponsors of E.S.I. for distribution to the teachers engaged in the experiment. The 'Markers' in particular, have proved very useful indeed.

Miss Lucy L. Addy
Education Officer
Primary Mathematics
Ministry of Education
Accra, Ghana

April 26, 1966

REPORT ON ESI INSTITUTE
IN KITWE, ZAMBIA
3-14 JANUARY 1966

A two weeks institute for thirty eight Zambia primary teachers, head teachers, inspectors, and teacher training college mathematics tutors was held from 3 January through 14 January at Kitwe Training College, Kitwe, Zambia, under the auspices of ESI and with the co-operation of the Zambia Ministry of Education. The staff consisted of Mr. Robert Walsh, a UNESCO educational adviser assigned to the Zambian Ministry and attached to Mufulira Training College (Zambia), Miss Nancy Greene, a mathematics tutor at David Livingstone Training College (Livingstone, Zambia), and the undersigned, of the Mathematics Department of the University of North Carolina. The architect of the institute was Mrs. Mary Neville, acting Chief Education Officer of the USA AID Mission to Zambia and member of the Inspectorate of the Zambian Ministry of Education; unfortunately, the press of her having to write final reports on her then concluding tour of duty prevented her joining the institute staff, a loss felt keenly by those of us at the institute who were familiar with her ability and accomplishments.

The fact that schools and colleges were re-opening on Monday, January 17, created both time and travel squeezes, thereby cutting short attendance times for some members. Mr. Bwalanda and Mr. Atkinson, tutors at Mufulira Training College were required by college duties to leave on the afternoon of the 10th, as was Miss Greene of the institute staff. Two other members left at that time to serve at a Thursday meeting of the Zambian Primary Mathematics Syllabus Committee. For similar reasons, two or three head teachers missed the last two or three days of the institute. Due to the schedules of trains and the extremely heavy bookings for that week-end, it was found necessary to end the institute at noon on Friday, January 14th, to allow members to return to their schools in time for the openings on the 17th. Also due to travel and scheduling difficulties was the one day delay in the arrival of the members from the Muleya Winter School. Nevertheless, there were each day at least 30 members in attendance.

A list of the staff and participants is attached.

Understandably, but nevertheless unfortunately for the Institute and its purposes, about fifteen of the most able teachers scheduled to teach Entebbe material in 1966 were at this time attending a recently arranged high priority Ministry course in English language teaching at Lusaka. Thus, only about ten participants were to teach Entebbe this year.

The daily schedule began at 0830 with an hour's lecture by Professor Pettis on Geometry, using Entebbe Primary I, II, III and Basic Concepts III, followed by another one hour lecture by Mr. Walsh on material in Volumes I and II of Basic Concepts. After a half hour coffee break, Miss Greene, through Monday of the second week, lectured on number bases and the number line until 12:30. The afternoon hours, from 1400 to 1700 including a tea break, were spent in group sessions of the following kinds: (1) subgroups consisting of participants who would be, or might be, teaching (or supervising) a particular Entebbe text this year; such groups discussed lesson plans and methods, conducted trial lessons, and made apparatus; (2) supplementary sessions, rather like laboratories, on topics discussed in the morning; (3) test periods; (4) discussions of supplementary ideas and materials; (5) showing Madison Project and NCTM films supplied by

Mrs. Neville. Of these (2) and (3) were effective, (4) sometimes wasteful, and in (1) trial lessons, without actual children, are essentially a waste of time, but making apparatus is very worthwhile since the teachers when on the job have great difficulty in finding enough time, energy, and materials to make the considerable amount needed.

Four or five of the participants clearly showed especial mathematical ability, while a few others were at the other end of the spectrum. In general this group was somewhat below those in other institutes I have seen, due no doubt to the better Entebbe teachers having been sent to the concurrent English Teaching Institute. The present group was well worth working with, however.

Those who had taught Entebbe material reported to one group that they had found the texts much superior to the standard ones, for much the same reasons put forth by other African teachers at other institutes; the material was child-centered, the children became much more involved, excited, and proud about the mathematics they were doing and progressed much further, the teachers learned more widely and deeply the mathematics they were teaching, and the learning of Entebbe and of English were mutually reinforcing. There was some question as to the difficulty of teaching Entebbe when a vernacular was the school room language; those teachers who had proper knowledge of the mathematics they were teaching reported little or no trouble when using a vernacular, so perhaps whatever the difficulty (chiefly, I think, a lack of vocabulary in the vernaculars) its resolution lies more in the teacher than in Entebbe or the vernacular. Those reporting warned that apparatus is important, there is a lot to be made, and the making of it must be planned ahead.

Written comments on the Institute made on the final day by the participants followed much the same patterns as those at other Institutes; they found sets, the number line, and number bases to be novel and very useful and sometimes intriguing, their conceptual and computational knowledge of arithmetic and geometry to have been markedly improved and their horizons surprisingly expanded in seeing what can be learned by children in the first three grades and new and more productive ways in which pupils can be guided in their learning. They were noticeably grateful for the opportunity to learn those things that were new to them and to improve their competence and they very earnestly urged that such institutes be more frequently given and more widely spread in order to expand knowledge of Entebbe math and to help Zambian teachers and children to meet the future. To show that not all was roses, some made pertinent criticisms of certain points in Basic Concepts I and II and in some of the lectures and filing and while writing their considerable appreciations of the staff's abilities and efforts, they pointed out ways by which presentation and organization might be improved. Those written criticisms were left with Mr. Walsh to be forwarded to me later; unfortunately, I haven't received them, so no direct quotes can be given.

The staff of Kitwe Teacher Training College were continually and consistently very helpful in providing accommodations and all assistance that they could; very good marks there. Mr. Paul Bowles, Chief Inspector for the Copper Belt, I found hard to decipher; courteous, correct, and logistically and administratively cooperative, he seemed both sympathetic towards the Institute as a pedagogical project arising from presumably good intentions and antagonistic towards Entebbe on what I consider some misunderstanding of mathematics, some misinterpretation of Entebbe texts, and misgivings concerning its American origins.

As a last but most important point, I must emphasize the importance of Mr. Walsh and Miss Greene in whatever success the Institute had. Miss Greene cut short her much needed vacation to come and worked hard, ably, and unselfishly; what she does, she does well. Mr. Walsh was the real wheelhorse of the whole affair; he lugged carloads of books from Mufalira, contributed material and equipment invaluable for making apparatus, organized for the participants trips to a copper plant, T.V. station, computer, and shops, organized and supplied the Institute library, was general trouble-shooter and information center, and shared the load of additional lecturing caused by Miss Greene's forced return to Livingstone on the second Monday. He does an excellent job of lecturing, and is a credit to the profession and to UNESCO. He contributed more than everyone else, and I feel indebted to him not only on behalf of ESI but personally.

B. J. Pettis
Professor of Mathematics
University of North Carolina
Chapel Hill, N. C.

MATHS. COURSE - KITWE TEACHER TRAINING COLLEGE - Jan. 3rd - 15th, 1966

Professor B. J. Pettis, Guest Lecturer
Mr. R. A. Walsh, UNESCO Lecturer
Miss N. Greene, Lecturer from David Livingstone Teacher Training College

PARTICIPANTS

Mr. Emmerson Mudenda)
Mr. Musokotwane) Coillard School, Livingstone
Mr. Flexion Malilwe)
Miss Freida Mudenda)

Lusaka

Miss E. Laws, Inspector of Schools
Mr. J. S. Siyolwe, Chitanda School
Mr. S. Phiri)
Mr. F. K. Ngoma) Chisengalumbwe School
Mr. E. Chilinda)
Mrs. F. Mzyccc, Burma Lower
Mr. A. Ambali, Chunga
Mr. F. A. Nhango, Chingwele
Mr. D. L. Mwalye, Chinika
Mr. W. Kachinga, Chilenje Upper
Mr. K. G. Katala, Mulongoti

Broken Hill

Mr. C. Nangani, Inspector of Schools
Miss Grace Nyirenda
Miss May Lupende

Mulaya Winter School

Mr. J. Banda, Head
Mr. K. Ngoma
Mr. B. Mpundu
Miss C. Chishimba
Miss A. Gondwe
Mr. Sinkamba
Mr. B. Bulambo

Buyantanshi School

Mr. G. Bwalya, Head
Mr. P. N. Celelwa
Mr. M. B. Mukobe

Mary Moffat School

Mr. C. Haamukwele

MATHS. COURSE-KITWE TEACHER TRAINING COLLEGE - PARTICIPANTS (Continued)

Mufulira Teacher Training College

Mr. John Atkinson, Tutor

Mr. L. Bwalanda, Tutor

Miss M. Zimba

Mr. Mbewe, Head, Kapajimpanga School, Solwezi

Sister Annunciata, Principal, Mongu Teacher Training College

Mr. A.M.P. Lumbwe, Inspector, Balovale

Mr. A. Ndalama, Lubwe Mission, Fort Rosebery

Sister Jean Baptiste

TANZANIA PRIMARY INSTITUTE

REPORT OF CHANG'OMBE MATHS INSTITUTE.

There were forty participants in the Institute: twenty-two were Primary School Inspectors, fourteen were Teachers' College Tutors, and four were Lecturers. The Institute was held at Dar es Salaam Teachers' College during the dates of December 1st, 1965 to December 18th, 1965.

This was the third and final in a series of such Institutes sponsored by Educational Service Incorporated and whose purpose was to train a cadre of people qualified to instruct primary school teachers in the New Maths. The first two Institutes were under the leadership of Roy Dubisoh. This last Institute was conducted by people employed in Tanzania.

The goal of the Chang'ombe Institute was to prepare a course of study the participants could use when they started the training of primary school teachers in their home districts. To achieve this goal the Institute was divided into two broad areas. The morning sessions were devoted to three common lectures attended by all participants in the Institute. The first lecture each day dealt with number concepts and they were given by Professor J. B. Roberts, Visiting Professor of Mathematics University College, Dar es Salaam. The second lecture each day was given by Alfred Nawa, a Tanzanian, and Nawa's lectures dealt with Geometry. The third lecture each day was concerned with Algebraic Concepts and it was given by Mr. Spencer Swinton, a TEEA teacher, and Mr. Michael Kinunda of the Tanzanian Ministry of Education.

The afternoon sessions were devoted to writing and workshop type activities. They were conducted in three subgroups each representing a cross section of the participants. Each subgroup was composed of Primary School Inspectors and Teachers' College Tutors and were matched according to experience in the New Maths. A general topic was assigned to each subgroup; one was assigned "Sets and Numbers", another was assigned "Operations", and the third was assigned the topic "Geometry and Measurement". Each subgroup was then charged with the task of preparing outlines of Lectures, exercises, and Visual Aides that could be used by each of the participants in conducting his course when he returned to his home district.

The Lecture outlines mentioned above were prepared in three drafts; 0; first, and final. The first and final drafts are enclosed with this report. Most people concerned with the Institute were satisfied with the results considering there was only a little over two weeks time - except for the section dealing with the topic "Operations". This section is currently being revised by Mr. Swinton and Professor Roberts. Though the written materials do not have the polish of En. ebbe Mathematics materials, they were prepared by the Participants themselves.

The Visual Aides prepared were mainly wall charts but each participant also prepared on 3' by 3' flannel board and a variety of materials such as geometric shapes that could be placed on the flannel board.

Mr. Michael Kinunda, an official of the Ministry of Education, told the participants at the close of the course to arrange with their own Regional Education Officers the setting up of a course for training primary school teachers so that the experiment of teaching the New Maths in Tanzanian Primary Schools, launched over two years ago using Entebbe Mathematics, could be expanded to more schools. As E S I limits the free materials to 30 streams, arrangements have been made by the Chief Educational Officer to have 2,000 copies published of an adopted version of Entebbe Maths for Standard I. The adoption consists mainly of replacing some of the pages with wall charts and using Swahili words instead of English words - e.g. mamoja, makumi, and mamia for ones, tens and hundreds. These should be available by March 1966 and will be used in about 40 more primary schools - there are currently 21 schools with a total of 27 streams using the Entebbe Primary Maths in Standards I, II, and III, or about 3,600 pupils.

This is the first experience I have had directing an Institute here in Tanzania. It was a most valuable experience for me. The real worth of the Institute will be measured by how many more schools adopt a New Maths program. As a member of the Institute of Education I will be able to keep a close watch on developments. The Ministry of Education has seconded to the Institute of Education a Mr. Raphael Mwajombe who will help me with the problems caused by Swahili being the medium of instruction and he will also aid in the supervision of the experiment.

Albert Beninati
AID Visiting Professor of
Mathematics
Institute of Education
University College
Dar es Salaam
Tanzania

REPORT ON UNIVERSITY OF LIBERIA VACATION SCHOOL IN MATHEMATICS
January 3 - 28, 1966

On January 3, 1966 a group of 52 primary and secondary school teachers from throughout Liberia registered for a four-week course in modern mathematics. Of these teachers, 47 completed the course, 11 doing excellent work, 12 receiving a good recommendation and 6 recommended with slight reservations. The remaining 10 should return for further work before attempting to teach the Entebbe materials.

The class was divided into two small groups roughly equivalent to a primary school group and a secondary group. The secondary group went at a slightly faster rate than the primary group covering all three volumes of the Basic Concepts as well as going over the Secondary Two and Three pupils' and teachers' texts. The primary group covered the first two volumes of the Basic Concepts and looked over the Primary Two and Three teachers' and students' books. In addition both groups had copies of Insights Into Modern Mathematics by Paul R. Traston, which dealt mainly with what 'modern' mathematics is.

Each group attended class six hours a day five days a week with field trips each of the three Saturdays within the four week period. Four hours were lecture, one hour was demonstration class, and one hour was discussion and a coffee break.

The daily program was as follows:

7:00 a.m.	Breakfast
7:30 a.m.	Bus from Department of Education to the University
7:45 a.m.	Lecture
8:45 a.m.	Lecture
9:45 a.m.	Demonstration classes - Primary Two & Secondary One
10:30 a.m.	Discussion of demonstrations
11:00 a.m.	Coffee and informal discussions
11:30 a.m.	Lecture
12:30 p.m.	Lecture
1:30 p.m.	Bus back to the Department of Education for lunch
5:30 p.m.	Supper

The three field trips were a trip to the Mt. Coffee Hydroelectric Plant, a trip to the VOA and a trip to Bong Mines and the University Farm. These trips were extremely well received and helped to form more of a group cohesiveness.

The Staff consisted of the following persons:

Mr. Joseph Battie, Laboratory High School, Monrovia
Mr. Alysius Farrah, University of Liberia
Mr. John T. Norris, Department of Education
Mrs. Virginia Sherman-Boyd, University of Liberia
Mr. H. M. Thompson, University of Liberia
Mr. Henry Walker, Zorzor Lutheran Mission
Mr. Bennie Warner, Gbarnga Methodist Mission

The following are the teachers who received the highest recommendations from their instructors:

Abanobi, Samuel	Cuttington (helped in demo class)
Arnulpha, Mary	Monrovia
Diggs, Alfred	Robertsport
Edana, Mary	Monrovia
Flor-Enoarnacion, Maria	Monrovia
Gompah, Railey John	Sanniquellie
Hylton, Eda M.	Homi Mills
Kornorboi, George	Belahun
Lund, Else T.	Paswama Mission (Lofa County)
Pauline, Catherine	Monrovia
Russell, John Martin	Kakata

In addition to these teachers listed above the following received a good recommendation from their instructors:

Aidoo, Peter	Ricks Institute
Dennis, John B.	Harper
Gbagbe, Fredrick S.	Fisibu
Karlch, Joseph K.	Juarzon
McCritty, Dolly Payne	Buchanan
Moses, Benedict	Voinjama
Randolph, Anna S.	Bolahun
Stephens, Henry W.	Dubli Island
Taylor, Idell L.	Monrovia
Walker, Williams	Sanniquellie
Wayler, Oliver	Tchien
Williams, Alphonso	Voinjama

The following received recommendation with slight reservations:

Amissah, T.K.A.	Monrovia
Cheeseman, Saykun	Sinoe (Upper Jedapo)
Cholopheh, Russell T.	Sinoe (Upper Jedapo)
Xoliogo, Augustino	Harbel
Pippins, Amos T.	Bassa (Corblee)
Street, George	Johnsonville

The remaining teachers have some grasp of the material but not enough to teach without further work:

Aquah, Samuel R.	Monrovia
Arku, Mosses B.	Voinjama
Bairian, David	Palala
Caroy, Ayedo	Monrovia
Diggs, O.V. Bismark	Bassa
Fofanan, Michael	Zorzor
Harris, Joseph L.	Harper
Kaifar, John	Kolahun
Kpangbai, Francis A.	Gbarnga
Kumeh, David	Sinoe
Sharpe, Mary	Monrovia
Togba, George	Jadepo

Tuch, John
Turay, Joseph J.
Ukeje, Enoch
Vafee, Stephen
Walters, Edward
Wilson, Obadiah

Monrovia
Careysburg
Ricks Institute
Bolahun
Marshall
Harbel

Housing was provided for all up-country participants, the men stayed at the GWA hostel which is within walking distance of the Department of Education cafeteria and the women stayed at the YWCA and had to be bussed in for meals. Three meals a day were served at the Department of Education cafeteria and donuts and coffee were provided at the University during the class day.

The Primary Two and Secondary One demonstration classes gave the participants a chance to see how effectively the Entebbe materials can be used. Each class had approximately 35 students who came mostly from the Monrovia Demonstration School. Primary Two was chosen over Primary One because it was difficult to arrange for enough first grade children to attend since most did not live close to the University.

COMMENTS AND EVALUATION

The cooperation expressed by both the University and Department of Education was the main reason for the success of this Institute. At the University special thanks should go to President Weeks who allowed the institute to be offered as a regular course and also the Cornell team for allowing Mr. H. M. Thompson to participate in the Institute. In addition special thanks should go to Mr. Gifford and Mr. Varfly who were in charge of the vacation school, Dr. Wilook and Mr. Bestman of the Teachers College and Mr. Davis who kept the busses running.

Thanks goes to Secretary Caine who supported the program fully and was instrumental in obtaining the money necessary to repay the participants for their transportation before the institute ended. Special thanks goes to Dr. A. Doris Banks Henrie who kept all of the disrupting factors well in hand and was the main reason that the Institute ran as smoothly as it did. Thanks also to Mrs. Kamara who made available the necessary amount of gas slips from her very tight vacation school budget. In addition to these two groups of people thanks should go to Dr. Florell and Dr. Futter of the Monrovia Consolidated Schools for providing items ranging from chairs for our second grade demonstration class to a coffee pot for our coffee break.

The division of the course into two groups of approximately equal size was necessary because of the large enrollment but was also very advantageous due to the fact that the two groups could go at different rates, cover slightly different materials, i.e. either the primary or the secondary books, and the class size was conducive to discussions that were more lively because the class was neither too small nor too large.

Four weeks seems to be the correct length for this type of institute. The first three weeks in both groups were spent on the Basic Concepts and the last on reviewing and looking at the actual Entebbe classroom texts. This last week was probably the most significant because it allowed the teachers to see how certain ideas were expressed in the students' texts as well as see the format of the teachers' texts and it allowed the instructors to test more accurately the actual level of understanding of each teacher and gave some time to correct any weak spots.

Although the day was not broken into two parts as done at the Cuttington Institute last year, this did not appear to hamper the effectiveness of the Institute. The coffee break seemed to provide the necessary relief in the middle of the day and if the class had been broken up there would have been a great deal of time lost in transporting people back and forth between the University and the Department of Education. Attendance was almost perfect and no one who was still registered at the end of the course missed more than two days of class, except for the four nuns from St. Teresa's Convent who, through no fault of their own, were forced to miss the last week. Even so, they still had received instruction that covered the Basic Concepts.

The fact that we had a separate demonstration class for both primary and secondary school teachers provided interest for all and allowed a few to attend a sampling of both. However during the last week attendance at the demonstration classes was low due to the heavy load of the lecture classes. Also, the demonstration classes had to be cancelled two Fridays in a row due to University sponsored assemblies, which was unfortunate but could not be helped.

RECOMMENDATIONS

Although this Institute was very successful, it was the consensus that another one should be held in 1967. Toward this end there are several recommendations:

1. Although the actual number of participants met our estimates almost exactly the names of these individuals was not known beforehand. Therefore it is recommended that the planning of the institute be started earlier and that notices and invitations be sent out no later than November 15, 1967 since communications are very difficult during the entire month of December due to the closing of school and the holiday season.

2. It is hoped that more people of a supervisory level, could be made available to attend the institute. Although this is very difficult due to the regular vacation school projects it is hoped that at least one supervisor or assistant supervisor could attend from each county.

3. Since this institute was actually giving a course title, Education 505, at the University of Liberia, it is hoped that this course can be offered again next vacation school as part of the University's regular program with ESI again supplying the books necessary. In addition perhaps an Education 506 could be set up for those who want to come back for more work in modern mathematics.

4. Whether or not the University decided to offer a modern mathematics course for teachers it is necessary to conduct another large institute again either at Cuttington or the University, or perhaps slightly different programs at both depending on the faculty available at each institution.

5. If possible the faculty of this year's institute should be invited to participate again next year since they did a really outstanding job.

6. Group cohesiveness was created by the field trip and psychologically it gave a big boost to everyone. Perhaps more could be done in the way of informal night sessions since a majority of the people were staying at the CWA hostel and perhaps next year instructional movies might be made available on various subjects.

7. Although there was a final party to end the course, perhaps more could be made of this and certificates of completion could be handed out by both representatives of the Department of Education and the University of Liberia.

In summary it appears that the interest in the Entebbe program and modern mathematics in general is increasing rapidly in all the agencies concerned with education as well as with the teachers in the field. In order to nurture these feelings more should be done along the lines of these past two institutes and in the area of in-service training of teachers.

John T. Norris, PCV
Department of Education
Monrovia, Liberia
February 2, 1966

Report on Ibadan Institute
for Inspectors and Primary School Teachers

Conducted at the Yejide Girls Grammar School, Ibadan, from January 2 to January 15, 1966, for 10 inspectors and 48 teachers from the Western Region of Nigeria, 5 teachers from Benin City in the Midwestern Region, and one tutor from St. Luke's Teacher Training College. The institute was sponsored by the Ministries of Education of the Western and Midwestern Regions and by E.S.I..

Program. The 64 participants were divided into three groups (groups A, B, C given on the attached list of participants), and the program for each group consisted of:

- (a) 10 lectures on the material and philosophy of the Entebbe mathematics project.
- (b) 10 discussion periods.
- (c) 10 periods in which participants engaged in independent reading and exercises and were able to consult individually with the staff.
- (d) 10 enrichment periods, used in different manners by the 3 groups, mainly in discussion of teaching materials and methods by groups A and B, but in further lectures and discussions on more advanced topics by group C.

In addition, groups A and B prepared and presented, in as realistic a classroom situation as it was possible to simulate, 6 lessons from Units of Entebbe Primary One materials. The inspectors from group C attended these practice classes and participated in the ensuing lively and sometimes devastating discussions.

Daily Schedule. 8:00 - 9:00 - lecture
9:00 -10:00 - discussion
10:00 -10:30 - coffee
10:30 -12:30 - independent work (or additional lecture topics if warranted) and individual discussion with the staff.
12:30 - 2:00 - lunch period
2:00 - 3:00 - enrichment lectures and discussion of teaching methods.
3:00 - 4:00 - tea and discussion

The schedule was sometimes modified, as appropriate to the progress of the separate groups, by interchanging lectures, discussions, and so forth. In addition, during the latter part of the institute, the scheduled periods were borrowed for the purpose of presenting the practice lessons from Primary One and of discussion of these lessons.

Accommodations. In the presence of the First African Conference on Population, the University of Ibadan was not available as a site for the Institute.

Group C: Inspectors and other officials.

In splitting off the inspectors into Group C, the strong recommendation of Professor Vincent Haag, in his report on the Ibadan Institute held on August 23 - September 10, 1964, was being followed. We concurred in Professor Haag's observation that discussion by the teachers was inhibited in the presence of the inspectors, both because the latter represent positions of authority and because the inspectors are unwilling to admit the inadequacy of their own backgrounds in the presence of the teachers. It was our further hope that the inspectors could be drawn into a more active role in the running of the institute and thus gain the experience necessary for continuing the experimentation with Entebbe materials after the departure from the scene of the institute staff and in particular of Dr. Williams.

Scope of the lectures. After the first day, when Professor Kreider gave an introductory lecture and a lecture on sets and counting, most of the lectures for Group A were given by Dr. Battle, those of Group B by Professor Kreider, and the lectures to Group C by Dr. Williams. There was some deviation from this scheme as certain groups were combined for lectures viewed as suitable for more than one group. The material of Basic Concepts (Vol. I), the first of Entebbe's Teacher Training texts, and the Teacher's Handbook were covered by both Groups A and B. The pace was adjusted to the needs of the participants, and accordingly Group B proceeded a little faster and a little more deeply into the basic concepts.

During the first two days the enrichment period was used to give Groups B and C (combined) a further look at matching and counting, especially as it pertains to infinite sets. There was a lively discussion in connection with these topics, and the lecturers were emboldened to apply another enrichment session to "clock arithmetic". On subsequent days it was felt that there was greater need for detailed presentation of teaching methods and proper use of Entebbe materials than in further enrichment lectures. Groups A and B were combined for this purpose and led by Dr. Williams.

The inspectors were anxious to proceed more rapidly than the teachers, and, although their background was only slightly stronger than that of the teachers, it was felt that they should be encouraged to proceed. Quite contrary to Professor Haag's observation that the inspectors are better served and are more interested in indoctrination than in mathematical content, we found that Group C was eager to learn about new ideas in teaching of mathematics and strive to surpass the teachers in this regard. The lectures and discussions of Group C, a large portion of them led by one of their own numbers, covered the material of all three Teacher Training texts.

The discussions were held in each group by the morning lecturer for that group. It was fortunate to have present some teachers who had attended the past Ibadan institutes. They were of substantial assistance in handling doubts that primary school children are able to comprehend the ideas presented in the Entebbe books. It is unfortunate that demonstration classes could not be arranged, as they had been at previous institutes, due to the fact that schools were not in session. But the teachers seemed willing to accept the feasibility of the Entebbe approach to teaching mathematics and were anxious to increase their own knowledge.

Reaction of the Participants. The teachers among the participants were a lively and enthusiastic lot. Inciting discussion was the easiest task of this lecturer; stopping it (or even controlling it) was another matter. The teachers were agreed that "teaching by understanding" is far better than "teaching by rote". However there was not such uniform agreement on what constitutes "understanding". One teacher suggested that the traditional algorithm for long division is more easily "understood" by primary school children than is a step-by-step process leading up to this algorithm. It developed that the best way to handle such points of view, particularly in Group B, was to have the lecturer remain silent. The members of the group took upon themselves the conversion of the dissident individual (with a little refereeing by the lecturer), apparently to everyone's satisfaction. They would turn to the lecturer for his opinion after they were convinced that they had handled the situation well.

Some of the comments of the teachers, as obtained in answer to a brief questionnaire, are given on a separate attached sheet.

Most surprising and encouraging was the reaction of the inspectors in Group C. They viewed it as their mission to understand all three volumes of the teacher training texts as well as the teacher's guides. After the first few days they took substantial pride in being self-sufficient and arranged about half of their lectures themselves. The intrusion of a lecturer into their midst was most easily accomplished by a casual comment that Groups A and B had discussed a particular topic. A lecture on this topic was then invited. The independence of the inspectors was welcomed and encouraged. It depended to a large extent on the fact that they formed a separate group.

There is no doubt in my mind that the inspectors are thoroughly behind a substantial Entebbe program in their schools. They worked quite hard on understanding the ideas in Basic Concepts and seemed convinced of the superiority of the Entebbe approach and materials. They can be a strong ally.

Reaction of Officials. At least on the surface the Ministry of Education in the Western Region is backing (or tolerating) the use of Entebbe materials in appropriate schools. A visit to the institute by Mr. C. C. Okafor from the Western Ministry produced one of those puzzling situations wherein he spoke strongly in favor of the institute and of experimentation with new texts but seemed annoyed that he had not been informed earlier about the institute. Dr Williams explained with her usual infinite patience that both Mr. Somade, the Permanent Secretary of Education, and Mr. Fagbulu in the Ministry had been thoroughly informed of, and involved in, the plans for the institute. Why such information does not trickle down through the various levels of the Ministry is anyone's guess.

Evaluation. It would appear that the institute has substantially brightened prospects for a major pilot project in the use of Entebbe materials. Among the 64 participants, 24 schools in the Western Region and 2 in the Midwest were represented. Particular stress was laid on the use of the pupils' texts and Teacher's Guide, and the staff is confident that many of those who participated are capable of teaching a section of Primary One with reasonable preservation of the intended Entebbe flavor.

Perhaps more important for the prospects of success, however, is the role played in this institute by the inspectors and to be continued by them afterwards. Dr. Williams and Mr. (Inspector) Akinleye have managed to reorganize the assignment of inspectors in the Ibadan area with the consent of Miss Sandham in the inspectorate so that those who attended the institute will be inspecting schools in which Entebbe materials are being introduced. With an apparently enthusiastic core of inspectors so distributed, there would seem to be much less chance that the teachers will go home from the institute and forget about the entire project. The disappointing results of the past two institutes might be attributed to lack of support in the ministry and inspectorate and consequent inability or unwillingness on the part of the teachers to use Entebbe materials in the face of resistance from headmasters, etc.

The extent to which basic concepts of mathematics have been understood by the participants is difficult to measure. Probably in Group A it is less than satisfactory or just barely so. But Groups B and C made substantial progress. This seems to demonstrate the value of repeated exposure to institutes of this kind, several short institutes being more valuable than one longer one.

One of the more essential and revealing activities of this institute was the actual preparation and presentation by the teachers of lessons chosen from the Entebbe Primary One materials. Beyond lectures, discussions, and individual work, it is clear that actual experience in teaching Entebbe mathematics is required before the teachers completely grasp the intent of the project. Demonstration lessons by an experienced teacher are a must for these institutes, and judging from our experience in this particular institute the participants as well must get into the teaching act, simulated classroom conditions being quite satisfactory. Our participants, in teams of 5, presented such lessons in the presence of the inspectors, and ensuing comments, suggestions, and discussion were as valuable and enlightening as they were unrestrained.

In summary, I strongly recommend that future institutes of this kind make provisions for demonstration classes by an experienced teacher and include in the program an opportunity for each participating teacher to prepare, present (not to children), and be criticized on several units of Entebbe materials. The presence of inspectors in substantial numbers at these institutes is also to be strongly recommended, both for their own good and for the morals of the teachers.

Donald L. Kreider
Asst. Professor
Mathematics Department
Dartmouth College
Hanover, New Hampshire

Ibadan Institute for Inspectors and Primary School Teachers Report-from
Meeting Held January 2 to January 15, 1966
Comments from the teachers

Question: What, in your opinion, is the Entebbe program trying to achieve?

- Answers:
- (a) To have children understand ideas as well as techniques.
 - (b) To change the attitude of children towards mathematics.
 - (c) To teach children to think and discover things for themselves.
 - (d) To provide a good background for further studies.

Question: What do you think will be the reactions of pupils, headmasters, other teachers, and parents to the Entebbe mathematics program?

- Answers:
- (a) The pupils will enjoy the subject more.
 - (b) Some headmasters will appreciate the project and will be proud to have it operating in their schools.
 - (c) Some headmasters will not be familiar with the materials and will feel that sets, etc., are a waste of time.
 - (d) Some teachers will not show initial interest but will become enthusiastic after they observe the progress of other classes using Entebbe books.
 - (e) Parents will be baffled initially but will be anxious to have their children in Entebbe classes after they understand what it is.
 - (f) Some parents will feel that too much time is spent on useless ideas in Primary One. They will feel, for example, that "carrying" and "borrowing" should be taught in the first year.

Question: What changes would you recommend in the Entebbe materials?

- Answers:
- (a) Some figures in the pupils' texts are unfamiliar to Nigerian children and should be replaced.
 - (b) Entebbe materials should be introduced into Teacher Training Colleges.
 - (c) Books should be more readily available.
 - (d) There should be more teacher institutes.
 - (e) Simple sums involving money should be introduced in Primary One.

Report on Institute at Dar Es Salaam Jan. 2-15, 1966

The Institute was held at the magnificent new campus of the University College about 8 miles from down-town Dar. The campus is surrounded by bush so it is almost completely residential as far as students and faculty are concerned, although a number of the staff do commute from Dar, or from their shambas nearby.

The program had been prepared by the planning committee of Ted Phythian, head of maths department, David Woodhouse, a young British expatriate just finishing his doctorate at Cambridge, Joe Roberts, visiting professor from Reed College, Al Beninati, visiting professor in The Institute of Education from the State University of New York and Charles Pratt, audio visual expert from the Institute of Education.

The program was heavily scheduled from 8:20 AM to 4:30 PM with several special lectures or activities after this in the afternoon or evening.

The first day or two moved a bit slowly as the participants came to know the lecturers and each other. After this there was a great deal of enthusiasm. Modern mathematics was greeted joyfully and everyone wanted to introduce it in as many streams as possible. As is discussed in a separate report from Phythian, not all requests could be granted.

While some of the participants had some background in Modern math, for most this was their first introduction. They were quite surprised to find that mathematics was not necessarily something one was told by experts, and then passed on. The idea that discovery, discussion and reasonableness in human affairs were relevant in mathematics was quite a surprise for them. The idea that mathematics was a social activity with ideas to be discussed for their own interest was new.

In the lectures given by me the central ideas in the Geometry and Algebra of Secondary C were discussed. A program of the conference is attached. While all the participants had substantial mathematics background, many concepts were not clear.

Included in these little known concepts were 1.1 correspondence, incidence, betweenness, congruence, parallel, symmetry, in geometry; number, types of proof, reasons for accepting commutative, and associative and distributive laws in algebra. However, these and other basic ideas in algebra and geometry were discussed until understanding responses were received at least from the middle-understanding group. Routine manipulations and algorithms could be performed well by the entire group.

Not only were the group given a thorough introduction to Entebbe mathematics but they also were exposed to SMP. Some schools in Tanzania are using SMP. Kenner and Thwaites gave very lucid and convincing discussions of the good points of SMP. Both attended the conference for a couple of days each. Hence the group are convinced modern math is here to stay.

No small benefit of the conference was to bring the mathematicians of Tanzania together, essentially for the first time. 64 persons were listed on the official roster, with many others attending selected meetings. About 100 persons were included in the larger group. As a partial result The Mathematics Association of Tanzania was formed with plans for a journal, and reasonably frequent regional meetings to foster further development. I think very healthy results will develop from this.

Many of the lectures considered advanced ideas which were new to the group. This opened windows to the future mathematicians.

The conference definitely brought closer relations between the secondary, teacher training college and university mathematicians. Definite misconceptions were removed, and both groups will be able to move forward in the future. There is greater appreciation that mathematics must be relevant if it is to occupy its deserved place in a developing society. Serious discussions of relevance were started on a much sounder footing than previously existed. An interesting by play developed when one person praised mathematics for its ability to be universal - i.e. culture free. This was followed by the challenge to discuss a possibly "culture-rich" mathematics on the ground that such discussion might lead to greater relevance.

A dramatic new insight came in the afternoon discussions. For the first time in the experience of these persons they were asked to separate into small groups of about 7, and to discuss specific ideas. Several formats were tried. These included a brief review of class lectures with suggestions for the attenders to discuss, short talks on new topics with a number of small questions for specific discussion. Toward the end of the conference time was very precious for discussion of necessary ideas in Secondary C, so to a certain extent the period became almost half lecture.

The most useful pattern for these sessions was for the entire group to meet. The lecturer would then raise a number of questions involving an explanation or problem solving relating to morning lectures, or even a new topic. After 15-20 minutes, the group separated into the small groups.

Each group tended to have an informal leader who posed the questions and made suggestions. Each group talked about the topic interesting it most. Each individual expressed himself.

It would be impossible to list all the topics discussed. They included computation in different numeration systems, solving equations in modulo numbers, developing the group of symmetries of a Δ , and solving pairs of linear equations.

From a practical point of view the afternoon discussions were the most valuable period in the Institute. Participants were able to explore their own thinking and thus get a better appreciation of what Modern Mathematics meant for them.

A staff member, or two, or three would circulate among the groups clearing up difficulties which could not be answered by the delegated themselves. There is a great temptation for the circulating lecturer to want to lecture rather than clear up felt difficulties. It is important to resist this temptation.

I would strongly urge that more of such small self-led discussions be included in future workshops with the possible structures explained in detail in advance to those leading the workshop.

There were some difficulties because the texts did not arrive at the start of the conference, despite the air line promises. The supplementary books sent from Los Angeles were well received. There was a good supply of books from local Dar sources as well. Phythian was told to contact Weinstein about the ultimate disposal of the books sent from L.A. However I suggested to him they be used locally, then sent to Mombasa for the summer conference.

One of the good things about the program was that all three of the Dar University mathematicians and two of the Institute of Education Lecturers appeared on the program. This introduced them to the secondary mathematicians. However this loaded the program heavily with little time for personal study by the participants. Also some of the local mathematicians felt the secondary mathematicians needed advanced ideas of little bearing on their teaching of Entebbe Mathematics in order to "Enrich their Background." In general conferences need more attention paid to achieving self-motivated learning by participants, and less to exposure.

After the program started some changes were made. More time was actually devoted to Entebbe material. Many of the lecturers planned by the local staff were drastically changed to make them more relevant. Instead of talking about topological spaces, for example, Woodhouse talked about Euler's polyhedral formula, and the Jordan curve theorem - both topics which appear in Entebbe Secondary C.

This underlines that a vital part of the ABC Conference in Nairobi in Summer '66 should be on structuring Institutes with thorough discussion of ways to encourage participants to react and to share what they learn. The format of lectures given by visiting experts is weak for Africa - there aren't enough visiting experts. Patterns for self study and mutual encouragement and stimulation need development.

The weather was hot and humid. Fortunately a monsoon blew steadily. Still the heat did not encourage study.

A real high point to the Institute was the high quality and dedication of the leadership. Harry Cannon, of Science Education from the University of British Columbia also attended many of the lectures.

Phythian has made a long term commitment to Africa and African education. He is a non-professional christian missionary also, like John Gay. He works hard, and pragmatically. He is a good administrator. Woodhouse is competent and willing to change to meet the needs of the people. Roberts is able, an excellent mathematical theoretician, one of the reasons for Reed's success. Beninati is enthusiastic. He will be a good help in interpreting Entebbe mathematics, but he does not have a deep mathematical background. Charles Pratt as a audio-visual expert has some top quality ideas, with high standards for achievement, but little math background. Harry Cannon is a dedicated enthusiastic Science educator whom I'm glad to see in the Entebbe Science Workshop.

Among the participants, in general the expatriates and Asians stood out ahead of the Africans.

Among those persons Phythian and I suggest for future use by E.S.I. are:

1. Francomb, Mr. P. R. - Able expatriate, British, thorough knowledge, fine personality - At Marangu Teacher Training College.
2. Dunstan, D. (Fr) a highly motivated, sensitive person. He is head teacher. He answered questions well, was liked by others. He is the best non-European. He is Asian.
3. Swinton, S. - European - young, able.

Two Africans.

4. Odiambo, A. - weak math background, but answered questions well. Speaks easily. Kiviro secondary school, Private Bay, Mahenge.
5. Pole, B. - Tabora Boys School - asked and answered questions well.
6. Berg-Sonne, N. - Dane with 2-3 years in Tanzania, - competent
7. Campbell, J. D'arc. Sister, Catholic
8. Heard, T. - organizer of Math. Assoc. of Tanzania, young, European.
9. Laiser, N. - African, good math knowledge, at Technical College. May not have as good knowledge of secondary schools.
10. Leyland, K. - European - good, may be in Tanzania only a short time longer.
11. Martin, D. - European, good.

There is a great need for books in Tanzania. There is an enthusiasm for adopting Entebbe Math, but some of the enthusiasm is because the books are free as well as the type of program. The Primary program is well accepted. Leaders look forward to Secondary C because they feel the books are more helpful for the teachers to teach.

The SMP is attractive to some because it appears to have an Exam already set, and to fit East African school patterns.

There was a brisk inquiry, especially from the Asians, as to what Entebbe planned for "additional maths". Traditionally Additional Maths is a more advanced math. The SMP additional math is to be mathematics for art, biology, and so on.

While on the plane out I was shown a list of the participants at the Pugwash Conference to be held at Addis Abbaba, on education in developing countries. There was no one on the list connected with E.S.I. so I called Ted Martin to see if there was an oversight. It appeared that one of the persons had been briefed on E.S.I., which relieved me. I hope the Pugwash conference did get the full story of the things E.S.I. has learned.

I saw Ella Williamson at Dar. She is planning on leaving Dar in November.

Mohamed Bashrahail's address is P.O. Box 715 Zanzibar. I wrote him at his school, Bububu school, and received a reply about 12 days later. I found it was possible to visit Zanzibar as a tourist, by taking a tourist tour. However this would not have left time to see M.B. It is possible to get a business visa, with about 2 weeks time. I pulled all strings I could, but I had no way of contacting M.B. except by telegram to his P.O. Box. While I did not see him, I feel that the next visitor to Dar should definitely do so. He should write M. B. to determine whether a business visa is possible and convenient, or a tourist visa, with M.B. meeting on a bootleg basis. If there is sufficient lead time, I think a business visa is possible with no damage to M.B. It would certainly be possible to have Mike Kinunda or Ted Phythian make the actual arrangements so M.B. would get no mail from the U.S.

The Ministry of Tanzania claims that it was an oversight that no one from Zanzibar was invited to the Institute. This is a tragedy. Next time we should ask if specific steps have been taken to include Zanzibar, and not just assume that the political situation prevented it. If an invitation had been sent, I think someone would have come.

M. B. would like to use Secondary C, I think. Phythian is not saving any books for Zanzibar, so some thought will be necessary about books for there.

Living accommodations at Dar were fine. Participants stayed in the new dorms which are adequate. I spent most of the time with Phythian riding his Vespa to classes. When Thwaites came I was invited to Harry Cannon's, since Thwaites was to stay at Phythians. Thus I was not so close to the participants, but I was able to sleep. The dorms are pretty noisy. We considered my staying at the Kilimanjaro, but decided against it.

Everyone agrees that Modern Math is here for Tanzania. E.S.I. is given the credit for this achievement. The books and approach which will be most useful will be those which can do the job, and which are easiest to use.

It was a fine Conference and I was privileged to represent E.S.I. there.

Paul B. Johnson
Associate Professor
Mathematics Department
University of California
Los Angeles, California

PARTICIPANTS OF SECONDARY SCHOOL
Dar es Salaam
MATHEMATICS INSTITUTE

JANUARY 2nd, 1966

D. J. BREEN	E. MASSALA
R. BROOK	F. R. M. MLAY
Sr. J. d'ARC	A. MULUNGU
Sr. M. CHANEZ	K. K. NAIK
A. E. S. DE SILVA	V. M. N. NAYAR
Fr. D. DUNSTAN	A. NEWA
Fr. G. EIBL	A. ODIAMBO
P. FRANCOMB	P. F. PANCHAL
G. CABRIELSON	C. D. PATEL
M. GYUNDA	J. J. PATEL
A. HANGI (MISS)	R. PETRICKA
T. HEARD	PHILLIPS
T. V. JACOB	G. K. PILLAI
I. A. KABIR	B. POLE
M. KASAMBALA (MISS)	C. PRATT
M. J. KINUNDA	J. B. ROBERTS
A. J. KITONDA	S. SWINTON
F. KUSACA	A. TAYLOR (MISS)
Bro. LAWRENCE	N. A. WALLI
K. LEYLAND	D. WOODHOUSE
J. MAKOYE	R. MWAJOMBE
D. MARTIN	

TANZANIAN SCHOOLS

The following schools are starting to use the Entebbe Mathematics Secondary C1 books this year:

	<u>Number of Streams</u>
Alliance School, P.O. Box 47, Dodoma	2
Dodoma Secondary School, P.O. Box 32, Dodoma	2
Kazima Secondary School, P.O. Box 369, Tabora	4
Kibaha Secondary School, P.O. Box 2530, Dar es Salaam	2
Korogwe Girls' School, P.O. Box 5, Muheza	3
Kwiro Secondary School, Private Bag, Mahenge	2
Marion College, P.O. Box 40, Morogoro	2
Rosary College, P.O. Box 710, Mwanza	2
St. Mary's Secondary School, P.O. Box 356, Tabora	2
St. Joseph's Convent School, P.O. Box 9052, Dar es Salaam	2
Tabora Girls' School, P.O. Box 152, Tabora	2

The following training colleges are starting to use the Entebbe Mathematics Secondary C1 books this year:

Changombe Teachers' Training College, Box 2329, Dar es Salaam	1
Narangu Teachers' Training College, P.O. Box 9, Moshi	1
Morogoro Teachers' Training College, P.O. Box 640, Morogoro	1
Mpwapwa Teachers' Training College, P.O. Box 34, Mpwapwa	1

REPORT OF LECTURING AT COMPREHENSIVE HIGH SCHOOL, AIYETORO
W. NIGERIA CONFERENCE FOR SECONDARY SCHOOLS MATHEMATICS TEACHERS

April 25 to May 10, 1966

I arrived in Lagos in the evening of Monday, April 25, where I was met by Mr. Joseph Pavlovich the director of the Institute. We then drove directly to Aiyetoro, as to go in to Lagos and then out again the next morning would have been time consuming and more tiring. It was well after 11:00 PM when we got to Aiyetoro and midnight before I was in bed, at the Sorensens' home (as chief of the Harvard Party he put me up).

On Tuesday Pavlovich, Richard Little and P. Ogunbunde and I talked a bit about the proposed courses. I made tentative plans for my first few lectures and later in the day prepared the first of the daily dittoed sheets that were to accompany my lectures. I was to lecture on "functions" and the others to give a course entitled "algebra" but which was really an examination of the number system. As it eventually turned out the two courses fitted together remarkably well, complementing each other in many spots.

On Tuesday evening we were a bit discouraged. Only about 19 participants were on hand - and many of those had very little, or no, money. (I cannot urge too strongly that future institutes be properly funded from the start. Nevertheless, in spite of the shoestring character of the project, I think it was worth all the time and effort spent. A start has been made on the establishment of internally operated teacher institutes.)

The first lectures on Wednesday saw a few more participants and both lecturers and participants unsure of themselves. Gradually, we (lecturers and participants) acquired a feeling about the other - and there was often lively discussion about our mathematics. I was gratified because I was worried that these teachers would be as passive as their students often are. So we had a good time - and by the end of the week there were 31 present.

From then on life was rather smooth. Lecture preparation, lecturing and conversation with the staff at Aiyetoro kept me fully occupied - or almost. The Institute had to be shortened to but $2\frac{1}{2}$ weeks because several participants had to hurry back to teach their classes. One man had been on a train 5 days to get to Aiyetoro! So when I left on Tuesday afternoon there were but 3 lectures left in each of the courses. On that last day I was very pleased and surprised to receive a gift from the participants and staff.

In addition to my lectures on functions, the formal course, I also gave three lectures on Euclidean geometry on three afternoons. It so happened that these fitted remarkably well with the invited lecture by Professor Farkas of the University of Lagos.

I arrived back home on Wednesday, May 11.

Merrill Shanks
Professor of Mathematical
Science
Purdue University
Lafayette, Indiana

LECTURERS AT THE ABC INSTITUTE

Nairobi, July 1966

Professor Andrew Mattei Gleason, Department of Mathematics
Harvard University, Cambridge, Mass.

Professor Donald E. Richmond, Department of Mathematics
Williams College, Williamstown, Mass.

Professor B. J. Pettis, Department of Mathematics
University of North Carolina
Chapel Hill, North Carolina

Dr. Grace Alele Williams, Institute of Education
University of Lagos, Lagos

(The ABC Institutes are financed with a grant from the Ford Foundation)

Provisional List

A and B Group Participants at the ABD Institute, University College, Nairobi

July 1966 and July 1967

Ghana

Mr. A. D. Mortagbe, B. Sc., Government Secondary Technical School
P. O. Box 252, Takoradi
Mr. E. B. Dogbe, B. Sc., Government Secondary School, Tamale
Mr. S. E. Amissah, B. Sc. Government Secondary Technical School
P. O. Box 252, Takoradi

Liberia

Mr. T. Blamo Snoh, Kataka Rural Teacher Training Institute, Kakata
Mr. William Momolu, Zorzor Rural Teacher Training Institute, Zorzor
Mrs. H. J. Summerville (returning from San Francisco State College to Liberia)
Mr. Joseph Bettie, Laboratory High School, University of Liberia, Monrovia

Malawi

Mr. A. E. Gadama, St. John's Teacher Training College, Lilongwe
Mr. F. N. Tembo, Robert Laws Teacher Training College, Embangweni
Miss L. Mileme, Kapeni Teacher Training College, Blantyre

Sierre Leone

Mrs. M. Greene, B.A., Dip, Ed., Annie Walsh Memorial School, Kissy Road
Freetown
Miss F. C. Hedd, B. Sc. Dip. Ed., Secondary Technical School
Congo Cross, Freetown
Mr. J. Sawyerr, B. A. Dip. Ed., Prince of Wales School, King Tom
Mr. M. C. Khalu, Inspector of Schools, Ministry of Education, Freetown

Tanzania

Mr. Alfred Nawa, Teachers College, P. O. Box 34, Mpwapwa
Mr. G. Mizambwa, Teachers College, P.O. Box 640, Morogoro
Mr. Michael Muze, Shinyanga Secondary School, P.O. Shinyanga
Mr. R. Mwajombe, Mathematics Unit, Ministry of Education,
P. O. Box 9121, Dar es Salaam

Uganda

Mr. J. K. Kahwa, St. Augustine's Teacher Training College, P.O. Butiti
Mr. W. O. Isiagi, Bishop Kitching Teacher Training College, Box 3020, Ngora
Mr. H. Kasule, Namutamba Training College, P.C. Box 332, Kampala

C-Participants at the ABC Institute, Nairobi, July 1966 and July 1967

- Mr. Robert A. Ampomah, University College of Science Education,
Cape Coast, Ghana
- Mr. Aloysius Farrah, Mathematics Dept., University of Liberia
Monrovia, Liberia
- Mr. P. M. Igboko, B.A., M.Ed., Education Department, University of Nigeria
Nsukka, Nigeria
- Mr. J. S. Jackson, B.Sc., B.A., Mathematics Department, Madingley Hall,
Cambridge, England (of Ghana)
- Mr. E. M. Kizza, B. Sc., Mathematics Dept., The University College,
Nairobi, Kenya
- Dr. Yohannes Menkir, Mathematics Dept., Haile Selassie I University
Addis Ababa, Ethiopia
- Mr. Ade Okuneye, Mathematics Dept., University of Ife (Ibadan Branch),
Ibadan Nigeria
- Mr. Akbar Rhemtulla, King's College, Cambridge, England (of Tanzania)
- Dr. John Simbo, Mathematics Dept., Fourah Bay College, Freetown,
Sierra Leone

(as at 4/15/66)

