47.

Non-Capital Project Paper (PROP)

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African Primary Science Program (PROP)

Preface: Under an A.I.D. research and development contract, the Education Development Center (EDC) has developed science curriculum materials cooperatively with African educators and initiated training programs for African teachers. It has also introduced into a number of African countries new methods of science teaching. This proposal sets forth a five-year plan for the implementation phase of the African Primary Science Program (APSP).

A. Summary Description

If the African nations are to achieve their goals for development, a sound grasp of scientific phenomena and problem solving techniques is considered essential for sizeable portions of the population. Until the inception of this program the primary science curriculum in most African countries ranged from inadequate programs to complete neglect. It was felt that a new curriculum development program, involving Africans from the start, would not only produce superior instruction in primary school science but would also demonstrate an effective process whereby reforms in other subjects could be affected.

The program has now reached the point where it is ready to move from research and development, which by its nature was limited in terms of widespread introduction of materials into African classrooms, into the implementation phase. Detailed planning for the first two-year period of the implementation phase beginning July 1, 1971 is set out in this continuation proposal within the following framework: (1) Methods for introducing the

variety of developed materials into the schools of the participating African countries -- Sierra Leone, Ghana, Uganda, Kenya and Tanzania -- are advanced. The plan is to achieve this by concentrating on the development of materials for tutors to use in their courses in the 151 participating teacher training colleges and on the training of the science tutors (one for each college) in the use of these materials so that all new primary school teachers graduating from the colleges will be exposed to the APSP materials and teaching methods. At the same time training of primary teachers already in service in the use of APSP materials will also be carried out but this will not call for major EDC assistance. (2) Ways are identified for strengthening the bases of curriculum development in science in various parts of English-speaking Africa so that the development process can continue. Continuation assistance is sought for local curriculum development efforts where sufficient talent and finance are not yet available to assume the complete task. Locations have been identified where modest additional input would appear sufficient to place local efforts on a more self-sustaining basis within the five-year period contemplated by this proposal. Ways are outlined which encourage nations to cooperate in their efforts toward curriculum improvement. (3) Plans are set forth for moving toward African direction of all science curriculum development work. An African based and directed organization,

Science Education Programme for Africa (SEPA), has come into being within the past year. Considerable effort will be expended in the two year plan outlined to make this organization viable and independent.

One of the most effective ways to enhance SEPA's future is to help it broaden its base of support among African nations which had not previously participated actively in the APSP. Ways of involving newly interested countries are examined and proposals made.

SEPA does not look solely to USAID for its future. Funding from participating governments has been sought with some success. Modest support has already been received from UNESCO and a promise of support from the British Centre for Educational Development Overseas (CEDO) has been made. Other funding is being actively sought.

B. Project Goal:

The long range objective of the program is to provide primary school leavers with a certain body of basic scientific knowledge which is relevant to African development and to develop certain characteristics in the children that will carry over into their adult lives; i.e., helping them learn to become persons who are questioning, innovative, self-starting, resourceful, flexible, collaborative, and who have other traits associated with a scientific approach to solving the problems faced in everyday life.

C. Setting:

The African Primary Science Program began in February 1965 at a meeting of African and American educators in Kano, Nigeria. The purpose of this meeting, jointly sponsored by the USAID and the Ford Foundation, was to develop a strategy for examining in the African context some of the new ideas in teaching science emanating from the United States and the United Kingdom. This science project followed an earlier Mathematics program as part of an African education program that had been conceived at Endicott House in Dedham, Massachusetts in 1961. Prominent African educators had gathered there to consider priorities in educational assistance for the decade of the sixties.

Concern with primary school science was given high priority by African and American educators as, in their collective judgments, it appeared to offer the most promising way to alter significantly teaching and learning styles in Africa. This was considered important in combating the fatalistic attitude toward life considered so prevalent in Africa. It was felt that if Africa was to deal with its problems realistically, it must develop a citizenry increasingly able to acquire a sense of control of its environment.

The African Primary Science Program began as a research project to determine the extent to which new ideas could be

developed and adapted to be relevant to Africa's situation. The first task of the project was to determine a strategy for examining these new ideas critically and for undertaking a program of change.

This strategy involved two major strands: development of science curriculum materials and development of institutions to provide for a continuing process of curriculum reform. Although the project had originally been conceived as embracing Sub-Saharan English-speaking Africa, specific countries in which the Program was to operate were not defined at the beginning. Rather, the Program determined, through a series of meetings with Ministry of Education officials of the various governments, where opportunities for trial of these new ideas was to be most promising. Seven countries, representing a variety of local conditions, were identified.

French-speaking Africa was excluded in the beginning. It was recognized that the system of education in the former French Colonial world was different from that existing in the former British colonies. To grapple with these differences, not to mention the differences in language, seemed to the original planners to be unwise and premature.

During 1965 and 1966 negotiations were undertaken with the Ministries of Education of Ethiopia, Liberia, Sierra Leone, Ghana, Nigeria (Western, Eastern, Mid-West, Lagos, and Northern Regions), Kenya, Uganda, Tanzania, Malawi, and Zambia relative to possibilities for undertaking an initial trial effort under this Program. Discussions centered around the possibility of jointly locating expatriate and

local Program personnel at mutually agreeable host institutions for the purpose of undertaking development and trial testing of new science materials appropriate for primary school age children. As a result of these negotiations, development efforts were eventually begun in Sierra Leone, Ghana, Eastern, Mid-Western and Lagos Regions of Nigeria, Kenya, Uganda, Tanzania, and Malawi with the various activities beginning at different times.

The early stages featured a heavy emphasis on materials development. It was felt that until materials were available for actual trial use in classrooms, it would be difficult to convey the import of what the Program was attempting to do. Three international workshops were held in the summers of 1965, 1966, and 1967 to develop materials and ideas which could be tried out in various locations. An arbitrary target of 70 units covering discrete blocks of science was established. This was developed to provide approximately ten units for each of seven years of primary school. This target was subsequently modified to a more realistic figure of 50 units, as being all that was necessary to establish examples of a full sequence throughout the seven years of primary school. The 50 units also would give ample latitude for developing variations in the science program depending upon particular local priorities.

Coincident with the materials development effort was the stress on the establishment and development of local institutions tied

closely with the Ministry of Education. These science centers were to be responsible for developing, adapting and trial teaching new materials in science. The intent of the local effort was to encourage Ministries of Education to give active consideration to the deployment of resources to continue the work in curriculum development if they were to avoid continually playing the "Catch-up" game. It was viewed that a materials development effort itself, however good the result might be, was not enough. Unless there was some institutionalized process for keeping the development process in motion, for incorporating new ideas and information, in a short time the materials prepared would be as irrelevant for the work of the 70's as the materials now used in the schools are for the present. Thiswas seen as particularly important in the sciences.

Determination of the effectiveness of new science materials developed by the Program was recognized as important. However, evaluation provided an unusually difficult problem since techniques for determining changes in attitudes and development of skills of inquiry had not been developed anywhere in the world. The function of the evaluation aspect of this project was less to evaluate than to learn how to evaluate. In this connection an evaluation effort has been under way since 1966 under the Chairmanship of Dr. E. A. Yoloye of the University of Ibadan,

Institute of Education. He has been coordinating the evaluation work of individuals in a number of participating countries and has been instrumental in identifying, developing and adapting measurement and observation instruments for determining classroom interaction. These instruments have been tried out in several trial situations, particularly Kenya and Sierra Leone. In Kenya, the evaluation project has been carried out by Program personnel, but, at the University of Njala, by staff personnel.

The current status of the African Primary Science Program is as follows:

1. Materials

Program objectives with respect to materials have been met. Over fifty units - teachers' guides, pupil books and science readers have been produced in Africa, each of which has been trial tested in at least two countries, and prepared in preliminary printed form for wider scale trial and use and consideration by the Ministries of Education for inclusion in their curricula. (See Appendix A.) Each unit is designed to occupy 6 to 12 weeks of classroom time. These materials are appropriate for all of the grade levels of the primary school and across the subject disciplines of science. Emphasis is perhaps more heavily on the biological sciences, but this is seen as relevant since the focus of the Program has been on use of the local environment in helping children acquire skills of inquiry.

In some countries, Program materials may be used in their present form. In other situations, local adaptations have been developed based on APSP. Which direction countries will take in the use of the materials remains unclear at this time. It appears that more experienced centers will more likely develop their own adaptations, of some of the materials while utilizing others in their present format.

2. Institution Building

Curriculum Development Institutions now exist in Ghana, Kenya, Malawi, Nigeria, Sierra Leone, Tanzania, and Uganda. All were either begun or expanded to include primary school science as a result of input from this project. (See Appendix B.) All projects are closely linked with Ministries of Education, operating under Ministry control or within another institution directed by Steering Committees including Ministry of Education officials. Local professional staff for the Program presently ranges from one person in Uganda to nine in Ghana. EDC Program personnel have been withdrawn from the Malawi Curriculum Centre after completion of the development program. This withdrawal was jointly agreed upon by the project and the Malawi Government. This Centre continues under Government auspices.

3. Science Education Programme for Africa (SEPA)

In furtherance of a contract objective, considerable effort has gone into encouraging African leadership for a continuing

Pan African effort in science education. Science Education Programme for Africa (SEPA) has come into existence through appointment of a governing Representative Council, an Executive Committee, an Acting Executive Secretary, adoption of a formal constitution and formulation of a plan of action. The SEPA Constitution (see TOAID A-147 from Uganda dated October 2, 1970) describes SEPA's objectives, functions, membership and organizational framework.

The latest Representative Council Meeting was held in September 1970 in East Africa with official delegates from 13 Governments present. Priority consideration was given at that time to the question of finance. It was agreed that participating Governments should be called upon to support a significant share of the continuing operating expenses of the Organization's secretariat and to make an immediate token constribution of $600 per country as evidence of interest. This contribution is expected by June 30, 1971.-/ By vote at the recent Representative Council Meeting, the secretariat moved to Accra, Ghana January 1, 1971, at the invitation of the Ghana Government. It was located at Ujala University since its formation. The specific location of the Secretariat in Ghana is yet to be determined, but the former quarters of the Ghana Academy of Science is under consideration.

(Note: Ghana has already come forward with its share).

A promising beginning has been made toward bringing together 13 different countries of English speaking tropical Africa with

a view to collaborating on continued curriculum development in science through Pan-African efforts and through support of individual country activities, with in the case of the latter, a major focus on the development of manpower resources and particularly the tutors in the teacher training colleges.

Realism would require acknowledgement that SEPA faces a difficult task. Although early indications are encouraging, whether African countries, beset with a myriad of priority problems in education, will see international cooperation in curriculum development as sufficiently important has yet to be fully answered. Nor is the reaction of other external agencies know.

Thus this proposal is designed to maintain the necessary program machinery, so programming can continue throughout the five-year period contemplated solely under EDC auspices, if necessary, without loss of momentum of continuity. Nevertheless, in addition to the usual annual review, the project should be thoroughly reviewed at the end of two-years to determine whether (1) output targets planned during this time phase have been satisfactorily met and (2) the African nations have demonstrated sufficient interest and support (financial, logistical, personnel) to warrant continuation of U.S. inputs.

D. Project Purpose/Strategy:

The purpose of this project is to carry forward the work of African Primary Science curriculum reform which began in 1965 under an A.I.D. research and development contract with EDC. The research and development phase of this program concentrated on the development of science curriculum materials and the development of institutions to provide for a continuing process of curriculum reform. The present implementation phase, proposed to begin in July 1, 1971, has as its objectives introducing the science materials which have already been developed into the schools of participating African countries, strengthening the institutional bases of curriculum development, and moving toward African direction of all science curriculum development work.

These objectives will be accomplished by concentrating assistance on the science programs and personnel at the teacher training colleges which prepare all new primary school teachers, continuing assistance in the development of local science curriculum development personnel to staff the curriculum development centers already established in participating countries, and assisting SEPA to become a viable, independent organization and to broaden its base of support among the African nations.

Alternate Program Strategies:

Serious consideration has been given to further strengthening the hand of SEPA even further than presently planned. This could

be done by providing for the employment of Science Educators by SEPA and permitting that organization to make decisions with respect to support of various in-country efforts at implementation. This would have the obvious advantage of enhancing the prestige and visibility of SEPA as an operating international organization, thus hopefully encouraging early and substantial support from the member governments.

This approach was abandoned for the time being on the basis that too much was being asked too soon. SEPA as yet has no separate financial existence of its own and in all probability this condition will continue for at least two years of its life. During that time attempts to broaden the basis of financial support will have been undertaken. Two years hence, EDC will have had the benefit of independent judgements of governments and foundations as to the long term viability of an international organization of this type. The basic issue of international cooperation in curriculum development will have been carefully examined.

As mentioned earlier, it seems prudent not to require that political decisions with respect to deployment of personnel be made by SEPA alone. EDC can make these decisions as part of its program continuation with less difficulty. Additionally, EDC

would be in a better position to capitalize on developments of the past six years in all participating countries by virtue of its Program experience.

Another strategy considered was to make Program Science Educator talent more broadly available to new and continuing countries by creating peripatetic Science Educator posts with responsibilities for several contiguous countries. This approach was rejected for two basic reasons.

First, Program personnel with responsibilities spread over several countries would not be adequate for the task ahead in our judgment. It would be preferable to see a job well done in a limited number of settings, than a more superficial job done more widely. Looking ahead to additional countries becoming interested in undertaking projects in primary science curriculum reform, this Program should do its best to provide a limited number of alternate ways of working that might be considered for adoption or adaptation. The one exception will be the second person assigned to Ghana who will serve as SEPA training officer and will, therefore, work with trainees from all participating African countries.

Second, it we felt unwise to convey the impression of diminishing Program interest in countries where significant input has been available for some time. This could be interpreted, with possible negative effect, as failure of follow-through effort on the part of an American based program.

The program is most conscious of the high cost of expatriate Science Educator personnel. For the same funds proposed for

employing U.S. personnel, double the number of Africans could be made available. To the extent that qualified Africans are available, the program would plan to move in this direction. However, experience to date suggests that it is not yet realistic to think in terms of total Africanization of staff, desirable as it may be. Moreover, it could be argued that should qualified Africans be available, they could be of greater benefit to the development of science education in Africa by continuing in their respective countries. Even so, it is to be hoped that as SEPA takes over greater responsibility for continued programming, there will be an increasing recruitment of African professional personnel.

Commitment to Continuation:

It must be emphasized that all negotiations undertaken at the beginning of this project and indeed the focus of the project itself were on obtaining permission and cooperation from various African Ministries of Education to undertake a research and development program in a pre-commitment atmosphere. No Ministry, by permitting development and trial use of materials, was committing itself to widespread use of materials in its schools. The following constraints were present:

a. Few Ministries have been in a position to consider widespread adoption of materials until it was apparent that sufficient variety

was available for all primary grade levels. Appropriate materials for all grade levels were not available until late 1970.

b. Ministries had need to consider how primary school science could be fitted into the present curriculum schedule. In many countries, science has notbeen a part of the primary school curriculum. A lengthy process would be required to reschedule the school day to allow for its teaching.

c. All countries were properly concerned about introducing new materials into the schools without understanding the full consequences of the teacher training problem which would necessarily follow.

d. Few ministries were prepared to commit themselves to introducing science into primary schools without understanding better what "learning" would in fact be taking place. They needed at least initial results of the evaluation effort to determine whether the inevitable upheaval which would accompany the introduction of new subject matter into the curriculum would be worthwile.

e. A further economic decision would be required as well. Apart from the training and retraining of teachers, the introduction of a new subject involves the commitment of additional resources for printed materials and simple science apparatus.

Briefly, the hurdles to be crossed before commitment to implement could be obtained were high and numerous. Substantial progress, however, can be reported.

Ghana has shown perhaps the most ministerial commitment to the introduction of new primary science materials into its schools. A primary science unit is operating as an integral part of the Ministry of Education under the direction of the Assistant Chief Education Officer - Science. Nine local professional people and a Program Science Educator make up its present staff. Active work is under way in reorienting the teaching of science in the nation's 82 teacher training institutions with a view toward introducing APSP materials into Ghana's schools through pre-service teacher training. APSP units are currently on the accepted list of educational materials which may be purchased by schools throughout the country. This suggests that the Ministry is preparing to supply these materials on a large-scale basis.

Kenya Ministry of Education commitment to introduce lower primary materials encompassing primary Grades 1- 4 throughout the country on a one grade a year basis over the next four years is under active consideration. Further, the Ministry is presently considering adoption of a new primary school science syllabus based on APSP unit materials.

Malawi. Science based on local adaptations of primary science materials developed by this project is now being taught in all primary schools in Malawi for Grades 5, 6 and 7 with plans for introduction into Standard 8 in 1971.

Nigeria. Promising efforts in the former Eastern and Mid-west Regions were terminated due to the Nigerian Civil War in early 1967. However, development has continued in the West under the direction of Nigerian nationals at the Universities of Lagos, Ibadan and Ife. Program materials or adaptations are widely used in Lagos City Council schools and in teacher education at the Universities in Western State.

Sierra Leone. A Science Curriculum Development Centre has been in existence for over four years. Located at Njala University, the Centre is under the direction of a Ministry appointed Steering Committee. Local staff personnel are working at the Njala Centre and two sub-centres have been established to service teachers, one in Bo and the other in Freetown. The Ministry of Education plans adoption of APSP science materials for use in Sierra Leone's schools and is moving ahead at both pre-service and in-service teacher training levels.

Tanzania. Heavy emphasis on pre-service teacher training is seen as a necessary pre-requisite to wide-spread use of new science materials in the schools. All Grade A training colleges in the country are now using a science curriculum based primarily on African Primary Science Program materials. These colleges are now graduating 300-400 teachers a year who are gradually moving throughout the country prepared to teach science in the

new manner. Seminars are being held for the science tutors from all teacher training colleges. At the same time training courses for primary school teachers already in service are being conducted. Tanzania is also continuing with its program of translation of unit materials into Swahili.

Uganda. Ministry officials concerned with science have shown an active and increasing interest in APSP materials. Widespread trial use of materials has been undertaken through the country, with the encouragement of the Ministry. Seminars for primary teachers and for teacher training college tutors on the use of the materials are being held and preparation of a new syllabus based on the materials is under active consideration. Although a formal commitment has not been forthcoming for adoption of materials developed, prospects are considered good over the next two years.

Other Interested Countries. The Government of Ethiopia has been interested for over two years in cooperating more fully with the Program and in having a Program Science Educator assist in the development of appropriate curriculum for Ethiopian schools. Ethiopia is currently actively considering APSP materials for broad scale use either in present or adapted form.

Other countries showing increased interest are: Botswana, Swaziland, Lesotho, Zambia, Liberia, and The Gambia.

It appears that countries now participating in the Program are spread along a continuum of progress in science curriculum development. Several will be ready during the next 5 years to take over full direction of their own in-country effort without recourse to further program assistance. The differences reflect partly the difficulties in getting programs started. But they also reflect variations in locally available resources.

Other Donor Support

SEPA will be actively searching for program funding from a variety of national and international agencies. It is intended that USAID would supply only a portion of the necessary funding for the total program envisaged by SEPA. The SEPA Representative Council has outlined a five year program of international activities which will depend upon extensive additional external support. CEDO has decided to make financial support available to SEPA for on-going expenses. UNESCO has already made a token contribution to on-going programming with favorable indication that support could be expected to increase in the future. This contribution is in the form of assigning personnel to the Science Curriculum Development Center in Kenya. Their efforts which are needed will be coordinated with SEPA and are complementary to EDC activities.

E. Planned Targets and Course of Action:

Plans for continuation beyond July 1, 1971, are examined in the context of: (1) participating Ministry interest and commitment toward continuation activities, (2) continued input required from foreign technical assistance to provide the "critical mass" for various in-country efforts, and (3) the possibilities for enhancing the viability of SEPA.

Methods for Introduction of New Materials - Teacher Training

Program activities over the period of this proposal will focus on teacher training. Program materials have been proved in trial class situations; emphasis must now be on helping teachers to use them. The necessary in-depth exposure to materials and methods can best be accomplished at Teacher Training Institutions over an extensive period.

But work at the Teacher Training Institutions must begin with the science tutors. Tutor courses and workshops have been conducted on a trial basis at selected institutions over the past six years. This effort now needs to be broadened to include more Teacher Training Institutions. In the past, science tutors have been mainly expatriates thus hampering the long-term effectiveness of any training. Efforts to fill science tutor posts with local personnel have significantly reduced the percentage of expatriates now teaching, but this "nationalization' must be accelerated. Identification and training of additional manpower is thus seen as a major thrust of the program. This program will focus on the 151 tutors located at the same number of teacher training colleges as follows: Sierra Leone (8), Ghana (82), Uganda (24) Kenya (25) and Tanzania (12).

Teachers-in-training must be helped to gain a broader understanding of science so that they, in turn, may better help their pupils. If tutors are to be effective in their work with students, materials which provide learning opportunities beyond those available in the APSP units for primary school children are a necessity.

Continuing materials development is viewed as an essential and integral part of any program seeking to produce fundamental changes in attitudes toward teaching and learning. Such a component gives life to the concept of development as a process. It allows for the nurture of creative skills, and experience has amply demonstrated that engaging in the development process is one of the most fruitful ways to help tutors and teachers deepen their own understanding. It is also an effective modus operandi for implementation.

It is planned that a development program be undertaken beginning in the first summer to produce a two/three year course in science for training colleges. The course would capitalize heavily on APSP materials already available by looking in greater depth at their learning possibilities. Indeed the first year might well be familiarization with classroom materials now completed. But the training colleges course materials would attempt to develop a greater understanding of the science embodied in APSP materials.

A workshop at which the best tutors from African Teacher Training Colleges came together with Program science educators and a small cadre of African and American university scientists in the various subject diciplines of science is viewed as the most effective way to begin. A set of trial materials designed to be used during a portion of the first year of teacher training would be the objective of the first workshop. They would be tried out selectively in participating countries and subsequently modified according to experience. A second workshop would be scheduled in the following year to focus on the second year of the training college curriculum and to modify the first year's work. A third workshop would be envisaged to develop materials for the final training college year if this were seen as a need by participating ministries.

Efforts would be made to include consideration of the varieties of education technologies now available. Because the training college has the necessary facilities, it is seen as the most useful setting for considering the possible employment of television, audio and video tape, programmed instruction, and other techniques designed to enhance individual learning.

Planning for the most productive use of workshop time and effort is a necessity. It is now envisaged that a small planning

group would convene in April 1970 to develop a detailed outline of the overall plan for materials development and to establish specific goals for the first workshop.

The time table for these workshop activities is as follows:

April 1971	- Planning meeting for summer, 1971 workshop.
Summer 1971	- Workshop to produce materials for the first year's course at teacher training colleges.
1971-72 School Year	- Tryout of workshop materials in selected teacher training colleges
Summer 1972	- Workshop for second year's course 1/
1972-73 School Year	- Tryout of materials
Summer 1973	- Workshop for third year's course 1/
1973-74 School Year	- Tryout of materials
1974-75 School Year	- Materials in all colleges for implementation.

Appendix C outlines further extension of the development component beyond the two years set forth in detail in this proposal. It would be the five year objective of this development activity to see a high proportion - if not all - of the new primary teachers graduated by the training colleges prepared to teach science in new and creative ways.

1/ Note: Modifications to materials tried out during the school year to take place at summer workshops.

The pre-service approach to teacher training provides for better institutionalization of the process of training in new and innovative ways. This is important if momentum is to be continued following expatriate withdrawal.

Massive in-service training, would require large additional numbers of staff, many of whom would not be sufficiently familiar with Program work and materials to handle the task satisfactorily. In our judgment, this is the very point at which implementation could fail if not recognized. Use of imaginative Program materials in old and conventional ways would succeed only in replacing old materials with new. Rarely can this approach alter the patterns of learning and teaching the classroom which APSP seeks to foster.

Continued EDC Role

If the Program is to continue to assist development efforts throughout Africa, it will become necessary to continue Program personnel for varying periods of time as part of the implementation phase of the current project. A five-year program of gradually decreasing science educators' presence is visualized as Ministries of Education take on full responsibility for in-country work. Decisions with respect to deployment of personnel will be made in concert with SEPA. This joint decision-making process has the advantage of not burdening SEPA with the political problems inherent in the deployment of a limited number of Science Educators. The plan is to continue four Science Educators in the field, with two in Ghana, one in Tanzania and the fourth either in Kenya or Uganda. These people are being stationed in countries which still have

need for expatriate input to further assist the local primary science effort, and to proceed with the organization and conduct of the pre-service teacher training, the fundamental thrust for the period ahead. The one exception is the second man assigned to Ghana as SEPA Training Officer.

Role of Science Educators

Science Educator activity during the two years considered in detail by this proposal will be concentrated on the following tasks:

1. developing course materials in primary science suitable for inclusion in the syllabuses of Teacher Training Colleges (beginning with the summer 1971 workshop),
2. training and developing of Teacher Training Colleges science tutors in APSP methods and materials. The best tutors from each country will attend the summer workshops. In January of each year following the summer workshop they, in turn, will hold workshops within their own countries, assisted by the Science Educators, for the other tutors in which they will modify the summer material to fit their country's specific situation and will teach the tutors how to handle the material. Additionally, the Science Educators will visit all teacher-training colleges on a continuous basis to work with tutors,
3. continuing in-service teacher training activities in primary science where circumstances warrant. Assistance for Teacher Training College Tutors in conducting in-service programs

for primary teachers as part of their development would be one example of an appropriate activity. The amount of time the Science Educators will devote to this activity will depend on the situation in each country; i.e., in countries where there are many teacher training colleges and, therefore, many tutor's to be trained, less time will be available for work with primary teachers. In any case, primary teacher training must remain the principal responsibility of school inspectors and college tutors,

4. consulting with Ministries of Education, as needed and as time permits, on logistical problems of supply and distribution of software and hardware materials for primary science throughout school systems,
5. continuing assistance in development of local curriculum development personnel.

As countries are only beginning to make decisions with respect to implementation, it is most difficult to be precise at the present time about locations where EDC presence would most profitably be continued. In West Africa, Sierra Leone is far enough along that it is not considered necessary to continue to station an American science educator there, although an APSP presence in the form of a local educator modestly supported by the program might be desirable. This possibility is currently under review. It is contemplated that the present EDC Science Educator in Ghana will continue into the implementation phase of the program there and will be joined by a second Educator who will be responsible for training activities (see next section on Training). Tanzania, Kenya and Uganda are reasonable prospects for East Africa. These location decisions can only be worked out after careful resolution with local Program

personnel in conjunction with Ministries of Education, while taking into account current developments in these various countries. These decisions would be influenced by specific Ministry plans for the introduction of science and the need for personnel to carry out these plans. Resolution of all location issues would be sought by April 1971.

Training

The supply of skilled curriculum developers continues to be a serious problem in Africa, as indeed it is elsewhere. No program which seeks to help create change in schools through the development of relevant and timely teaching materials can ignore this problem. And indeed continued implementation of programs is based more upon human resources than upon up-to-date curricular materials.

Exposure of staff personnel to the curriculum development process through both local and international workshops and meetings is seen as one useful way for people to develop requisite skills. However, a method for providing more sustained opportunities for learning is seen as necessary for successful internalization.

This proposal seeks to establish a base in Africa, preferably in Ghana, under SEPA/NDC auspices in cooperation with the Ghana Ministry of Education, where curriculum personnel from various countries can come to work on ideas in interaction with others. These persons would primarily be drawn from the ranks of the

present underqualified staff members of existing curriculum development centers but may also include tutors, supervisors or even selected primary teachers. It is contemplated that the EDC staff member will be assigned to Ghana under this proposal as SEPA Training Officer to work jointly with the Ghana Elementary Science Unit and SEPA. He will be responsible for the organization of training opportunities for these curriculum development specialists from other participating countries (estimated at ten persons per year) in the context of the Ghanaian schools. These specialists would come to Ghana on residence courses of approximately ninety days duration per year for each of the five years of the proposed program with the first group beginning on or about January, 1972.

This training program would develop along the lines of the pilot program for three Ghanaian curriculum developers who are currently in residence at EDC on a combination work/study program under USAID/Ghana sponsorship. It is felt that such a program should more appropriately be carried on in Africa where conditions are nearly parallel those of other African countries. Such a plan would also avoid the inevitable pressure for more academic credentials on the part of participants who have the opportunity to come to America. And costs of operating such a program would be considerably less than for a similar project carried on in the U.S.

Program Support for the Science Education Programme for Africa (SEPA)
USAID

It is also proposed that continuing costs of the Secretariat, principally the salary, allowances, and travel expenses of the Executive Secretary, would be financed under this renewal proposal for a period of two years. Efforts are now under way to encourage governments to underwrite as much of their costs as possible during that period. To the extent that this effort is successful, Program commitment would be reduced. It would be the Program's objective to have support for SEPA's Secretariat for the most part eliminated by the summer of 1973.

Working with other Program personnel, the Acting Executive Secretary (SEPA) will have responsibility for:

raising the necessary government financial support for the SEPA Secretariat,

undertaking discussions with other governments in English and French speaking Africa relative to their participation in and support of SEPA activities,

obtaining financial support from other international agencies, organizing and coordinating international program activities to be conducted under SEPA auspices,

providing pedogogical and substantive support for in-country implementation efforts as required, exploring possibilities for inter-relationships with other curriculum development projects currently active in Africa.

All the above activities are scheduled to get underway by July 1, 1971.

In addition to Secretariat support, it would seem important to encourage SEPA to undertake initial programming activities, as outlined in the proposal, to help build credence as a functioning international organization.

It is thought that the international materials development workshop scheduled for the summer of 1971 would be conducted under joint SEPA/EDC auspices. This workshop would allow countries already actively engaged in science development efforts to share experiences. But perhaps more importantly, it would provide an opportunity for new countries to begin to participate by working with experienced people.

Funds would also be provided for at least one meeting per year of the SEPA Executive Committee to continue its planning and development of new areas of support.

Finally, depending on such factors as satisfactory demonstration of commitment to the program on the part of the participating African Governments; e.g., picking up support costs for the secretariat, A.I.D. will explore in annual reviews the possibility of contracting directly with SEPA by the summer of

1973 to carry out program activities. SEPA, in turn would sub-contract with EDC to assist them with the program until the project (and A.I.D. assistance) is completed. This would follow the pattern established in the AID/AAU/AAI arrangements.

Evaluation

The African Primary Science Program has had a team of people -- composed mainly of persons engaged in other aspects of the program -- concerned with general problems of evaluation. Direction has been supplied by Dr. E. A. Yoloye of the University of Ibadan, Nigeria. In September 1970 Miss Eleanor Duckworth, an EDC consultant working with this team for almost a year, authored a monograph entitled, Evaluation of the African Primary Science Program. In brief, the monograph first establishes the agreed upon goals of the program and then proceeds to indicate how the success in achieving these goals can be evaluated. Goals for children are the development of:

1. A first-hand familiarity with the world around them.
2. A curiosity about things and initiative in investigating them.
3. An ability to learn for themselves and on their own.
4. Self-confidence and a realization that they can generate their own ideas.
5. An appreciation of the value of cooperation.

The largest single contribution of the evaluation team so far has been to develop an instrument to examine classes of

children who have been in the program for some time to see to what extent they have made progress toward these goals as compared with others in the traditional science programs. Initial findings indicate that the children in the APSP do better than others and the longer they are in the program, the more striking is the degree to which they do better.

In a broader sense the team is seeking to provide indicators that people can use to help them judge their progress as they go. For teachers, whose work with their pupils is the most central influence in the educational process, the team is suggesting indicators that can be used daily in classrooms. For those whose job is to help teachers, the team is providing ways for them to judge the effectiveness of the courses, the writing, and the suggestions they offer to teachers. For ministry officials, they are providing ways of judging how well this program as a whole can help large numbers of teachers to help children become competent, confident, resourceful individuals.

Evaluation of this kind of educational experience is still in its early stages and needs further development. This project intends to maintain an on-going effort in this direction.

Examinations

Examinations for primary science in Africa are not generally fixed and firm as yet and, therefore, it is hoped that the program

materials and the course syllabi developing from these materials will determine the nature of the examination, rather than the other way around as it has tended to be in other subject areas in the past. Additionally, the evaluators in the APSP have been encouraging officials to develop more open-ended type examinations where a child has the chance to reveal whatever he has learned rather than being expected to answer precise questions. At the same time the evaluators have collaborated with science educators in making up multiple choice examination questions which relate to the content and approach in the new science program about as much as paper and pencil tests ever can.

The Future

In mid-1973 the Program looks forward to:

1. additional country commitment to the implementation of science at the primary level;
2. materials developed especially for use in teaching science at training college level;
3. progress toward the introduction of new science courses in teacher training colleges;
4. a number of new countries participating in SEPA and beginning programs in-country to adapt APSP materials for local use;

5. the SEPA secretariat established on a reasonably sound continuing basis. SEPA would in all probability have received programming funds from additional external agencies in support of its program. A permanent Executive Secretary will have been appointed.

Financing of Continuation Programming

Implementation programming will be the responsibility of the host government in all cases. EDC and SEPA will be called upon to assist with various aspects of the total Program training effort, principally at the Teacher Training College level. Assistance would also include Science Educators acting as facilitators in Program implementation as well. Division of financial responsibility for the future is seen as follows:

Locally financed costs:

1. Basic operating costs of host institution to which Program personnel are attached. This would include rent, maintenance, equipment and support staff salaries for office and secretarial help, maintenance personnel and shop staff. Also the Program would look for housing for expatriate staff to be provided by the host government where possible.
2. Costs of large scale printings of Program materials. Film positives of all presently prepared Program units would be provided governments without charge.

3. At le t one-half of all costs of workshops and seminars run in-country for the purpose of training in primary science; i.e., transportation and lodging for participants.
4. Travel costs for in-residence training at the Ghana training center in curriculum development, where feasible.

Program financed:

1. Salary and allowances for Science Educator staff deployed by EDC. This would include all cost of travel for self and family to and from posts.
2. Contribution of up to half of total workshop costs for activities related to implementation of primary science schemes. This would be exclusive of salaries of local personnel participating in activities.
3. Travel and accommodation costs for local personnel at Program/SEPA sponsored international meetings and workshops. (Note: Attempts will be made to have this item financed by the African countries).
4. As required, all costs associated with SEPA Secretariat for the first two years of contract extension.
5. Cost of development materials for Teacher Training Colleges.

6. Accommodation and materials and local expenses of in-residence training program for curriculum developers.

Other External Support:

1. SEPA Program activities other than initial international materials workshop.
2. Evaluation effort.
3. Science materials for implementation of primary science into schools.

Drafted
AFR/TAC, HFreeman:dph:2/25/71

Clearance:
AFR/NA, EMoore _____
AFR/CWA, SChristmas _____
AFR/CWR, FSpencer _____
AFR/ESA, JKnoll _____
AFR/TAC, MBelcher _____

APPENDIX A

AFRICAN PRIMARY SCIENCE PROGRAM MATERIAL

Suggested Grade Levels

NAME OF UNIT	GRADE LEVEL						
	1	2	3	4	5	6	7
NOTE: Teachers' Guides unless otherwise indicated.							
INTRODUCTION TO LOWER PRIMARY	XX	XX	XX				
ARTS AND CRAFTS	XX	XX	XX				
CONSTRUCTION	XX	XX	XX				
COOKING	XX	XX	XX				
DRY SAND	XX	XX	XX				
EXPLORING THE LOCAL COMMUNITY	XX	XX	XX				
PLANTS IN THE CLASSROOM	XX	XX	XX				
WATER	XX	XX	XX				
WET SAND	XX	XX	XX				
WOODWORK	XX	XX	XX				
PLAYGROUND EQUIPMENT	XX	XX	XX	**			
EXPLORING NATURE	**	**	XX	XX			
MAKING PAINTS			**	XX			
COLOURS, WATER, AND PAPER				XX	**		
SMALL ANIMALS				XX	**		
SINKING AND FLOATING				XX	**		
SEEDS				XX	**		
TORCH BATTERIES & BULBS				XX	**		
a. MAKING A START				XX	XX	XX	XX
b. MAKING THINGS LOOK BIGGER				XX	XX	XX	XX
. CHANGING SOLIDS - SOLDERING				**	XX		
ESTIMATING NUMBERS				**	XX	**	
P. MAKING A MAGNIFIER				**	XX	**	
ASK THE ANT LION					XX	**	
S. CHIMA MAKES A CLOCK					XX	**	
CONSTRUCTION WITH GRASS					XX	**	
INKS AND PAPERS					XX	**	
MEASURING TIME: PART I					XX	**	
MOSQUITOES					XX	**	
POWDERS					XX	**	
OURSELVES					XX	**	
SCIENTIFIC LOOK AT SOIL					XX	**	
S. STARS OVER AFRICA					XX	**	
BALANCING AND WEIGHING					XX	**	**
TOOLS FOR THE CLASSROOM					XX	**	**
P. MAKING A MICROSCOPE					**	XX	**

Name of Unit (Contd.)	GRADE LEVEL						
	1	2	3	4	5	6	7
BUDS AND TWIGS						XX	**
COMMON SUBSTANCES AROUND THE HOME						XX	**
S.HOW THE SKY LOOKS						XX	**
MEASURING TIME: PART II						XX	**
S.STRANGERS IN THE SKY						XX	**
S.TILAPIA						XX	**
S.USING THE SKY						**	XX
S.THE MOON WATCHERS						**	XX
PENDULUMS							XX
LIQUIDS							
c.SOUND: A LOOK AT MUSICAL INSTRUMENTS						**	XX
c.BRICKMAKING				**	**	XX	**
S.THE WATER BOOK			**	XX	**		
P.A BOOK ABOUT PENDULUMS (Teacher's Resource)						**	**
P.COPPER ACTIVITIES				**	**	**	**
P.BUBBLES					**	**	**
P.BUILDING HOUSES IN OTHER COUNTRIES					**	**	**
P.PRINTING						**	**
P.TOOLS IN THE VILLAGE						**	**

XX - Major level of use
** - Other, or possible, levels of use

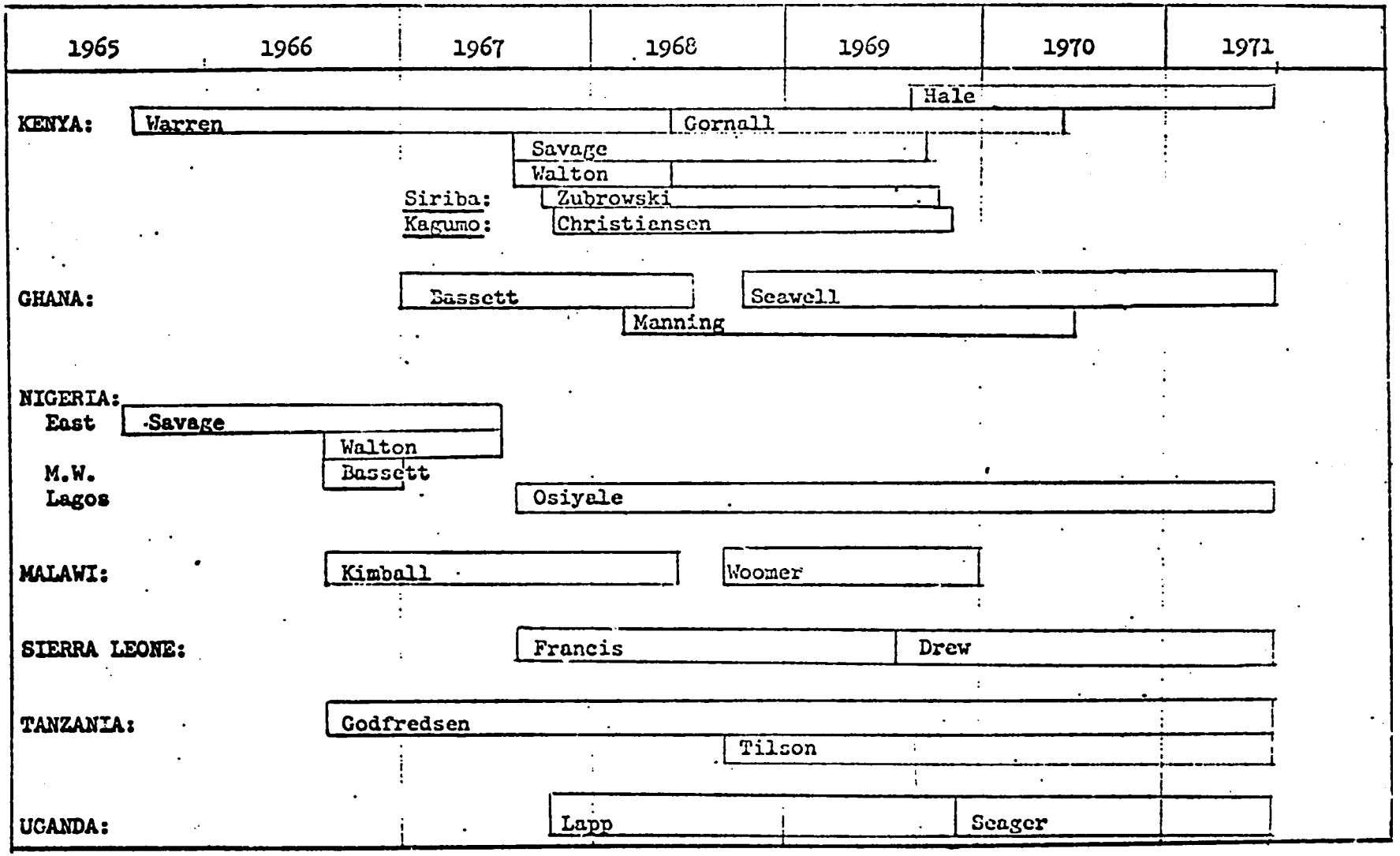
a. Companion piece to APSP guides
b. Teachers' Handbook for: Making a Magnifier
Making a Microscope
c. To be completed in 1971

P. Pupil's Book
S. Science LIbrary Series (Children's Reader)
WP. Working Paper - determination of Grade level not yet made.

December, 1970.

African Primary Science Program

STAFFING OF SCIENCE CENTERS - Showing the Growth of the Program



APPENDIX B

APPENDIX C

African Primary Science Program

FIVE-YEAR TEACHER TRAINING PLAN

	7/71	7/72	7/73	7/74	7/75	7/7
MATERIALS DEVELOPMENT	1. TRIAL TESTING 1ST YEAR MATERIALS SELECTED SCHOOLS	REVISION OF MATERIALS		IMPLEMENTATION INTO TRAINING COLLEGES		
		2. TRIAL TESTING 2ND YEAR MATERIALS SELECTED COLLEGES	REVISION OF MATERIALS			
			3. TRIAL TESTING 3RD YEAR MATERIALS SELECTED COLLEGES	REVISION OF MATERIALS		
PRE-SERVICE	TEACHER TRAINING COLLEGE TUTOR WORKSHOPS					
IN-SERVICE	IN-SERVICE WORKSHOPS FOR PRIMARY TEACHERS					

1. 1st Teacher Training Unit Development Workshop
2. 2nd Teacher Training Unit Development Workshop
3. 3rd Teacher Training Unit Development Workshop

PROPOSED BUDGET

AFRICAN PRIMARY SCIENCE PROGRAM

ADMINISTRATION	7/1/71-6/30/72	7/1/72-6/30/73
Project Co-director 1/2 time	$ 9,500	$10,500
Administrative Director	18,000	19,500
Secretarial	8,000	8,500
Editor 1/2 time	6,000	6,500
Science Consultant (1 day/wk @ $125)	6,500	6,500
Travel	8,000	8,000
Fringes 13%	5,395	5,850
Office Expenses	4,000	4,000
Consultants 20 x $100	2,000	2,000
Rent and Maintenance	2,000	2,000
TRAINING - SEPA/GHANA		
Local Training Expenses	4,000	4,000
Per Diem - Trainees $9/day x 90 days x 10 trainees	8,100	8,100
Travel 10 @ $500	5,000	5,000
SCIENCE EDUCATORS		
Salaries $18,000 x 4	72,000	72,000
Fringes 13%	9,360	9,360
Allowances 20% ave.	14,400	14,400
Travel to and from post @ $5,000	20,000	20,000
Local Expenses	8,000	8,000
SEPA SECRETARIAT		
Executive Secretary L 3000	8,400	8,400
Fringes 13%	1,095	1,095
Allowances (Housing, Car)	4,000	4,000
Travel	5,000	5,000
Secretary	2,500	2,500
Allowances	500	500
Office Expenses	2,500	----
SEPA PROGRAM		
Executive Committee Meeting		
Travel 7 x $550	3,850	3,850
Accommodations 4 days x $25 x 7	700	700
Meeting Expenses - Secretarial, Office Rent	500	500

	7/1/71-6/30/72	7/1/72-6/30/73
International Materials Development Workshops		
Travel $600 x 30 partic.	$ 18,000	$ 18,000
Accommodation 30 days x 16 x 30	14,400	14,400
Stipends 4 persons @ $75 x 24 days	7,200	7,200
Office Expenses	2,000	2,000
Overhead 36% of salaries	43,885	45,145
	$324,785	$327,500

Fiscal Years	Total	Contract	Personnel Serv. AID PASA CONT.	Participants U.S.Agency Cont	Commodities Dir. U.S. Cont	Other Costs Dir & U.S. Cont.
Prior through Act. FY 70						
Oper. FY 71	324	324	194	17		113
Budget FY 72	327	327	197	17		113
B + 1 FY 73	286	286	160	25		101
B + 2 FY 74	286	286	160	30		96
B + 3 FY 75	251	251	135	30		86
Total Life	1,474	1,474	846	119		509

Annex A.

Regional Science Program (Contract No. afr-772)

Line Item Budget (Article IV of Contract)

July 1, 1971 to June 30, 1975

	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975	Total life of project
U.S. Technicians	194	197	160	160	135	846
Training	17	17	25	30	30	119
Other Direct and Indirect Costs	113	113	101	96	86	509
TOTAL	324	7	286	286	251	1,474

March 31, 1971

AID 1020-24 (10-69)

AGENCY FOR INTERNATIONAL DEVELOPMENT (A.I.D. Proj. No. 6980357 PV

PROJECT AUTHORIZATION

1. PROJECT NUMBER	3. COUNTRY	4. AUTHORIZATION NUMBER
698-11-690-357	AFRICAL REGIONAL	0184
2. PROJECT TITLE		5. AUTHORIZATION DATE: 4/26/71
AFRICAN PRIMARY SCIENCE PROGRAM		6. PROP DATED: March 30, 1971

7. TYPE OF PROJECT

a. Number of Years of Funding: 5 Starting FY 1971; Terminal FY 1975

b. Estimated Duration of Physical Work After Last Year of Funding (in Months): 12 months

8. FUNDING BY FISCAL YEAR (in U.S. $ or $ equivalent)

	DOLLARS		P.L. 480	LOCAL CURRENCY Exchange Rate: $1 =			
				U.S. OWNED		HOST COUNTRY	
	GRANT	LOAN	CCC + FREIGHT	GRANT	LOAN	JOINTLY PROGRAMMED	OTHER
Prior through Actual FY 71	324						
Operational FY 72	327						
Budget FY 73	286						
B + 1 FY 74	286						
B + 2 FY 75	251						
B + 3 FY							
All Subsequent FY's							
TOTAL	1,474						

9. DESCRIBE SPECIAL FUNDING CONDITIONS OR RECOMMENDATIONS FOR IMPLEMENTATION, AND LIST KINDS AND QUANTITIES OF ANY P.L. 480 COMMODITIES

None

10. CONDITIONS OF APPROVAL OF PROJECT

Project approval is given only through FY 1972 pending an evaluation ~~to determine if it is feasible to accomplish project objectives by final funding earlier than FY 1975 or if the project warrants longer extension~~ in FY 71/2 to determine the future of this project. The Evaluation Team should include appropriate African educators.

(Use continuation sheet if necessary)

11. Approved in substance for the life of the project as described in the PROP, subject to the conditions cited in Block 10 above, and the availability of funds. Detailed planning with cooperating country and drafting of implementation documents is authorized.

This authorization is contingent upon timely completion of the self-help and other conditions listed in the PROP or attached thereto.

This authorization will be reviewed at such time as the objectives, scope and nature of the project and/or the magnitudes and scheduling of any inputs or outputs deviate so significantly from the project as originally authorized as to warrant submission of a new or revised PROP.

A.I.D. APPROVAL	CLEARANCES	DATE
Samuel C. Adams Jr. SIGNATURE	AFR/TAC, MBelcher	4/1/71
AA AFR, Samuel C. Adams, Jr. TITLE	AFR/DP, DShear	4/20/71
4/26/71 DATE	DAA/AFR, PBirnbaum	4/23/71
	A/CONT	