

FINAL REPORT ON THE
AFRICAN PRIMARY SCIENCE PROGRAM
IMPLEMENTATION PHASE 7/1/71-6/30/76

Contract No. afr-791

Submitted to the
United States Agency for International Development
Bureau for Africa

by

EDUCATION DEVELOPMENT CENTER
55 Chapel Street
Newton, Massachusetts 02160

June 30, 1976

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PREFACE

This terminal report of the African Primary Science Program and its myriad activities across most of English-speaking Tropical Africa has been made deliberately short at the request of USAID, its sponsor. The Agency has taken the position that the work of this program has been written about internally and externally, assessed and evaluated on numerous occasions. Thus a further analytical piece was felt to be an unnecessary use of scarce agency funds.

This decision, while reasonable from the point of view of USAID, fails to recognize that such terminal reports usually serve diverse audiences. For example, terminal reports of the various projects of Education Development Center, the contractor for this eleven year effort, represent institutional learning crucial for its own development. Evaluation and reflection are most important to this process. So it is with considerable misgiving that EDC submits this limited document at the conclusion of one of its more significant change programs.

Fortunately, plans are already well advanced for a collaborative international undertaking to examine and record in some depth many of the professional issues on which APSP has attempted to break new ground. It is expected that the nature and the extent of the innovations attempted by APSP will arouse considerable interest on the part of those concerned with educational change. With knowledge of these writing plans, EDC has acquiesced in the production of the present report.

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AFRICAN PRIMARY SCIENCE PROGRAM

INTRODUCTION

The African Primary Science Program (APSP) was conceived as an effort to upgrade the teaching of science at the primary level in the schools of English-speaking tropical Africa. First discussed at the Endicott House meeting of American and African scholars and educators at M.I.T. in the summer of 1961, programming began in 1965. The program was designed to learn whether new methods and materials being adopted in the United States and Western Europe could be adapted to the needs of the developing world. APSP was carried on under the cognizance of the USAID Office of Technical Assistance Coordination. The initial research and development effort continued until 1971 culminating in a decision within the Agency that the results were sufficiently promising to warrant further support. There was strong indication within Africa that development of science at the primary level was of high priority and that the materials and institutional networks established by this program were useful in helping to satisfy that priority need.

Research and development terminated June 30, 1971 after six years of activity in East, West and Central Africa. A full report of that effort made to the Agency on December 1, 1971 should be referenced for details of the period.

Since July 1, 1971 the African Primary Science Program has been conducted under the sponsorship of USAID's Bureau for Africa. The thrust of this five year period has been to help selected participating countries introduce modern science teaching methods into their primary schools. Implementation has been multi-faceted. Further localization of program prepared materials

was required, extensive training was needed to develop the human resources necessary to carry on locally, and help with the formation of both national and international supporting institutions was viewed as important to any continuing science curriculum development effort. The focus of this report is on this implementation effort.

Statement of Contract Objective

The outline of work contained in the original USAID contract afr-791 dated July 1, 1971 states the objective as follows:

"A. Objective

For a period as hereinafter set forth, the Contractor shall provide necessary services for the implementation of an African Primary Science Program. This program will promote curricular reform and new approaches to teaching primary science in five African countries - Sierra Leone, Ghana, Uganda, Kenya and Tanzania.

B. Scope of Work

The objective of the program will be accomplished through:

1. The development at workshops of materials for tutors to use in their courses in the 151 participating teacher training colleges, the training of the tutors in their use, and assistance to tutors with their in-service training programs for primary teachers.
2. Upgrading staff members of curriculum development centers in participating countries through a special training program developed for this purpose; and
3. Support to the Science Education Programme for Africa (hereinafter called SEPA), an African based and directed organization which will ultimately assume complete responsibility for leadership and coordination of African science programs."¹

¹ USAID Contract afr-791 for the support of the African Primary Science Program 1971-1976. May 28, 1971

Explanation for Initial Country Focus

Although development work had been conducted throughout all of English-speaking tropical Africa, implementation efforts were to be more carefully focused. Some participating countries appeared interested in participating in the program's implementation work but local educational priorities were in subject areas other than science. Thus, timing was bad. In other countries, sufficient local development had already taken place and trained local manpower was available in adequate numbers to indicate that further program support was not crucial to continuing efforts. Lastly, there was an Agency need to keep the financial commitment of the program within reasonable bounds. Five countries, two in West Africa and three in East Africa were identified for follow up work. In those countries conditions were judged to be sufficiently promising that further external assistance seemed warranted.

NATIONAL IMPLEMENTATION

At the time of planning for implementation efforts within the five designated East and West African countries, it was visualized that the agent for this work would continue to be EDC. In early 1971 no other organization existed with the capacity or experience to carry out the implementation phase. SEPA had just begun its organizational tasks and was hardly in a position to undertake programming responsibility.

In point of actual fact, the transfer to SEPA of professional leadership for these in-country implementation efforts proceeded more rapidly than had been envisaged. By mid-1973, informal agreements had been worked out by all parties concerned for liaison to be principally between African governments and SEPA with EDC withdrawing to a less active role. This was a sensitive transition to bring about since EDC continued to be contractually responsible for all programming components and had control over all program funds other than those provided by local governments. It was considered important to begin this transfer, however, if those governments were to come to see SEPA as an independent organization to which they could look for professional leadership in the future.

Implementation work in the five cited countries began under EDC auspices in July, 1971. The science educators at work there were all holdovers from previous EDC development activities on the continent and provided a good measure of continuity. These science educators also served to underscore the point that the transition from development to implementation was more imaginary than real. Programming directions within the five countries did not materially change at this transition point. Rather, activity was seen as mostly continuing implementation efforts which had already begun.

FIELD PERSONNEL EMPLOYED UNDER
USAID CONTRACT afr-791

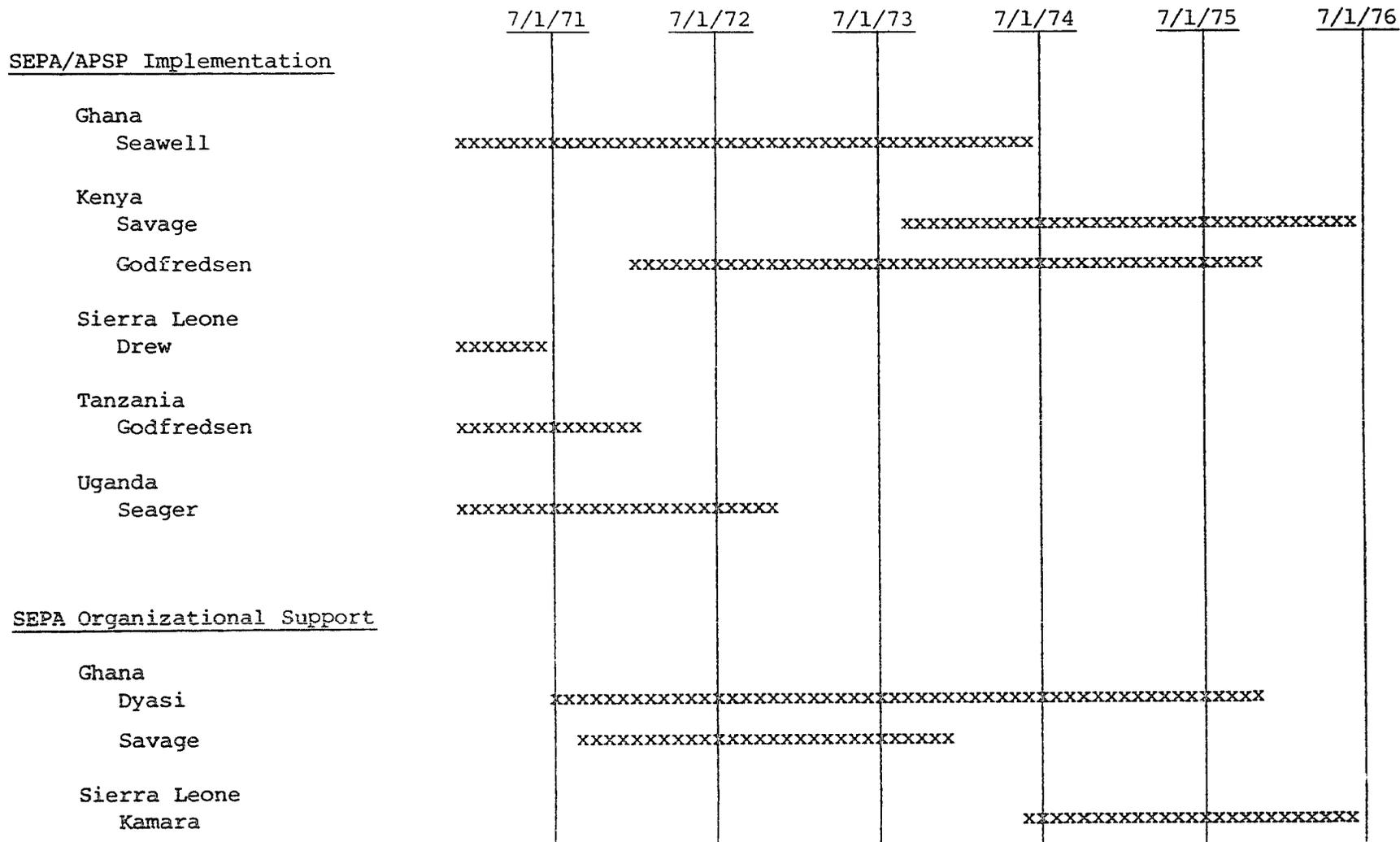


FIGURE 1.

Ghana

In 1965, Ghana had already begun a process which was to lead to a restructuring of its primary school curriculum. A curriculum division was in existence and a separate science unit was moving ahead on science curriculum reform under aggressive local leadership. APSP's early development work was timely in providing ideas, materials and skilled people to enrich and accelerate this work. By 1971 most APSP units had been locally printed and made available to schools throughout the country through the Ministry of Education's free textbook scheme. And Ghana had begun to move beyond those units to create a second generation of primary science materials.

During the most recent five-year period, EDC's role in Ghana has been to provide advisory assistance to the elementary science unit on such professional matters as further curriculum development, organization and functioning of the elementary science unit itself, primary syllabus revision, teacher training college course revision, and in-servicing of primary teachers.

In the pursuit of these activities, Ghana has developed what is probably the largest science curriculum development team in all of English-speaking Africa -- nine professional staff plus support personnel. Three were given a year of residence training at EDC in 1970-1971. Program supported personnel were withdrawn in mid-1974 as the Ghanaian staff acquired the requisite cohesiveness and experience.

Major emphasis of the science unit during the implementation period has been on creation of and training for an ambitious decentralized system of in-service teacher education. One hundred and ten science organizers have now been deployed throughout Ghana's nine regions to conduct local in-service courses. The science unit has had an influence in the selection of these individuals as well as taking major responsibility for their training. All

are Ghanaian, and all have now had extensive exposure to new science teaching methods and materials. Thus a substantial, trained infrastructure is in place throughout Ghana which is most capable of carrying out local implementation plans.

Coupled with this field work has been a major restructuring of the pre-service training to be provided new primary school teachers. To better rationalize its efforts in this field, Ghana has drastically reduced the number of institutions providing such training from 83 in 1973 to nine in 1979. These nine will concentrate only on primary teacher training and will be staffed by well qualified and trained Ghanaian tutors. EDC input has had a major influence on the nature of the pre-service teacher training work in science. The impact of the program has been major and is expected to be sustained.

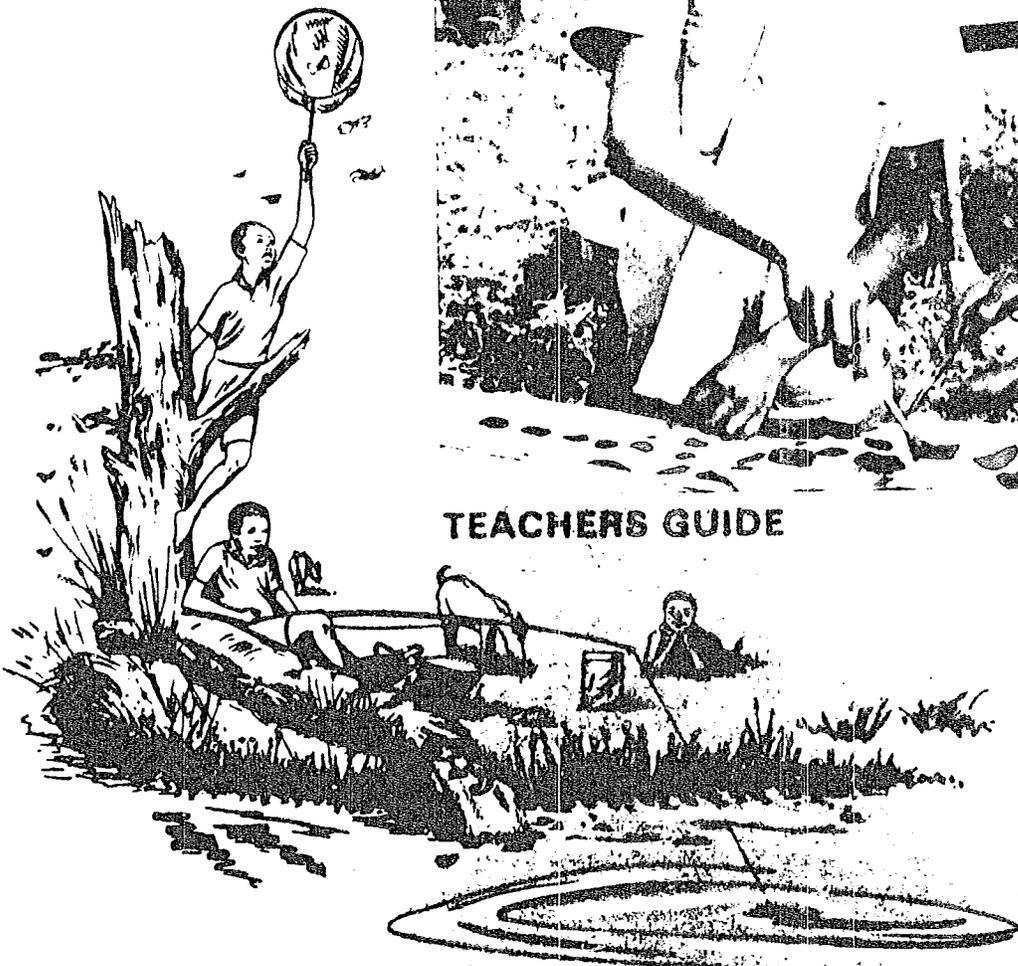
Kenya

The decision to devote program financial and manpower resources to implementation efforts in various countries was dependent on the willingness of those governments to commit resources of their own to that task and to make a commitment to the introduction of science into their primary schools. In early 1971 when planning for continuing implementation efforts was being undertaken, Kenya was not prepared to make that commitment. The result was that though Kenya was clearly in need of additional help to improve science in its primary schools, contributions from APSP were not particularly timely. Kenya was included in the list of five countries to which implementation effort would be devoted in part because of the large investment of program time and effort which had been made there since 1965 - in fact the largest made to any country in Africa. Thus, there was special incentive not to see that effort

lost. In addition, implementation was "a natural" for Kenya since a large portion of the APSP development effort had taken place there during the preceding six years. APSP materials, though Pan-African in design, were in fact, very largely Kenyan in origin.

Nonetheless, in mid-1971, program personnel were not deployed to Kenya but rather to its two neighbors, Tanzania and Uganda. A further contributing factor to this decision was that the local Kenyan curriculum organization which was expected to conduct the implementation work appeared to lack strong leadership, thus further jeopardizing chances of success.

Within a year the situation had changed dramatically. Not only had politics in Tanzania and Uganda overtaken development efforts there but the situation within Kenya had changed as well. The Kenyan government committed itself to an ambitious program of introducing science into its primary schools on a nationwide basis. Further, changes in local leadership and organization dramatically affected the climate for the better. Program personnel were redeployed to Nairobi from Tanzania and temporarily from Uganda. From the arrival of the first program science educator in Nairobi in April, 1972 developments took on an accelerating pace which called for the addition of a second permanent staff person in November 1973. From 1972 until completion of APSP programming efforts, Kenya has been engaged in the most extensive and widespread effort to "implement" the teaching of science into its primary schools of any country on the continent. This is true notwithstanding efforts in Tanzania and elsewhere because of the ambitious pace the Kenyan implementation effort was to take. Beginning with the introduction into the first three grades of the primary school of APSP Lower Primary materials and methods, the plan envisaged that science would be added to the balance of the primary curriculum at the rate of one grade level per year through 1976. That scale of development and implementation was not fully possible, hardly surprising in view of the numbers of teachers and schools



TEACHERS GUIDE

KENYA PRIMARY SCIENCE

involved and the resources required. Nonetheless, progress has been made with the production of a new syllabus for science, called "Guidelines", new materials for teachers now available on a national basis, and new examinations designed to test a different style of science learning. And of greater importance, there is now in the Kenya Institute of Education the professional leadership necessary to continue this implementation scheme.

Unfortunately, the implementation task will not be finished in Kenya by the time program input ceases. Because of the late implementation start, it simply was not possible to complete work on all aspects of the seven year primary school program. Contract targets called for work to be completed through Standard 6. This has been accomplished and thus it can fairly be said that everything APSP set out to do in Kenya by way of assistance has been done. But development work for Standard 7 which was never included in the program work plan (because of time limitations) is now in serious jeopardy unless other external support can be found. It appears likely that British Foreign Aid will be in a position to assist. EDC has done whatever it can to encourage this new involvement.

Twenty-five SEPA/APSP units are now available to Kenyan primary schools at prices ranging from KSh 2.20 to KSh 8.10 (\$.27-\$1.00). (See Figure 2 for sample cover.) These are produced by the Jomo Kenyatta Foundation, the government printer, after approval by the Ministry of Education as to quality and appropriateness for the curriculum. The number of materials is expected to rise sharply as provision for the full upper range of primary classes is made. In fact, all SEPA/APSP units are expected to be in use ultimately in Kenya.

Sierra Leone

Sierra Leone represents a different illustration of how APSP dealt with

continuing needs in primary science. Resident science educators had worked in Sierra Leone since 1966 assisting with various aspects of the materials development work taking place there. By mid-1971, however, it was judged that such expatriate presence was no longer necessary and all resident program personnel were withdrawn. Lacking still, however, were the resources and breadth of professional experience which the program could continue to bring. Thus, a new kind of implementational relationship was forged in Sierra Leone. Local personnel were solely responsible for direction and implementation, but external program input was in the form of resource personnel for workshops and funds to assist when sufficient local resources were unavailable.

During each summer from 1972 through 1975, a workshop was conducted to develop materials for Sierra Leone training colleges. The workshops received program assistance in the form of logistical support and small numbers of resource people from other parts of West Africa and from the United States. The products of these workshops served not only Sierra Leone science curriculum development but were shared with other SEPA countries as well. Thus local development and broader international needs were served simultaneously.

The implementational strategy being employed in Sierra Leone is heavily dependent upon science tutors at the nation's training colleges. Sierra Leone has perceived (we feel correctly) that changes in science teaching of the magnitude advocated by APSP require extensive long term teacher training which is best carried on through periods of college residence. While inservicing of working primary teachers is not to be ignored, results in terms of changes in their classroom behavior is less certain.

It is also felt in Sierra Leone that classroom unit materials are not as critical to implementation efforts as they are perceived to be in other

countries. Rather, the development of quality materials for use in training colleges was seen as the more urgent task.

Program support for local implementation efforts continued through the summer of 1975. Further work will be conducted exclusively by staff of the Science Curriculum Development Center at Njala University and the Sierra Leone Institute of Education.

While there is much room for encouragement in respect to science education development in Sierra Leone, a word of caution is necessary. The financial constraints imposed by the Sierra Leone Government, as the result of economic factors which have nothing to do with educational planning, are a source of concern. At the very least, they will cause delays in implementation work already under way. They also hold the potential for major disruption if not cancellation of much of the work to which that government has been committed for some years. It is perhaps another illustration of the close ties between progress in educational and economic-political development.

Tanzania

There is a special irony associated with EDC's work in Tanzania. Since publication of the Arusha Declaration in 1967, it has been clear that the paths to development laid out by President Nyerere for that country were the most congenial of any nation in Africa for the kind of education APSP was advocating. And, in fact, more progress toward the introduction of program materials had been made in Tanzanian schools than in any participating country. This had been accomplished through the upgrading of science instruction in the country's training colleges and the consequent graduation of significant numbers of better prepared teachers. Program materials had been translated into Swahili so that "Making Paints" became "Utengenazaji Wa Rangi",

"Buds and Twigs" became "Chipukizi Na Vitawi" and "Attribute Blocks" was used in schools as "Vipande vya Kufikirisha". There was even an equipment distribution scheme established by the Ministry of Education in support of primary science implementation.

But that same spirit which encouraged children to discover for themselves also led Tanzania to increasingly go its own way in educational development. By 1971, many foreign assistance projects had already terminated and opportunities for further expatriate contribution were becoming limited. Though Tanzania still lacked sufficient manpower and organization to carry forward its science education plans for its primary schools, it was clear that it would try to do so without additional foreign help. APSP planning had called for inputs to Tanzanian science education through June 1973. By April 1972 it was evident that prospects for further meaningful contribution were limited and the program science educator was transferred to Kenya.

Tanzania was the showcase for the relevance of APSP development work for African schools. It may still be, but contacts with that nation have been so limited since 1972 that it is by no means clear. Even Tanzania's posture vis-a-vis SEPA is in that same mold. Elimination of foreign influence came to mean even other African influence. As a result, SEPA contacts with Tanzania, while cordial, are nonetheless not close. If this development can be read as a sign of "psychological freedom and independence" then it may be profoundly beneficial. However, APSP views such aloofness as destructive in the long run. Development in the realm of ideas needs the nurture of support from others as well as the challenge of competing ideas.

Uganda

EDC support for Ugandan efforts toward improvement of science education

in its primary schools began in November of 1967. A program science educator was posted to the Uganda National Institute of Education at Makerere University to work on the localization of APSP materials and train Institute students taking both short and long-term courses in science and other subjects.

In July, 1971, at the inception of the implementation phase of APSP it was determined that a further two year tour of duty by the resident science educator would be necessary in order to complete tasks assigned. In particular, Uganda had embarked on an upgrading program with an Institute one-year residence course for its training college tutors. EDC's science educator was to serve as the principal science lecturer for this program which involved 13 new Ugandan tutors who were to be in residence at Makerere University throughout the 1972 calendar year. Training was to consist of general familiarization with APSP materials and methods. The one year resident course was to be followed by deployment to various Ugandan training colleges where tutors would work an additional full year under close supervision. At the conclusion of this two year training, it was felt that Uganda would be in a position to implement new materials and methods of teaching science to primary children through pre-service training of new teachers in these techniques. This method was perceived as slow but in keeping with the resources available to Uganda at that time.

However, all planning of programs for Uganda in 1971 and 1972 was done in a general atmosphere of uncertainty due to the political situation. The change in national leadership of the country was sure to bring about major revision in developmental priorities but new directions had not yet emerged as APSP set about its work.

Within a few months of inception, opportunity to do innovative educational programming had deteriorated. It was difficult for expatriate personnel

to travel out of the capital city safely. As a consequence, the EDC's science educator's work with personnel in the training colleges and in the trial primary schools had virtually ceased.

Work did continue with the residence course for science tutors at the National Institute of Education throughout the first half of the year but by early autumn even that program was experiencing difficulty. It became necessary to transfer the program science educator on temporary assignment to Kenya where opportunity for more profitable use of his talents existed.

During 1972 the Uganda Ministry of Education had been hard at work on the development of a new syllabus for the primary schools. The Ministry Science Panel, charged with responsibility for the science portion of the syllabus, were individuals drawn primarily from those involved with APSP work during the previous five years. However, Uganda was moving toward creation of a local modification of APSP materials. This was evidenced by the Panel attempting to interweave with APSP new ideas which were being developed through a UNESCO supported rural science scheme. Since there was no basic contradiction in teaching approaches advocated by APSP and the UNESCO program, the union was viewed as a positive one. In fact, the UNESCO project was headed by a Ugandan long associated with APSP. He had been trained at Njala University under a program made available to him through APSP sponsorship.

Little information is available about the state of primary science education in Uganda today. While Uganda does maintain its close connections with SEPA (the present Chief Inspector of Schools of Uganda is a member of SEPA's Executive Committee), there have been no APSP or SEPA sponsored activities within that country in over three years.

INTERNATIONAL PROGRAMMING

Throughout the five year implementation phase of APSP, EDC has attempted to conduct its international activities in a manner which contributed to the vision of SEPA as a worthy professional successor to APSP and as a pro-active as well as reactive organization. Thus, in addition to support for the organizational development of SEPA itself, every attempt has been made consistent with contractual limitations to share international programming design and direction with SEPA. Successful institution building, in our judgement, derives more from a record of professional accomplishment than from elaborate organizational structures.

The international components of SEPA/APSP programming during this implementation phase have been three. The first, a materials development effort for Africa's teacher training colleges has engaged a small group of African academics and educational practitioners continuously for five years.

The second component has been a training program responding to the widely felt need for curriculum developers and change agents. Students from eight countries in East, West and Central Africa thus far have participated in this nine month resident program conducted now at Njala University College in Sierra Leone.

A third component of SEPA's but not EDC's work addressed the question of evaluation. (See page 28.)

Teacher Training Materials Development

A major operating premise for APSP since its inception has been that

there must always be an active developmental component to its work if vitality is to be maintained and the best people are to be continuously engaged. All participating countries were placing heavy reliance on their teacher training institutions to effect the major changes in the teaching of science that were desired. If these institutions were to serve this role, then the science tutors themselves must be given intensive training in the "new science". Thus, for implementational activities, the development component was obvious: materials for tutor/teacher training.

In 1972 a group was convened in Accra, Ghana to consider appropriate future programming steps for the teacher training effort. The plan originally set in motion was for a Pan-African materials effort. However, African science educators present at the session argued persuasively for a more differentiated approach to development which recognized the widely differing professional backgrounds of tutors in different African countries. The group carefully considered how to reconcile the need for differentiation in its approach with its sense of the importance that some collective effort be undertaken in this area from which all participating countries could benefit. The solution ultimately reached was an ingenious compromise: preparation of background materials in science and science education which would support individually tailored national programs but would not constitute courses in themselves.

As programming was changed to meet this new perception and response to it, African direction under SEPA sponsorship was also proposed and quickly agreed to. This development group, now directed and financed by SEPA, has as its chairman the distinguished African zoologist, Professor D.E.B. Chaytor of the University of Sierra Leone. The members of the Teacher Training Materials Writing Team are as follows:

Prof. D.E.B. Chaytor (Chairman)	Fourah Bay College, University of Sierra Leone
Dr. Romanus Ohuche	Alvan Ikoku College of Education, Owerri, Nigeria
Dr. E. A. Godfredsen	EDC Science Educator, K.I.E., Nairobi
Mr. M.B.R. Savage	EDC Science Educator, K.I.E., Nairobi
Dr. Robert Pearson	University of Ghana, Legon
Dr. Mohammed Hyder	University of Nairobi
Mr. Robert Botchway	Ministry of Education, Ghana

Three specific objectives were identified; a handbook for teacher trainers which would introduce them to a broad range of classroom activities and ideas, a Sourcebook for the same group that would attempt to delve deeper into some of the important scientific and psychological ideas inherent in APSP and, lastly, a series of short monographs on topics relating to science education generally.

The Handbook was completed in 1974. Five hundred trial copies were printed and distributed to participating countries and to SEPA. Minor revisions have been made as the result of feedback obtained. Interest in the Handbook is high. If copies were now available for sale in Africa, at least a half dozen countries would have made purchases.

The Sourcebook is receiving finishing touches as of this writing. It will be in the nature of a 275 page volume which will require care in publishing. Funds for this work are now with SEPA and it is anticipated that a limited first printing will be done soon. In the longer term the same problem will be experienced as with the Handbook above.

A review of development priorities in 1974 concluded that the Monograph series would be abandoned, at least for the present. There was some feeling that a series of scholarly pieces about SEPA/APSP work might cause a misperception about the program. If there were too much departure from the

classroom and the problems of primary school teachers and pupils, it was seen that the program could become too academic and irrelevant to teachers' needs. A first Monograph "SEPA Science and Learning Theory", by Dr. O.R. Ohuche was produced. Treatment of other identified topics will await further SEPA reassessment.

The quality of their efforts has been judged to be high as evidenced by the recent End-of-Project review which states "The Handbook and nearly completed Sourcebook are well-conceived and will have a decided impact on the nature of science teacher training, provided problems of production and distribution can be overcome".² These results lend credence to the idea that African academics, if given the proper working environment and incentives, can become deeply engaged in the problems of public primary education in Africa.

The logistical problems, however, are serious. Fundamentally the problem is raised of how such quality materials produced in prototype form under program auspices can be made available in quantity. Unfortunately, materials designed for training colleges are required in insufficient quantities to justify national printings in most if not all African countries. Thus, it will be incumbent upon SEPA to explore ways to make such materials available on a Pan-African basis.

Resident Course For Curriculum Developers

Recognition of the need for intensive training for curriculum development personnel grew out of earlier program work. While the establishment of

² End of Project Review: SEPA/EDC/APSP, American Council on Education Overseas Liaison Committee. Benjamin, T.D. and Koran, J.J., Jr. November, 1975. p. 43

curriculum centers in participating countries was clearly a powerful idea for introducing change, shortages of trained manpower were everywhere apparent. Some Africans had been able to travel abroad for extensive study, but their numbers were small and their studies not always relevant to their needs. Further, it seemed important in the long run to look for ways to satisfy African training needs locally.

Implementation planning called for the establishment of a specialized pilot course for curriculum developers but details were to be spelled out later. After considerable planning the first such course was conducted in Ghana in 1972 under the direction of an EDC science educator loaned to SEPA for that purpose. Conceived as a six-month resident program for Africans scheduled to take major responsibility in their own countries for the introduction of science in primary schools, the course had participants from Liberia, Ghana and Kenya.

The pilot course was, in general, well received by participants from the point of view of professional development. However, it did reveal a compelling need to change the venue of future courses for several reasons. A university setting was seen as the most appropriate future site. First, in order to attract the most qualified candidates some kind of credentialing of course graduates would be important. Probably only a university could provide such certification acceptable to governments for upgrading and salary increase purposes. And secondly, an institutional setting was vital for such a long-term course in order to supply the necessary logistical support for needs as housing, food, library and recreation facilities, etc. Two subsequent courses have been conducted at Njala University in Sierra Leone with the last completing its program on June 19, 1976.

A program course evaluation was conducted in September, 1975 following completion of the second course. The evaluation group, led by Dr. C. Agbenyega of Ghana, concluded that the program had met a compelling need, was ably run

by Dr. A. I. Kamara, the course Director, (though badly understaffed) and stated that the participants uniformly praised the quality of the training they had received. (See Figure 3 for list of Resident Course Graduates.)

Early program planning for this course had anticipated that Njala University would incorporate the program as a part of its normal course offerings if and when it was established that the need was continuing and the conception sound. Recent events in Sierra Leone indicate this is highly unlikely for the present. Fiscal austerity required at present makes it impossible for the university to broaden its programming mandate. It can only be hoped that with additional external help for several more years the university can find its way clear to take on this course.

The End-Of-Project review concluded in its summary remarks that "After a slow start, the Resident Training Program (at Njala University) is now beginning to show excellent promise, and continued support is recommended."³

³ Ibid. Benjamin and Koran, p. 43

Figure 3.

NJALA UNIVERSITY/SEPA RESIDENT COURSE GRADUATES

1972

Kamau, P. M.	Kenya
Yankey, A. K.	Ghana
Bapuoroh, S. E.	Ghana
Bentum, E. C.	Ghana
Bailey-Yancey, Mrs. S.B.	Liberia
Gbegbe, F. S.	Liberia
Cephas, P. S.	Liberia

1974-75

Chanda, S. W.	Zambia
Kargbo, D.	Sierra Leone
Gyang, M.	Ghana
Myambe, B.	Uganda
Awiti, C. R.	Kenya
Katende, A. S.	Uganda
Jallow, Y.	The Gambia
Pefole, M.	Lesotho

1975-76

Jack, S.	The Gambia
Mugah, J.	Kenya
Fornah, D.	Sierra Leone
KaiKai, A.	Sierra Leone
Lepelēsana, D.	Lesotho
Manda, P.	Zambia
Nyarko, S.	Ghana
Peabody, A.	Liberia

Support for Pan-African Institutional Development in Science Education

Underlying much of the program's development work was the strong conviction that independent national efforts, particularly for a number of the smaller nations, were probably unviable without other supporting institutional structures. Thus interest grew in creating an international organization within Africa which could coordinate and enrich local curriculum development in order to broaden professional contacts and thereby share ideas.

This program concern coincided with an African interest in taking charge of its own educational development efforts. Though there was strong support for the work of the African Primary Science Program, it was perceived as foreign and therefore probably unable to fully respond to local needs. Further, foreign assistance was seen as relatively short-term and likely to be incapable of maintaining the sustained effort required to bring about major changes in public primary education. Creation of an African institution capable of more sustained support and linking individual country efforts into a larger coordinated one was a goal expressed as early as 1968 by Africans associated with the program. The Science Education Programme for Africa (SEPA) began in 1970 in response to that need and grew throughout the period covered by this implementation effort.

SEPA was conceived as an institution linking the countries of English-speaking Africa. It has made efforts to extend its interest to French-speaking countries as well. Overtures to Senegal, Ivory Coast, Dahomey (now Benin) and Togo began as early as 1972. However, such an institution posed problems for USAID as the Agency moved to a "regional" conception of programming. SEPA transcended the usual definition of "regional" in agency thinking, thus making proper monitoring of its activities difficult. It is to the credit of the

Agency, however, that it was able to adapt its governance mechanisms sufficiently to accommodate to SEPA.

A major shift of focus in the programming of SEPA/APSP has occurred over the past five years. Perceived first as a follow-up effort to six years of materials development -- "implementation" the contract calls it, the program emerged over time to place its emphasis on international institution building.

From 1971 when EDC successfully urged the inclusion of support for the development of SEPA as a technical assistance institution in the implementation contract until the present, encouragement of SEPA has been a consistent program thread.

But backing for SEPA did not come easily. Past efforts in support of various Pan-African organizations had not met with particular success. Considerable skepticism was voiced within the Agency and elsewhere about the prospects of yet another such organization. So it was with considerable reluctance on the part of the sponsor that support for SEPA was added to the brief list of program objectives specified in original contract language.

By 1973, APSP for all intents and purposes had become an institutional development program first and foremost with its major task assisting the formation and early development years of SEPA. Implementation efforts in the five countries, though important in each individual situation, were not perceived as being of as long range significance as a Pan-African organization which could look after Africa's continuing needs in science education.

The recently completed End-Of-Project review by Professors Benjamin and Koran has focussed heavily on this aspect of the past five years of activity, so treatment here will be brief and concentrate on those components not covered in detail by that report.

EDC has participated as advisor in all SEPA deliberations including the drafting of the constitution, preparation of secretariat and programming

budgets, development of plans for African government financial support, determination of programming priorities and the selection of personnel for important SEPA posts. EDC never had sought voting power in the various SEPA committees, feeling content to suggest alternatives, open new options, and bring other experience to bear on various organizational issues. This advisory role was important in allaying the considerable skepticism about the independence of an institution whose means of survival depended upon external support. It has only been since other avenues of support have opened up that this feeling has largely dissipated. And in particular it is only since eight African governments (Ethiopia, Ghana, Kenya, Liberia, Nigeria, Sierra Leone, Uganda and Zambia) have become contributing members that SEPA has emerged fully free of suspicion of foreign domination.

Regular meetings of the SEPA Representative Council and Executive Committees have been held bi-annually and annually respectively by constitutional dictate. (See Figure 4.) All meetings through June, 1976 have been financed by APSP program funds. EDC program personnel have been present at each session.

Figure 4.

MEETING SCHEDULE

SEPA GOVERNING BODIES

<u>Group</u>	<u>Place</u>	<u>Date</u>
Representative Council	Kampala, Uganda	Sept. 1970
Executive Committee	Nairobi, Kenya	August 1971
Executive Committee	Accra, Ghana	March 1972
Representative Council	Lagos, Nigeria	July 1972
Executive Committee	Addis Ababa, Ethiopia	April 1973
Executive Committee	Monrovia, Liberia	April 1974
Representative Council	Accra, Ghana	August 1974
Executive Committee	Nairobi, Kenya	March 1975
Executive Committee	Accra, Ghana	January 1976

While overall the development of SEPA has been a remarkable success story, there has been disappointment at the speed with which African governments have moved to shoulder the core secretariat costs. The reasons are numerous and compelling. The process of establishing SEPA as a recognized international body to which contributions could be made by governments was more complex and time consuming than anyone imagined. Ultimately, intercession by officials at the highest levels of government was required in nearly all countries. The size of the secretariat budget has grown commensurate with demands for assistance made upon it; thus while dollar contributions have increased healthily, percentages of total support have not. No new African countries have become contributing members of SEPA since 1973. Foreign exchange limitations imposed on some nations is still another important reason. SEPA had little if any control over these factors, yet it was itself slow in moving away from a fixed contribution system to a more flexible proportionate share scheme better able to adjust to increases in the budget. This change is only now under consideration.

But, in retrospect, good progress has been made. By FY'76 external contributions for the operation of the Secretariat have been reduced to \$28,515, representing approximately 1/3 of its total needs. This has occurred simultaneously with a doubling of the budget. (See Figure 5.)

Further, other international assistance agencies have been sufficiently optimistic about SEPA's development to award grants for a variety of program purposes. Among those organizations contributing to SEPA over the past five years are USAID, The British Council, UNESCO, UNEP, Ford Foundation and the Carnegie Corporation of New York.

FIGURE 5.

EDC/USAID FINANCIAL SUPPORT TO

SEPA

1971 - 1976

FISCAL YEAR	Total APSP/ SEPA Budget under afr-791 791	S E P A B U D G E T				TOTAL SEPA BUDGET
		Secretariat	Executive Comm. & Represent. Council Mtgs	Resident Curriculum Developmt. Course	Teacher/ Tutor Trng Materials Developmt.	
FY 71	-	20,500	22,000	-	-	42,500
FY 72	320,366	23,995	5,050	-	-	29,045
FY 73	327,000	35,375	25,250	17,680 ¹	- ²	78,305
FY 74	286,147	43,020	4,800	26,700	16,810	91,330
FY 75	267,237	39,630	24,350	54,740	16,910	135,630
FY 76	161,565	(28,515) ³	5,430	67,375	13,580	86,385
TOTAL	1,362,315	162,520	86,880	166,495	47,300	463,195

1. This figure does not include salary and fringe benefit costs of SEPA Education Officer. In FY73 that person was considered as an APSP science educator on loan to SEPA.

2 Teacher training materials development was not identified as a separate budget item until FY74, although some costs were incurred in prior years.

3 This Secretariat support for FY76 from USAID comes in the form of a direct grant, and not through EDC.

RHR
7/21/75

Program Evaluation

During the five year implementation phases of APSP there has been no formal evaluation component to its programming. Results of earlier evaluation efforts had demonstrated the validity of the approach to science teaching advocated by APSP for Africa. And more importantly, interest had been expressed by governments using APSP methods and materials in their primary schools. The central evaluation questions during implementation have been whether program development efforts were being sufficiently productive and whether specified programming targets were being met.

To examine these issues, USAID commissioned two independent reviews of APSP. The first was a combination study of the African Primary Science and Mathematics Programs, both of which employed EDC as the Contractor, by the American Institutes of Research in 1973. The second study was conducted by Professors T. Benjamin and J. Koran and submitted to the Agency November 26, 1975. The second study in particular was intended to provide guidance for Agency decisions with respect to appropriate continuing support to African efforts to upgrade formal and non-formal education in science and environmental studies.

Results of both studies were, in general, very supportive; indeed, enthusiastic. It should also be said, however, that both studies made a number of suggestions for improvement which EDC has felt were constructive.

Substantive issues in evaluation have not gone unheeded. SEPA has felt that the subject was so central to primary science development in Africa that in 1972 it took steps in collaboration with the University of Ibadan, Nigeria, to establish an International Centre for Educational Evaluation. The Carnegie Corporation of New York has assisted with the financing of this Centre in its formative years with the expectation that it will become part of the

university structure. The ICEE is concerned with training evaluators in new techniques demanded by new approaches to learning advocated by programs like APSP. Trainees have studied under SEPA fellowships. ICEE is also interested in research questions raised in part by the program. So evaluation work has gone on in parallel with APSP efforts but sponsored by other sources.

CONCLUSIONS

It will be important for those wishing to evaluate the impact of APSP and its successor organization not to limit investigation to those five countries cited in USAID's five year implementation contract with EDC. To do so would be to unduly narrow the extensiveness of its influence. A number of the countries participating in early program work, but not in the follow-up implementation stage, elected not to participate because of the rapid strides they had already made with program assistance. Nigeria and Malawi are two excellent examples.

Activities conducted by the African Primary Science Program cannot be divided into two discrete and separable phases. The distinction between research and development on the one hand and implementation on the other, while perhaps important for the sponsoring agency, has never conformed to the realities of Africa. From the beginning, all program development efforts which took place on that continent occurred because governments which participated in them were considering changing science teaching practices in their schools. While a number, if not most of the countries, were less clear about the specific nature of the changes to be made, there was a commitment to consider new ideas and materials and to allow personnel to participate in this work. There was appreciation of the opportunities for training which participation in program workshops provided. In short, manpower development was seen as the precondition for changing the teaching of science in the primary schools; the research and development activities of APSP provided at least some opportunity for that manpower development to occur. Implementation, in the true sense, began with the arrival of program personnel in Africa in 1965.

Implementation is perhaps an inappropriate word to describe the process which is now on-going in participating African countries. It implies that

there is a rational process of using the products of development to systematically change science education practices in all schools. Further, there is the impression conveyed that this process happens over a short, discrete period of time. This conception of the process of "implementation" is at considerable variance with reality. Implementation is not a short-term job of training followed by massive change in teaching practice in the primary schools. Five years is simply not a sufficient period of time to cope with the magnitude of the retraining effort involved for any nation's full complement of primary teachers. Implementation is rather a process of gradually changing an educational "center of gravity," of moving teachers in this case along a continuum from highly didactic practice to more open-ended, investigatory modes of classroom practice. The population of teachers changes significantly from year to year in nearly all developing countries. Thus, training is never completed but is rather a continuing process.

It was equally true, that as fuzzy as the demarcation line between development and implementation was, the shift in emphasis occurred at different times in different countries. It should be obvious that the involvement of 13 English-speaking African countries would be at different levels, at different paces and with different objectives in mind. But the point need not be belaboured further: implementation of primary science into African schools did not begin on July 1, 1971. It well preceded that date in some participating countries; in others the time has not yet arrived.

It is because of this disparity between the pace and timing of development in English-speaking Africa that the development of SEPA becomes so important. Developing nations on that continent number more than 40. Many have not yet been touched by innovations taking place in the English-speaking countries. A mechanism which can meet the needs of these new nations provides the possibility of greater long-term program impact, but more importantly recognizes present day realities. The efforts of SEPA/APSP for eleven

years were to open African eyes to new kinds of educational methods and materials using science as the vehicle. But the program's ultimate greater contribution was to help Africa shape its own future development through fostering those institutions which lead that development. SEPA has the potential for playing that role. Those who have watched its early growth feel strongly that SEPA will be able to realize that potential.

What APSP and SEPA together have done is to build a Pan-African technical assistance body (SEPA) which can help with national efforts, to provide materials for possible inclusion in local science curriculum building plans, and to provide manpower training for those who will be charged with carrying on implementation programs following withdrawal of external aid. What external programming has not done or cannot do is to undertake the extensive training necessary to significantly change teaching practice in any nation's entire school system. Just as it took the United States nearly 50 years to introduce kindergarten training into the nation's schools, a generational retraining effort in science is required in the developing world before widespread changes will be noticeable in schools. This work will have to be undertaken by the countries themselves, and indeed this is happening. Kenya and Ghana are but two examples of program countries that have made enormous matching contributions of economic and manpower resources to the task of implementing primary science into their schools. Local contributions far outweigh the inputs made by APSP and SEPA to in-country implementation efforts.

The Benjamin-Koran report made brief reference to a potentially serious problem foreseen for SEPA. The success of early organizational and programming efforts have begun to fuel a demand that SEPA concern itself with aspects of education beyond science. A specific suggestion has already been offered that SEPA change its name to EPA to symbolize this broadened focus.

There is increasing awareness particularly at the primary level, that curriculum change in a single subject area may not be the best long term way to proceed. Integration of subject matter at that level through the introduction of environmental studies is one illustration of this trend. So, there is strong argument for broadening professional concerns beyond science. But countering that argument is the conviction of those now most deeply involved with SEPA's past development that it is better to do one thing well than a number badly.

The problem lies with the fact that SEPA is already hard-pressed to meet present commitments. This situation could only become more difficult as the variety of programming initiatives increases. A number of external agencies have expressed interest in using SEPA as the organizational vehicle through which various educational work might be carried out. While this says much about the prestige and record of this fledgling organization, such additional programs put a burden on the secretariat. Increases in the secretariat budget only postpone the day when its headquarters operation becomes self-supporting.

Some pressure for this broadened organizational mandate comes from participating governments who visualize a future time when other specialist organizations concerned with mathematics, social studies, and language will be making similar demands for support. Also, European technical assistance has encouraged the establishment of an African Curriculum Development Institution within the last several years. At this writing, it is not clear what influence this will have on the future development of SEPA.

Given the kind of impact this collective African-American effort has had on the teaching of science throughout Africa, it is tempting to consider similar efforts either in different subject areas or in other parts of the

developing world. There have been all too few stories of relatively minor external inputs to the problems of these regions of the world having made major impact. However, replication of this effort in the 1970's would in all probability be a serious mistake. Programs attempting educational change orchestrated from abroad are largely passé. Had not APSP recognized this fact by showing a willingness to first share and then largely turn over responsibility for most significant aspects of its work, it is likely that impact would have been lessened considerably. African nations are sensitive to their "Africanness" and are averse to external imposition of ideas. Had not the ideas implicit in science teaching advocated by APSP come to be seen by Africans as compatible with African values and adaptable to the needs and resources there, it is more than likely such ideas would have had little impact. If credit is deserved by SEPA/APSP, it is in finding the programming mechanisms, the people, the institutions and the nations in and through which this adaptation process could best flourish.

Lastly, eleven years of EDC involvement with APSP and its companion programs in mathematics and social studies have produced a vision of fundamental psychological change in Africa which America would do well to heed. The period of the 1960's saw enormous and diverse infusions of technical assistance to Africa and around the world -- from the USSR, the People's Republic of China, Israel, Scandinavia as well as from the rest of Western Europe and North America. The richness of experience and viewpoint produced by this diversity may well be unparalleled in human history, at least in modern times. Although educational practices in developing nations have hardly had time to catch up to newly emerging conceptions of education, the sophistication of educational leaders in Africa is yet to be sufficiently recognized. America has much to learn from this part of the world as it

reexamines its own practices. Perhaps programs such as APSP can begin to mark the turning point in the flow of ideas. We would do well to consider how, henceforth, the U.S. can become a partner in educational development. We have so much to gain.

The Benjamin-Koran End-Of-Project Report concludes with a statement about the work of this eleven year effort to influence the teaching of science at primary level throughout much of a continent. It says "One cannot fail to be impressed by the magnitude of the change that has been brought about by the SEPA/EDC/APSP program. While it would take years of study to ascertain accurately the extent to which primary school science education has been affected at the local classroom level, there is little doubt that there has been a significant change in the nature of primary science education in almost half a continent. Few educational programs can make that claim."⁴

⁴ Ibid. Benjamin and Koran. p. 45

APPENDIX I

AFRICAN PRIMARY SCIENCE PROGRAMAID/afr-791SUMMARY OF EXPENSES FROM JULY 1, 1971 TO JUNE 30, 1976
(Rounded Totals)

	<u>FY</u> <u>1972</u>	<u>FY</u> <u>1973</u>	<u>FY</u> <u>1974</u>	<u>FY</u> <u>1975</u>	<u>FY</u> <u>1976 *</u>
1. Salaries					
a. U.S. Staff	38,608	37,079	31,128	28,079	34,826
b. Field Staff	69,423	80,961	81,557	58,822	26,098
2. Consultants	9,943	7,130	10,408	4,509	2,140
3. Fringe Benefits	16,385	17,415	14,642	14,152	13,796
4. Travel	54,196	66,237	48,121	68,096	59,735
5. Other Direct Costs (including Materials & Services and Equipment)	31,817	32,513	47,850	34,043	34,309
6. Indirect Costs	<u>33,210</u>	<u>34,959</u>	<u>33,285</u>	<u>26,960</u>	<u>22,522</u>
TOTALS	\$253,582	\$276,294	\$266,991	\$234,661	\$193,422
GRAND TOTAL					<u><u>\$1,224,950</u></u>

*Figures for FY'76 include estimates for April, May and June.

APPENDIX II

ROSTER OF SEPA/APSP PERSONNEL

Dr. H. M. Dyasi	SEPA Executive Secretary	1971 - 1975
Dr. A. I. Kamara	SEPA Education Officer	1974 - 1976
Dr. D. E. B. Chaytor	Director, Teacher Training Materials Development Project (part-time)	1972 - 1976
Dr. R. H. Robins	EDC Director APSP	1971 - 1976
Dr. R. W. Carlisle	EDC Director APSP	1971 - 1972
Dr. J. S. Goldstein	EDC Academic Consultant (part-time)	1971 - 1974
Dr. E. A. Godfredsen	EDC Science Educator, Kenya and Tanzania	1971 - 1975
Mr. D. Seager	EDC Science Educator, Uganda	1971 - 1972
Mr. J. P. Seawell	EDC Science Educator, Ghana	1971 - 1974
Mr. M. B. R. Savage	SEPA Education Officer EDC Science Educator, Kenya	1971 - 1973 1973 - 1976
Mrs. M. J. Neuendorffer	EDC Program Editor (part-time)	1971 - 1976
Miss B. Morse	EDC Administrative Secretary	1971 - 1975
Mr. W. Asumeng	SEPA Administrative Officer	1974
Miss K. Crowley	EDC Administrative Secretary (part-time)	1976
Mr. Phaniel R. Nyaku	SEPA Acting Executive Secretary	1976

APPENDIX III

Education Development Center

AFRICAN PRIMARY SCIENCE PROGRAM Contract afr-791
Logical Framework

<u>Summary</u>	<u>Indicators</u>	<u>Assumptions</u>
<u>Project Purpose</u>		
Implement APSP-type science in primary schools of English-speaking Tropical Africa	<ol style="list-style-type: none"> 1. APSP-type science will have been incorporated in the primary curriculum of at least 6 countries by June 1973. 2. APSP-type science incorporated in curriculum in majority of training colleges in these 6 countries by 1976. 3. An estimated 2,000,000 primary school children have had classroom exposure to APSP-type science by 1976. 	<ol style="list-style-type: none"> 1. Science continues as an educational priority in participating countries.
<u>Project Output</u>		
<ol style="list-style-type: none"> 1. New APSP-type materials available in quantity for teaching science throughout primary grades. 2. Primary Science Curriculum Centres exist with local staff. 3. African science tutors trained in APSP-type science to staff training colleges. 	<ol style="list-style-type: none"> 1. At least 6 countries have provided materials in quantity from local funds for widespread use by 1976. 2. At least 1 local professional staff person trained in APSP Science Curriculum Development paid by local funds will be available to oversee implementation in each adopting country by 1973. 3. 90% of all science tutors in adopting countries will have participated in at least 2 in-depth program-supported workshops to improve skills in APSP-type science by mid-1973. 	<ol style="list-style-type: none"> 1. Countries have means for producing & distributing simple science apparatus 3. Reasonable continuity exists among science tutor staff.

APPENDIX III (cont'd.)

Summary

Indicators

Assumptions

4. TTC materials prepared for tutors.

5. Pan-African organization (SEPA) established to continue Inter-African Technical Assistance in science education.

6. Broad participation in SEPA programming by African governments.

4. Tutor guide materials will have been produced at program-supported workshops for use in training colleges in adopting countries by mid-1974.

5a. SEPA is legally established & staffed by Africans. Secretariat expenses 75% underwritten by participating governments by 1976. Contributions will have been received from at least 9 countries.

5b. Financial support for SEPA programming will have been received from at least 2 External Aid agencies other than USAID by 1974.

6. All English-speaking Tropical African countries will have participated in one or more SEPA sponsored activities. Overtures will have been made to involve Francophone Africa in SEPA affairs by 1976.

5. Acceptance of principle of inter-governmental cooperation in education by participating governments.

Contract of \$647,366; 7/1/71 - 6/30/73

Oct. 25, 1972

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