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from

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of the

Southeast Asia Ministers of Education Organization (SEAMEO)

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FOREWORD

My major responsibility at RECSAM has been to advise the Training Division, but as I shall indicate later in this report I have also served as a consultant to the other divisions as well.

In this report I shall describe my activities as adviser to the Training Division, as consultant to the other divisions, and miscellaneous activities such as participating in seminars and visiting SEAMEO countries. I shall also discuss the effectiveness of RECSAM as I see it, and suggest ways for improving the role of RECSAM as an agent for change in science and mathematics education in the SEAMEO countries.

In August 1971 I prepared an interim report on my activities at RECSAM. In that report I went into detail on some topics, such as the content of the elementary science course, that I do not consider in this final report. I also wrote in more detail in the interim report on other topics that are considered briefly in this report. For these reasons the interim report is included here as Appendix A to supplement the discussions in the final report.

1.0 THE SEAMEO SETTING

The general objective of the Southeast Asia Ministers of Education Organization (SEAMEO) Regional Centre for Education in Science and Mathematics (RECSAM) was stated by the Steering Committee in October 1967 as: "To help the participating countries in improving the teaching of science and mathematics in the SEAMEO region in order to lay the foundations for meeting the technically and scientifically trained manpower requirements of the region. It is proposed to start initially at the elementary and secondary levels and to involve teacher training institutions and Colleges of Education Faculties of Mathematics and Science and other Faculties as may be necessary in implementing the program."

The Steering Committee went on to describe the major functional areas of RECSAM's activities. These are: 1) Training, 2) Research and Development, 3) Special Services, and 4) Information Centre and Clearinghouse.

I think it is important at the outset of this report to describe the setting in which RECSAM operates. The setting is the eight SEAMEO countries that differ greatly in economy, in the nature of their educational systems, in their social structures, in their stage of development in science and mathematics education and in the qualifications and the needs of the educators who come to RECSAM. This discussion is important to the rest of the report, because it points up one of the difficult problems at RECSAM, which is how to conduct programs that are truly regional in character while at the same time catering for the diverse needs of the SEAMEO member countries and of the educators who come to RECSAM from them.

1.1 Economics and Education

Economically the SEAMEO countries range from Singapore, which is prosperous, peaceful and highly industrialized, to Laos, the Khmer Republic and Vietnam which are economically depressed, war-torn and largely agricultural. The educational system in Singapore is well-organized and well financed and the teachers are well trained. In Laos, Khmer Republic and Vietnam the educational systems are disrupted by military activities, they are poorly financed, and the teachers in general are poorly prepared. The other four SEAMEO countries, Indonesia, Malaysia, Philippines and Thailand, have mixed economies, but are still predominantly agricultural. Of the four, Indonesia is the poorest and has the greatest educational problems. Malaysia has a rapidly growing industrial sector and a rising economy, though agriculture (including rubber, lumber, palm oil, sugar, rice, etc.) outweighs mineral industries, and light and heavy industries in the total economy. Malaysia is actively striving to improve elementary and secondary science and mathematics education. The same is true of the Philippines where the Science Education Center at the University of the Philippines and the Bureau of Public Schools have made major strides in improving primary and secondary education. Thailand is something of a special case. In and around Bangkok there are industries of various kinds, and the schools are quite good with reasonably well-trained teachers. In the

rest of the country, with the exception of larger cities such as Chiangmai, the economy is agricultural and the schools are quite poor. Some efforts are being made by the Thai Ministry of Education to improve elementary and secondary education, but the major attack is being made by the UNDP financed institute for the Improvement of Education in Science and Technology at Chulalongkorn University.

1.2 Educational Systems

The educational systems of the SEAMEO countries that were formerly colonies of European powers, have been strongly influenced by the educational systems of those powers. Education in Singapore and Malaysia is distinctly British. In Laos, Khmer Republic and Vietnam it is French, though there is some breaking away particularly at the secondary level in Laos and Vietnam. Education in the Philippines is distinctly American in pattern.

Both the quality and the quantity of education varies greatly throughout the SEAMEO region. In Malaysia and Singapore more than half the children of school age have at least some secondary school education. In countries such as Indonesia and Laos less than 10% of the children of school age are in secondary school. In Laos the majority of children leave school by the end of the third year, and many children, especially girls, do not go to school at all.

In the poorer countries many of the teachers, particularly at the elementary level, are not qualified even by country standards. In Laos, for example, a qualified elementary teacher must complete six years of school plus two years of normal school. More than half of the Laotian elementary school teachers have not had even that much training.

In the more affluent SEAMEO countries almost all teachers are qualified, even at the elementary level. Most Philippine elementary school teachers have bachelors degrees (ten years of school plus four years of university). In Malaysia and Singapore elementary teachers are certified after eleven years of school and two years of teacher training.

1.3 Social Structures

The voice of authority is strong in southeast Asian countries. With the possible exception of the Philippines this means that the teacher's word is law. With few exceptions, classrooms that I have visited in Malaysia, Singapore, Thailand and Laos have been quiet with the children in neat rows and the teacher standing in front of the class talking. Teachers do ask questions, but they are questions to which the pupils are supposed to respond with the right answer. The attitude of teachers to children is indicated by an incident that took place while the elementary science course was in session at RECSAM this year. One of the participants prepared a lesson and taught it to a Standard IV (10 to 11 years old) class at a British-type private school in

Penang. The class was a lively one and the classroom was somewhat noisy. But the thing that most impressed the participants who observed the class was the relationship of the children to the teacher. One of the participants said after class, "Why, the children even argued with the teacher. That could never happen in my country!"

1.4 Syllabi and External Examinations

National syllabi are the rule in SEAMEO countries. The course of study is laid down by the Ministry of Education, and teachers are expected to follow it closely. Both students and parents object if a teacher spends time on topics not included in the syllabus, or if he uses teaching methods that do not emphasize learning the facts specified in the syllabus. So teachers follow syllabi closely.

In most SEAMEO countries the success of a teacher is measured by how many of his pupils pass the external examinations that are prepared by or under the direction of the Ministry of Education. Since the examinations test how well the pupil has memorized facts about the topics in the syllabus, the teacher is lothe to use teaching methods other than rote memorization of facts.

1.5 New Curricula

In spite of the rigidities in the educational systems discussed in 1.3 and 1.4, there are efforts afoot in most SEAMEO countries to develop and introduce into schools new curricula in science and mathematics. Some of these are well advanced. The elementary and secondary science programs developed at the Science Teaching Center of the University of the Philippines is one of these. Others are in process of development and are being used in many schools. The elementary science program developed by the Malaysian Science Education Center is one of these. Still others are being tested in a few schools. An example is the fifth year process-oriented science program in Bangkok. And still others are in the early stages of planning and development. Such as the secondary school science programs of the Institute for the Promotion of Teaching of Science and Technology at Chulalongkorn University in Bangkok.

An important and common feature of all of the new science and mathematics programs being developed in the SEAMEO countries is that they emphasize learning science by investigation rather than by rote memorization. This is, of course, the approach to teaching science and mathematics that has been emphasized by all of the new curriculum development projects in the United States, the United Kingdom, and other countries active in science and mathematics curriculum development. Learning science and mathematics by investigation cannot be done in the traditional tidy classroom. So here there is a conflict between the social structure (section 1.3 of this report) and the new methods of teaching. How the conflict will be resolved remains to be seen. I discussed the problem with Mr. Abu Hassan, the director of the Malaysian Science Education

Center and the person responsible for preparing new student-activity elementary science teaching materials. Abu Hassan said, "Yes, the units we are producing encourage children to ask questions and to learn from the things they investigate rather than from the teacher. This is counter to the culture. But we will introduce the units into the schools and see what happens." He went on to say that the most important thing the Center has to do is to change the teacher; and specifically to change the way the teacher thinks about methods of teaching. As Abu Hassan puts it, "The most important change that we have to bring about is the change in the teacher here (pointing to his head)."

1.6 RECSAM in "The Setting"

From the outset RECSAM is faced with a problem. Its charge is to operate on a regional basis, to conduct courses, train key-educators, and stimulate research, that will help the SEAMEO region improve the teaching of science and mathematics. But the needs of the member countries of SEAMEO are varied both in quantity and in quality. The problem then is how to conduct courses and other programs at RECSAM in such a way as to be helpful to all of the participants from all eight SEAMEO countries.

The groups who prepared the Operation Plan for RECSAM in 1968 did not take account of this major problem. The courses they outlined assumed, at least tacitly, that all of the participants from the SEAMEO countries who attended them would have similar backgrounds, similar interests and similar educational experiences in their countries. No suggestion was made that the language of instruction at RECSAM might pose a problem to some participants.

RECSAM's problem is how to reconcile the plans for the courses that were outlined in the Operation Plan that was prepared in 1968 with the current needs of the SEAMEO countries; and how to maintain an international character to the courses while at the same time catering for the individual needs of the participants and of the countries from which they come. Some approaches to a solution to the problem will be discussed later in this report.

2.0 THE ORGANIZATION OF RECSAM

2.1 The Divisions

RECSAM is organized into four divisions: Administration which is headed by the Registrar/Bursar, and the three services divisions Training; Research, Development and Evaluation; and Special Services and Information which are headed by Assistant Directors. According to the Organization Plan, the heads of the divisions report to the Deputy Center Director and he reports to the Center Director.

Of the three services divisions the Training Division has been the most active since RECSAM entered its operational phase in 1970. From January

1971 to the present, the Training Division has conducted eleven courses in elementary and secondary school science and mathematics. Three of these courses (in secondary science) are still being conducted as I write this report in May 1972. The eleven courses have been attended by over 200 participants from the eight SEAMEO countries.

The Research, Development and Evaluation Division began operation in August 1971 with two courses. The Division is now conducting a third course and is scheduled to conduct ten more courses later in the year.

The Special Services and Information Division has only just begun to function. Several activities related to the division will be discussed in section 3.4 of this report.

2.2 The Staff

The staff positions at RECSAM are filled in part by Malaysians and in part by educators from the other SEAMEO countries. All through 1971 the activities at RECSAM were handicapped by a shortage of staff. When I arrived there were four staff members, all Malaysians, the Director, the Assistant Director (Training), the Training Officer (Science) and the Registrar/Bursar. Later in the year two more staff members (also Malaysians) were added. One was the Training Officer (Mathematics) and the other the Information Officer.

In 1972 the situation began to improve with the addition of three more staff members; Assistant Director (Research) from the Philippines, Train-in Officer (Mathematics) from Thailand, and Training Officer (Biology) from Singapore.

There are still three unfilled positions in the Training Division: Training Officer (Chemistry), Training Officer (Physics) and Training Officer (Elementary Science).

In the Research, Development and Evaluation Division there are two unfilled positions at the moment, one in chemistry and the other in elementary science. Two other research officers are scheduled to be appointed in 1974, one in biology and one in physics. Because of the shortage of staff in the Research Development and Evaluation Division, the Center Director has decided that the staff of the Training Division will also serve the RDE Division.

The Assistant Director (Special Services and Information) is still to be appointed. Two more appointments in this division are scheduled for 1973 These are the Librarian and the AVA Supervisor.

While the training and research staffs of RECSAM have had extensive experience in teaching,--mainly at the secondary and teacher training levels--and in administration, they have not had much previous experience in curriculum materials. Only two of the staff have their doctorates--Dr. Ponniah, Training Officer (Biology) and Dr. Tating, Assistant Director (Research).

The key position that is still unfilled is that of Deputy Director. The Deputy Director is slated to be appointed from a SEAMEO country other than Malaysia. So far no applications or nominations have been received. According to the Operation Plan prepared in 1968, the Deputy Center Director is to be responsible "for the day-to-day operations of the Center, thus releasing the Center Director for attention to external problems. He would make decisions as to project selection . . . and would be responsible for reviewing the outputs of each Division and insuring high quality. He would act as chairman of a panel of Division Heads to plan future operations and appraise Center output. He would also be responsible for internal budget control of the Center's operations."* Until a Deputy Director is appointed, his duties are shared by the Director and by the Assistant Director (Training). The burden that they share is becoming heavier as more staff members are appointed, and as the new buildings are being occupied. From August 1971 to March 1972, when Dr. Tating joined the staff, the Assistant Director (Training) was also acting Assistant Director (Research).

2.3 The Advisers

When I came to RECSAM in February 1971 there were two advisers from non-SEAMEO countries. Now there are six. In February 1971 the advisers were myself, Training Adviser, and Dr. Shindo, a biologist from Japan. The present advisers include two Americans, Training Adviser and Research Adviser (J. Dasbach), three British, Elementary Science (D. Harper) and Secondary Physics (A. Everest), and Mathematics (K. Watson) and one Japanese biologist (Dr. Sudzuki).

The intended major function of the advisers is to work closely with their SEAMEO counterparts on the staff. In fact, the major function of the advisers has been to direct and teach courses. There are two reasons for this: the shortage of staff and the heavy staff workloads. I have already described in 2.2 the extra load that the Assistant Director (Training) carries. Because of this load he has not been able to devote much time to training activities, and so, as I shall discuss in more detail in section 3.0, I have not been able to work as closely with him as I would have liked on training programs.

Since there are still no Elementary Science, Physics or Chemistry staff officers, Mr. Harper and Mr. Everest have no counterparts to work with. With the arrival of the Assistant Director (Research) in March, Mr. Dasbach now has a counterpart, and seems to be establishing a good working relationship with her. Mr. Watson has been working closely with the two mathematics staff officers, one Thai (Training) and one Malaysian (Research), though most of his time has been spent teaching in the mathematics course since he arrived

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* Part I - Operation Plan, P5/SCMS/14, Nov. 1968.

last January. During the year that he was at RECSAM, Dr. Shindo and the Training Officer (Science) worked together developing techniques for producing inexpensive science and mathematics teaching equipment from glass, plastic and styrofoam.

2.4 Visiting Consultants

More than twenty visiting consultants have come to RECSAM since January 1971 to assist in teaching courses. The consultants have come from the United States, United Kingdom, the Philippines, Singapore, Thailand, and Malaysia. These consultants spend from one to four weeks teaching in their area of specialty. Most of them have had considerable experience producing, teaching or evaluating one of the modern curriculum programs in elementary and secondary science and mathematics. They have contributed a great deal to the success of the RECSAM courses. Unfortunately, the staff of RECSAM have not had the time to take full benefit of their presence, so it has been the course participants and the long-term advisers who have profited most from their presence.

2.5 RECSAM's Facilities

Until late March 1972 when RECSAM took occupancy of the 60-unit hostel block that had just been completed, all of RECSAM's activities were carried out in premises leased from the Malayan Teachers College and the University of Penang.* The participants in the present secondary school science courses are housed in the new hostel, but all of the teaching and administrative activities are still carried on in Malayan Teachers College and University of Penang buildings.

A second building is nearing completion and will be occupied late in June. This building will in the future be the recreation/dining block for the participants, but for the time being it will be used for administrative and staff offices. When the offices are moved to the new building the space occupied at present by staff offices will be converted into library space. This will be a boon since the present library is much too small. The present business office will be converted into a much needed laboratory. But all of the teaching will still be done in borrowed premises for at least another two years.

Undoubtedly the RECSAM training and research programs could be carried on more efficiently and effectively in more adequate quarters. But in spite of the inadequacies of the facilities, courses have gone ahead as scheduled. The patience and forbearance of staff, advisers, visiting consultants and participants have contributed to the relatively smooth functioning of the Center. There are problems to be sure. The teaching space is not always appropriate to the activities. There is no permanent storage space

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* Recently renamed The University of Science and Technology.

in classrooms and laboratories. The storeroom has moved twice since I have been here. The second move was into a concrete block house built for the purpose. But the new storeroom quarters are much too small, and as more and more equipment and supplies are purchased it becomes increasingly difficult to store them in a way in which they can be easily found. The storeroom is some distance from the laboratories and classrooms, and supplies have to be carried back and forth daily.

A serious problem that results from operating in borrowed quarters is that classrooms and laboratories cannot be kept open except during scheduled class hours. This inhibits the participants from working on their own during "off" hours. And the workshop which is essential for the construction of the inexpensive teaching equipment so important to Southeast Asian countries, is open to participants only a few hours a week. RECSAM looks forward eagerly to the time when it can occupy its own teaching block, but construction of the block has not yet begun.

The participants have been patient and forebearing with the logistic problems just described, but on one matter they have expressed strong feelings. That is the matter of food. Institutional cooking done on a limited budget is seldom very good. But the food provided by the Malayan Teachers College food contractor to the RECSAM participants is really quite bad. One problem is that, because of Moslem food requirements, pork cannot be served at Malayan Teachers College--and pork is, of course, a staple food in most southeast Asian cultures. Many of the participants take at least some of their meals at restaurants near the campus, even though the cost of those meals comes out of their own pockets. It is to be hoped that when RECSAM operates its own food service conditions will improve.

3.0 MY ACTIVITIES IN THE TRAINING DIVISION

In this section of the report I shall comment on my activities using the list of eight duties stated in my contract with the United States Government.* Each subsection refers to one of the items in the contract. Thus, section 3.1 refers to contract item I.B.1.a.

3.1 (item I.B.1.a) "Guide and advise the Assistant Director (Training) for planning, staffing and managing the Training Division."

Planning for the training division suggests that there might be a deviation from the Operation Plan set down in 1968. There was no deviation as far as courses were concerned, though there have been some changes in content (see section 3.2).

Staffing the Training division was, in 1971, done mainly by visiting consultants. One of my first tasks when I arrived at RECSAM was to suggest people who might be induced to come to teach in courses for short periods.

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* Contract AID/ea-145 (Regional). PIO/T 498-198-3-10002. Article I.B.1.a through h.

There has been little top level management of the Training Division. For the most part the course directors have managed their own courses and the Assistant Director (Training) has arranged for visiting consultants to help conduct them. Where special arrangements needed to be made for events such as the educational tour to Kuala Lumpur, which the participants in each course take, the award ceremony at the end of each course, or visits to schools in Penang, the Assistant Director (Training) was better informed than I so there was little or nothing I could offer in the way of advice.

One area of management on which I have given the Assistant Director (Training) some help is the organization of the science and mathematics supplies storeroom. With the move of the storeroom into its present quarters (see Section 2.5), all incoming supplies went first to general stores from where they were released by the general storekeeper to the laboratory assistant who keeps the science storeroom. This system was very cumbersome and slow, so now supplies go directly to science stores, bypassing general stores. The organization of the supplies in the science storeroom remains a problem because of inadequate space.

3.2 (item I.B.1.b) "Assist the Assistant Director (Training) in developing the technical contents of the science training projects ensuring quality of output and achievement of course objectives."

The technical contents of the elementary and secondary science and mathematics courses that have been conducted by the Training Division during my time at RECSAM have been developed mainly by the advisers and the visiting consultants. As I have said already, the Assistant Director (Training) has had to assume many of the functions of the Deputy Director and so has not had time to concern himself very much with the technical contents of the projects.

While I was working with the participants in the elementary and secondary science and mathematics courses during the first few months I was at RECSAM, I became concerned that we were expecting all participants to do the same things, work with the same project materials, and were not taking account of the diverse needs which I have discussed earlier in the report (sections 1.2 and 1.3). I suggested to the Assistant Director and Director that in future courses each participant should spend part of his time working on an individual project that was directly related to his own and his country's needs in science or mathematics education. This suggestion was accepted by the Assistant Director (Training) and by the Center Director, and was tried for the first time in the 1972 courses. The participants in the elementary science and mathematics courses completed their individual projects in March, and those in the secondary school science courses are now working on theirs. Approximately one-third of their time is spent on individual projects. The participants work enthusiastically on their projects. The results so far have been quite good and, I believe, will be of practical use to the participants in their home countries.

Although, for the reasons already stated, I was not able to help the Assistant Director (Training) very much in planning the technical contents of courses conducted in 1971 and early 1972, I have been giving advice on future courses and programs. Later this year several projects will be conducted for the first time. Among them are "Development of Primary Science Kits" and "Development of Chemistry Prototype Syllabus". Both of these were described in the 1968 Operation Plan. Recently I have spent considerable time with the Assistant Director (Training) discussing whether the projects as described in the Operation Plan are relevent to the current needs of the region. We have agreed that they are not. As a result of these discussions the plans for the two projects mentioned have now been changed to "Developing Primary Science Teaching Aids" and "Developing Programmed Instruction Materials for Secondary School Chemistry". Similar changes have been made in several other projected programs.

3.3 (item I.B.1.c) "Work with the Assistant Director (Research) on problems involving instructional design and new syllabi development."

Since the Assistant Director (Research) has only recently been appointed, there has been no opportunity to work with her on problems involving instructional design and new syllabi development. Before J. Dasbach arrived, I did give some assistance to the Assistant Director (Training) in planning for the first two research programs that were held in August. Those programs were "Science and Maths Requirements Analysis" and "Administrative Techniques for Project Implementation."

3.4 (item I.B.1.d) "Assist other RECSAM Divisions as appropriate."

I have done several things that, had the Special Services and Information Division been in operation, would have been considered assistance to that division. After the 1971 elementary science course was finished, it was decided to send to the Ministry of Education of each of the SEAMEO countries samples of the various curriculum project materials that the participants had worked with. I made the selection of the items to be sent, designed the packet into which they were put and wrote a brochure to explain to the ministries the purpose of the sample packet and the nature of the materials included.

I prepared for the Center Director a list of books that should be added to the library. He has used the list in approaching potential donors to the RECSAM library. I also purchased and donated to the library a set of mathematics books from the School Mathematics Study Group (SMSG) project.

Several times last year I discussed with Mr. Alan Mulder of the SEAMEO Regional English Language Center (RELC) in Singapore the problem of assisting the participants whose English is poor. Many of these participants come from former French Indochina and speak French better than English. Mulder agreed with me that if we could provide those participants with some materials in French it would at least boost their morale and at best help them understand the new approaches to teaching science and mathematics.

I suggested to the Director and Assistant Director (Training) that as a start in providing materials in French, we obtain from the Far West Regional Laboratory in Berkeley, California the film strip - audio tape presentation they had prepared to introduce several new United States science curriculum projects to educators, parent-teacher organizations and so on. The film strips and tapes were purchased by RECSAM, and I obtained permission from the Far West Laboratory to have the tapes translated into French. The translation was made by a Penang school teacher who had studied in France. Unfortunately his translation was too literal, partly because he did not understand all of the American English on the tapes. Phrases such as "alphabet soup" bothered him. So we started again. Mr. Everest, the secondary school science consultant from England, "translated" the American English into British English. The British version is now being translated into French by a native Frenchman, the director of the Alliance Francaise in Penang. I am recommending that if this project turns out to be useful, the Special Services and Information Division extend it and prepare other audio visual aids in English and French, and later in the national languages of the SEAMEO countries. Over a period of years, such a project might turn out to be extremely helpful to the SEAMEO countries.

Finally, at the request of the Director, I produced an information unit about RECSAM. I wrote the script for the audio tape and obtained colored slides to illustrate it. The Director used the information unit at the annual meeting of SEAMEO in Vientiane, Laos in January where, he said, it was well received. The unit has many faults. It is too long, and some of the art work is poor. But it is a prototype. It is now being shortened and revised and new illustrations are being prepared with the assistance of Mr. Short, the A/V expert from SEAMEO. The information unit should be helpful not only in briefing the many visitors to RECSAM on the activities of the Center, but also in presenting RECSAM to potential donors. The Director has received requests for copies of the unit from the Ministries of Education of each of the SEAMEO countries.

3.5 (I.B.1.e) "Assist in organizing and executing appropriate training programs for members of the Center's professional staff."

This was my least successful activity. Until September 1971 there was no opportunity to organize and execute training programs for the staff, because we were all busy all of the time conducting courses. With the arrival of more consultants in July and August, I began to plan a series of seminars for the staff from September through December when the course load was light. But other activities interfered and the seminars never came off.

Informally the staff has undergone training during the time I have been at RECSAM. Through informal discussions between staff and consultants there has been a noticable change in the staff's understanding of the philosphy of teaching science and mathematics through pupil investigation instead of by rote learning and teacher direction. One of the staff, the Training Officer (Science), told me enthusiastically that he now understood the philosophy of

the United States elementary science programs after viewing the Far West Laboratory information unit several times.

Two visitors to RECSAM provided some education experiences for the staff. One of these was Dr. Robert Ward of the University of Chicago who spent several years as science adviser at the Science Education Center of the University of the Philippines. Dr. Ward wrote to me to say that he was returning to the Philippine Center for a month in May 1971 and would like to come to RECSAM for a visit. The Director and I arranged for him to spent a week here in June 1971 helping us evaluate the elementary science course that had just finished. While he was here he had both formal and informal discussions with the staff about curriculum development and evaluation.

The other visitor was Dr. Martin Schein of the University of West Virginia. Dr. Schein came to Penang in July 1971 to visit me enroute from a meeting in India to the University of Hawaii where he was to spend a few weeks helping Dr. Francis Pottenger in the development of the junior high school science project "Foundational Approaches in Science Teaching (FAST.) While he was here, Dr. Schein gave a lecture on modern approaches to teaching the biological sciences, and had informal discussions with the RECSAM staff.

At the time Dr. Schein was here, the Center Director was preparing to go on a several-week trip to Hawaii, the United States and Japan. Dr. Schein and the Director made plans to meet in Hawaii, and the Director told me on his return that he had spent a very profitable day with Dr. Schein visiting the project. I arranged another educational visit for the Director on his trip. It was to the Science Curriculum Improvement Project (SCIS) in Berkeley, California.

This is an appropriate place to mention an educational tour that the Assistant Director (Training) took in November and December, even though I had no part in arranging for it or planning his visits. He obtained a grant to travel in England and Scotland where he visited curriculum development projects, schools and teacher training colleges. From comments he has made from time to time since his return to RECSAM, I infer that his tour was truly an educational experience for him.

3.6 (item I.B.1.f) "Periodic travel to the SEAMEO countries to follow up with the Ministries of Education on training courses held at RECSAM."

My first trip away from Penang was in May 1971 when I went to Singapore and visited at RELC and INNOTECH, and with Dr. Ruth Wong, the Director of Research for the Ministry of Education. At RELC I discussed the English language problem of the course participants at RECSAM, and it was during this discussion that I mentioned the idea of translating the Far West Laboratory information tapes into French (see item 3.4). At INNOTECH I investigated with the staff possible ways in which RECSAM and INNOTECH might cooperate in developing individualized instructional materials for RECSAM.

Dr. Ruth Wong told me about the development of the new combined science/math/language program that is going on in the Ministry, and took me on a visit of two schools where the new materials are being tried out.

I did not have an opportunity on that trip to visit with former RECSAM participants.

My second visit was to Kuala Lumpur to meet with the director, Mr. Abu Hassan, and the Peace Corps consultant, Dr. Richard Salinger, of the Science Education Center. The Center is developing a science program for elementary schools, preparing teaching equipment and organizing teacher training programs at "centers of excellence" throughout the country. Key teachers come from the centers of excellence to the Center for training; then they return home and conduct training courses for other teachers. At the Center Hassan, Salinger and I discussed possible ways in which RECSAM might assist them. Training some of their center workers and key teachers had already been done at RECSAM. The possibility that RECSAM might conduct special training programs on contract with the Center was discussed. There have been some follow up discussions but no action yet.

During that trip I also had a brief visit with the joint Malaysian-British team which was starting a training course for teachers of the Malaysian adaptation of the Nuffield secondary school science programs. The team was headed by Dr. Gordon van Praagh, of CEDO, who has also been directing the development of the new Malaysian science courses. A few weeks later some members of the writing teams met at RECSAM with Dr. van Praagh to work on revision of the new science curricula.

After the arrival of more advisers and staff in July and August, and with the respite from courses starting in September, I recommended to the Director that visits by teams of consultants and RECSAM staff be made to meet with ministry officials and former RECSAM participants in the SEAMEO countries. The purpose of the visits was to be several fold: to find out from the participants whether and how their experiences at RECSAM had been useful to them on their return to their countries; to get participants suggestions on possible changes in the RECSAM programs; to meet with Ministry officials to discuss country needs in science and mathematics education and the role RECSAM might play in meeting them; and to visit schools and school administrators to see at first hand something of the progress and the problems in the educational systems of the SEAMEO countries.

The advisers and staff prepared a suggested itinerary for the visits, and the proposal was presented to the Governing Board in October. After extended discussion by the Governing Board, much of it opposed to the visits, the Board agreed to approve the visits. The visits were held in November and December. The staff and advisers were formed into three teams. Each team was scheduled to visit two or three of the SEAMEO countries. Mr. Everest, the secondary school science consultant from England and I were scheduled to visit Thailand, Laos and the Khmer Republic. Because of military activity around the airport in Phnom Penh, and because the American ambassador to the

Khmer Republic requested that no Americans come to Phnom Penh during the latter part of November, we cancelled our trip to the Khmer Republic.

Mr. Everest's and my visit to Thailand and Laos were informative to us and should be useful to RECSAM. We prepared detailed reports of the visits for the director of RECSAM. Briefly, the reports tell of our discussions with ministry officials, administrators, curriculum developers and former RECSAM participants. They discuss educational problems, curriculum improvement programs (in particular the work of the Institute for the Improvement of Education in Science and Technology at Chulalongkorn University in Bangkok), country needs and suggestions for ways in which RECSAM can improve its contributions to the reform of science and mathematics education in Southeast Asia.

Two of the suggestions were that RECSAM assist Laos in setting up a model school cum education center in Vientiane, and that RECSAM put on a special course for eight or nine graduates of the new English section of the Ecole Superiour Pedagogie (ESP) in Vientiane. We presented this suggestion to the Director after we returned to RECSAM. He, in turn, discussed it further with the Ministry officials in Laos in January, and agreed that RECSAM would put on a special course during July and August. This will be the first course tailored to meet specific country needs.

All of the RECSAM advisers have recommended to the Director that country visits be made periodically (at least every other year), for only through such visits can RECSAM keep informed on country needs, the progress of science and mathematics education in the SEAMEO countries, and the activities of RECSAM alumni.

3.7 (item I.B.1.g) "In general, assist the faculty of RECSAM to maintain a high level of academic standards in carrying out training activities for the SEAMEO countries."

A high level of academic standards is not necessary or desirable for RECSAM training activities if the term "level of academic standards" is taken to mean "level of sophistication of subject matter" -- which I believe it frequently connotes. A high level of academic standards in this sense will not help the participants in RECSAM training programs, particularly if they come from countries where academic standards, or level of sophistication of subject matter, is low. The function of RECSAM is not to help countries raise the level of sophistication of curricula, for example by introducing molecular orbital theory into secondary school chemistry, but rather to insure that what <u>is</u> included in the country's curricula is honestly and properly taught.

What is most important is a high level of <u>teaching</u> standards both in RECSAM courses and in the schools of the SEAMEO countries. The first change that must be made in science and mathematics education in the SEAMEO countries is in the approach to teaching. Modern science and mathematics teaching must be pupil-centered, not teacher-centered. It must emphasize investigation by

children, not lecturing by teachers. Even in a country where the level of sophistication of subject matter is low by United States standards and the curricula are traditional, a change from teacher-centered to student-centered teaching can bring improvements in education.

All of the advisers, and all of the consultants who have helped conduct RECSAM courses have emphasized the importance of pupil-centered teaching by teaching that way themselves. I believe that by example the advisers and consultants have brought the staff of RECSAM to the point where they are convinced of the superiority of pupil-centered over teacher-centered teaching.

Another aspect of maintaining a high level of standards in RECSAM training activities is determining whether training programs actually produce the desired effects in the participants. This means that as a start the objectives of each course or program should be clearly and specifically stated, and that at the end of each program an evaluation should be made to determine whether the objectives have been achieved. Neither of these two things is yet being done satisfactorily. The course objectives stated in the Operation Plan are frequently vague and sometimes conflicting. The evaluation questionnaire given at the end of each course is not sufficient to determine whether the course has produced the desired effects in the participants.

As a first attempt to evaluate the effect of a course on participants, I prepared a fact/attitude/interest questionnaire for the participants in the secondary school chemistry course and gave it to the participants to fill out when the course started in March. Unfortunately, I will not be at RECSAM when the course is completed to administer a follow-up questionnaire prepared specifically for the course, but the results of the general end-of-course questionnaire that has been prepared by J. Dasbach, the Research Adviser, may give some indication of changes in participants attitudes brought about by the chemistry course.

Closely related to high standards of RECSAM training activities is relevance of these activities to the needs of the SEAMEO countries and to changes in the educational systems in the countries that are taking place as a result of curriculum development and implementation. I recently suggested to the Assistant Director (Training) that there is a pressing need to reconsider the 1968 Operation Plan, to eliminate any courses and programs in it that are no longer needed, to revise if necessary the statements of objectives of programs that are to be continued, and to add new programs if unfilled needs are identified. The Assistant Director (Training) has agreed enthusiastically with me on the need for revision of the Operation Plan, and suggested that revision should be carried out periodically -- perhaps every two years.

3.8 (item I.B.1.h) "Undertake any other duties in the professional field or in areas of related responsibility which may be determined by the RECSAM Director."

3.8.1 Teaching and Administration

I have taught in every course that has been held at RECSAM while I have been here. In some courses my participation was for only one or two two-hour sessions. In others, particularly in secondary school chemistry, I have done a major part of the teaching in the course. I have enjoyed these teaching experiences. They have helped me understand the backgrounds and attitudes of the participants from the various SEAMEO countries. My teaching activities could also have been helpful to RECSAM staff members had I had staff counterparts to understudy me. Unfortunately I had none.

I served as director for the chemistry course last year, and am again serving in that capacity this year, both times without a staff understudy.

3.8.2 Seminars

I have participated in two seminars for Senior National Administrators one in March 1971 and the other in March 1972. At each seminar I presented a paper in addition to taking part in the deliberations. The theme of the 1971 seminar was "Planning for National Science Education Reforms." The subject was too broad and the recommendations produced by the participants in the seminar were for the most part too broad also. I suggested that the theme of the 1972 seminar be more specific, so the theme chosen was "Strategies of Curriculum Development."

The recommendations from the 1972 seminar were much more useful. Many of them suggested specific things RECSAM might do to assist member countries in educational reform, for example: prepare a directory of experts in curriculum development and educational planning who are resident in SEAMEO countries; investigate the role of examinations in curriculum reforms and suggest ways for the improvement of examinations to support curriculum reforms; and, maintain a data bank of test items used to assist in the evaluation of the progress of students in new curricula.

A third RECSAM seminar that I took part in was held in October 1971. The theme of the seminar was "Research in Science and Mathematics Education in Southeast Asia." The participants reviewed the descriptions of the research projects in the Operation Plan of 1968, recommended changes in them and additions to them, and made specific suggestions for a role for RECSAM as a change agent in southeast Asia. One important recommendation made at this seminar and also at the two seminars for national administrators was that RECSAM should maintain a clearinghouse of information and should disseminate information to the SEAMEO countries. It was evident that the participants in the seminars felt that RECSAM should assume this role immediately. So far the Special Services and Information division has not assumed this role.

A fourth seminar that I participated in was the SEAMEO Regional Education Planning Seminar that was held in Bangkok in April 1971. At this

seminar urgent needs in education for Southeast Asia over the next decade were considered. The recommendations of the seminar were published in the report of the seminar.*

3.8.3 Assisting schools

I have conducted several Saturday morning sessions for the Penang Science Masters Association. These sessions have dealt with elementary school science and secondary school chemistry.

In September 1971, Mrs. Livermore and I conducted a one day workshop for elementary school teachers at the International School in Kuala Lumpur. These teachers were preparing to teach units from the Elementary Science Study program. Several weeks after the workshop, Mr. Robert Gaw, the director of the school wrote to request that we put on a follow-up workshop. Unfortunately it was not possible to find time to do that.

Last fall I taught a demonstration lesson to children in Junior IV (10-11 years old) at St. Christopher's school in Penang. The lesson was from the program Science--A Process Approach.

3.8.4 Building Plans

The Director asked the advisers to review the plans for the proposed administration and teaching block, and to suggest any changes that would make the building more suitable for RECSAM's activities. In reviewing the plans and suggesting changes, I used plans that I had obtained of the Science Teaching Center at Florida State University, and also drew on my experience in working with architects to design the Chemistry building at Reed College.

The advisers and staff spent several days examining the drawings in detail and discussing needed improvements such as putting classrooms and laboratories close to each other rather than in separate blocks. The revised plans and the reasons for the revisions were presented to the Governing Board at their annual meeting in October. Two members of the board acting as a subcommittee emasculated the revised plans. Unfortunately the board accepted the emasculated version.

3.8.5 TV Programs

The Ministry of Education is planning to start a series of educational TV programs in June 1972. A few months ago the staff and advisers of RECSAM met with the director of the science and mathematics TV programs. The outcome of the meeting was an agreement that RECSAM would review the science and math storyboards. I read several of the science storyboards and suggested ways to improve them.

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* SEAMEO Regional Educational Planning Seminar - Final Report, 26-30 April, 1971, pages 15-17.

3.8.6 Self-evaluation

In October 1971, the Director, Assistant Director (Training), Training Officer (Science) and Registrar prepared a response to a self-evaluation questionnaire that had been prepared at SEAMES. The Director considered the questionnaire and the response to be so confidential that he did not let the advisers see them.

In January, a two-man team from SEAMES came to RECSAM to discuss a revised form of the questionnaire. This time the advisers were asked to participate in the discussion and also to suggest in writing responses to items in the questionnaire in which they had particular interest. We also were allowed to see and comment on ther responses to the first questionnaire. We found that many of the responses were inaccurate or misleading. After the SEAMES team left, I proposed to the Director that the staff and the advisers meet for detailed discussions of items in the questionnaire that related to the training, research and services activities of RECSAM. I pointed out to the Director that the greatest value of any self-evaluation is the full and free discussion of activities and policies, and that the final report is of secondary significance. After considerable urging, the Director agreed to hold a meeting. For three hours we discussed the sections of the questionnaire of particular interest to the advisers. This was the first time since I came to RECSAM that such a discussion had taken place. The meeting was an extremely fruitful one for many good suggestions were made for improvements in courses in services to participants and alumni and in needs for research--indeed in defining what "research" is. I suggested to the Director that similar discussions be held every few months to review activities and policies and to consider needed modifications.

4.0 THE EFFECTIVENESS OF RECSAM IN FULFILLING ITS STATED OBJECTIVES

4.1 Are the present courses effective?

The present courses were designed originally to inform educators about new curricula in science and mathematics and about new ways to evaluate student progress. It was expected that such courses would spawn improvement in education in science and mathematics in the SEAMEO countries. To some extent this has happened. I believe for example, that the origins of the new fifth grade science program being tested in Bangkok can be traced directly to RECSAM. As more educators are trained in RECSAM courses a "critical mass" of educators could be built up in each SEAMEO country. Properly used by the ministry of education, this "critical mass" could effect signifcant changes in science and mathematics education.

The major defect in the present courses is still that they are concerned mainly with the question, "What are the new curricula like?" The question, "How does the teacher need to change his way of teaching?" is not considered sufficiently. I believe the courses would be more effective, and RECSAM would be more likely to influence science and mathematics education in the SEAMEO

countries, if the emphasis in the courses were changed. "How to change the teacher" is more important then "how to change the curriculum." The best curriculum can be ruined by inappropriate teaching while even a traditional curriculum can be improved by good teaching. I have suggested that the staff of RECSAM consider carefully what the objectives of each course are. That is, what should the participants be able to do at the end of the course. This has not yet been done. When it is, I think the courses will be more effective than they are now.

4.2 What about the training staff?

I am concerned that the training program is being carried on chiefly by the American and British advisers. A few excellent Southeast Asian consultants have served as short term teachers in the courses, but the major load of planning and teaching the courses has been carried by the non-Asian advisers. This situation must change if RECSAM is to be a viable agent for change in Southeast Asia.

4.3 Are the participants in RECSAM courses "key educators?"

During my first few months at RECSAM I was concerned that the participants in the elementary and secondary science and mathematics courses were not in the main key educators. The majority of them were classroom teachers and only a few were teachers college faculty members.* The latter should be in a better position to effect educational changes then the former.

As I became better informed about the educational systems of the SEAMEO countries, I came to see that there are just not enough "key educators" in many of the countries, and that if they are "key", the educators can not be spared for as long as three months to attend RECSAM courses.

So now I view RECSAM's role as <u>producing</u> key educators for the SEAMEO countries. The educators need not be "key" when they come to RECSAM, but should be "key" after they leave. Whether or not they will indeed by key educators in their own countries will depend, of course, on how effectively the ministries of education make use of their talents.

4.4 Is there effective communication with ministries of education?

RECSAM's effectiveness in improving education in science and mathematics in the SEAMEO countries will be directly proportional to the quality of the communication between RECSAM and the ministries of education. So far as I can tell the communication so far has been formal, chiefly by mail, and not very effective. There has been no planning with the ministries on how the RECSAM alumni will be used. Little or no information about the training courses

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* See 6.0 Appendix, Table 2, page 35.

has been sent to the ministries. RECSAM does not obtain from the ministries follow-up information on alumni. And with only one exception* to my knowledge, RECSAM has not asked ministries whether they needed help with special educational problems or agreed to give special help if requested.

The communication problem also relates to staff recruitment. The director has written to the ministries requesting them to nominate candidates for various staff positions, but has not followed up on the requests except by more letters. The response has been poor. Unless more vigorous attempts are made to recruit good staff members from the SEAMEO countries, RECSAM will never become a really effective catalyst for educational change.

4.5 Does RECSAM communicate effectively with educators in the SEAMEO countries?

In general the answer is no. It became clear during our country visits last November and December that many educators who should be well informed about RECSAM know little about it. Alumni had not heard anything about RECSAM since they left. Staff members of curriculum development centers, such as the Thai Institute for the Improvement of Education in Science and Technology, know about RECSAM and some have visited RECSAM, but there has been little discussion about the possibility of cooperative efforts between RECSAM and the center.

Clearly in this area RECSAM's effectiveness needs much improvement.

4.6 What about other activities and services?

4.6.1 Research and Development

RECSAM's activities in this area are so recent and on such a small scale that there has as yet been no effect on the SEAMEO countries.

4.6.2 Conferences

Some useful ideas for RECSAM activities have come from three short conferences held during the past year or so. These conferences have attracted really key educators and administrators from the SEAMEO countries. Because of shortage of staff RECSAM has not been able to implement the recommendations of the conferences.

4.6.3 Library

Important to the effectiveness of the training programs is the library, which is the responsibility of the Special Services and Communication Division.

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* Laos, see page 14.

The library is in sad shape. Although the claim is made that the library has 4000 volumes, most of these are multiple copies of texts and teachers guides from various curriculum projects. I estimate that there are not more than one hundred useful trade books on the library shelves. In spite of my recommendations, very few titles have been added to the collection during my time at RECSAM.

4.6.4 Newsletter

The newsletter is ineffective. The December 1970 issue was published in April 1972. It is dull. Keynote speeches given at RECSAM functions in 1970 are not news in 1972.

4.6.5 Clearinghouse and special services

The clearinghouse has not yet been started. Curriculum materials are available at RECSAM and as soon as space is available could be put on permanent display as a beginning of a clearinghouse of information about innovations in science and mathematics education.

RECSAM plans call for a bibliographic service to educators in SEAMEO countries. There is no bibliographic service at present.

RECSAM plans also call for a consultant service. There is as yet no consultant service.

5.0 RECOMMENDATIONS

5.1 On courses

Present training courses should be continued for several years in order to build up a critical mass of key personnel in each of the SEAMEO countrie

Course objectives should be carefully thought out, with more attention being given to "how to change the teacher".

Individual or country projects should be continued as a part of the activities of each course. This will help take care of individual differences and special country needs.

RECSAM should review annually the content and emphasis of each training course to determine whether--and if so, how--the course needs to be changed.

5.2 On participants

Efforts should be made to have more teacher trainers among the participants of each training course. Teacher trainers should be able to exert a greater affect on educational practices in the schools than could the classroom teachers themselves.

The number of participants from each country should be maintained at three per course, or even increased, and not reduced to two as was done for the 1972 secondary school science courses. Even with three participants per course the "critical mass" of key educators in each country is being built up slowly.

Participants should be given more material--books and teaching aids--to take home after the course. The present allotment of $60 per country per course for books and supplies is inadequate. With three participants per country, this is $20 per person. The amount should be doubled at least. If each participant could go home with $40 to $50 worth of books and teaching aids, this visible material outcome of a course should stimulate interest in new ways of teaching by the participants colleagues at home.

Special help with English should continue to be given to those participants who need it.

A long-range project to produce audio visual aids in native languages should be started. These aids could help participants whose English is not good. The aids could, in the future, be useful in in-service programs held in the SEAMEO countries.

Participants should be treated as the mature adults they are. Limiting them to only certain hours in the library and locking them out of laboratories during lunch time and after 4:00 p.m. is not treating them as adults.

5.3 On RECSAM staff and advisers

Vigorous efforts should be made to recruit the best possible staff. Requesting ministries of education for nominations is not the best way to get good staff. Potential staff members in the SEAMEO countries should be identified by personal visits, through members of the governing board and so on, and the ministries should then be requested to second those particular people to RECSAM. It is extremely important that a Deputy Director be appointed very soon.

Each member of the instructional staff should have the opportunity to work closely with the adviser who is his counterpart. He should be an understudy to his adviser, working with him in planning and teaching courses.*

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* In future years this mentor/understudy system might be continued along the lines suggested to the RECSAM governing board by Dr. Bitak, of the Praesamit College of Education in Bangkok. He suggested a one year overlap between outgoing and incoming staff with the new staff member understudying the outgoing staff member. He suggested further that the understudies be recent graduates who would be free to leave their countries for a few years.

Continual staff training should be carried. A series of seminars on recent developments in education--such as those proposed for the fall of 1971 but not held--could be an effective approach to continued training. I believe it will be necessary for RECSAM to have U. S. and British advisers for a number of years--probably from three to five years at least.

5.4 On RECSAM's relationships with ministries of education

A modification of RECSAM relationship with ministries in the matter of staff recruitment has been suggested in section 5.3.

RECSAM should provide more information about courses to the ministries. This information should help the ministries select appropriate participants for the courses.

RECSAM should urge the ministries to formulate plans for using RECSAM alumni in educational reform projects on their return home. The plans should be discussed with RECSAM. This would help the RECSAM staff to tailor courses to fit needs. It would also insure that the special talents of the RECSAM-trained educators are not wasted.

A two-way flow of information and ideas should be maintained between RECSAM and each of the ministries of education.

5.5 On RECSAM's relationship with educators and educational centers in SEAMEO countries

RECSAM should establish direct channels of communication with educators--particularly those in teacher training colleges--in the SEAMEO countries. These educators should know what RECSAM is doing and RECSAM should know what their needs are. Information filtered through ministries of education is not very rich.

RECSAM should establish closer working relationships with existing educational centers in the SEAMEO countries. Some of these are doing curriculum development work that RECSAM should know about. The centers should know what RECSAM is prepared to offer them.

5.6 On follow-up of RECSAM alumni

RECSAM's influence on key educators in the SEAMEO countries should not end with the award ceremony at the end of a three-month course. To be an effective catalyst for change RECSAM must establish two-way channels of information with its alumni. A newsletter, even if up-to-date and published frequently, is not enough. Some information about alumni activities could be gleaned through periodic questionnaires, but this is not enough either.

Most of the RECSAM staff and advisers who went on the country visits last November and December agree that much useful information and many ideas

were exchanged in the face to face conversations with alumni, and with ministry officials and other educators as well.

I recommend that periodic visits be made to the SEAMEO countries by RECSAM staff and advisers. These visits should take place at least every other year, and preferably oftener than that. Indeed, I think it would be worth considering having a permanently "roving" staff member in the field. This need not be one individual. Staff members could alternate every two or three months.

5.7 On research and development

At present there is a good deal of development (e.g. of new syllabi and curriculum materials) going on in the SEAMEO region, but there is little or no research (e.g. how Southeast Asian children learn scientific concepts). RECSAM has a role to play in educational development, but not, I believe in developing curricula. Rather RECSAM should develop prototype learning materials, such as programmed texts or learning packets.

RECSAM has a large role to play in stimulating educational research. I believe the best way to do this is for RECSAM to initiate some long range research projects in collaboration with educators in the SEAMEO countries. There are some useful ideas for research projects in the RECSAM Operation Plan.

There is another need in the SEAMEO region that is related to research and development. To my knowledge no SEAMEO country has asked the question "What is the purpose of science and mathematics education in our country?" There is a tacit assumption that "what is best for the rest of the world is best for us." I do not think this is necessarily true. I am sure that the science education that Singapore needs is quite different from the science education that Laos needs. RECSAM should encourage the SEAMEO countries to consider carefully what their science and mathematics educational needs are and to tailor their curricula to meet those needs.

5.8 On special services and information

5.8.1 Library

Two or three quantum jumps in the quantity and quality of the trade books in the library should be made immediately.

5.8.2 Clearinghouse

RECSAM should rapidly set up an effective clearinghouse which would collect information about educational activities in the SEAMEO region and disseminate that information in periodic reports. The clearinghouse should also collect and disseminate information about educational activities in countries outside the SEAMEO region that would be useful to the SEAMEO countries.

5.8.3 Consultant Services

RECSAM should begin to assemble a list of educators in the SEAMEO countries who could serve as consultants on educational projects in the region.

5.8.4 Bibliographic Service

This service will be useful, particularly as the SEAMEO countries begin to do research in education. I suspect that there will be no pressing need for a bibliographic service for the next two or three years.

5.8.5 Newsletter

This should be published four times a year, contain up-to-date news, and be disseminated widely. This is one of RECSAM's greatest needs.

5.9 On the Operation Plan

The Operation Plan of 1968 should be reviewed immediately and then periodically (every year or so) in the future. Many aspects of the plan are quite good, but some need to be revised, some deleted, and others added. The Operation Plan should not be a Procrustean bed.

6.0 LOGISTICS

6.1 Support and assistance from RECSAM

Logistic support from RECSAM was excellent. I had a well equipped office and good secretarial help. The director and staff were always willing to fill any requests I made for assistance.

6.2 Support and assistance from the U. S. Government

This could have been better. It was several weeks after I arrived in Penang that I found out from where I was to be reimbursed. This problem should not arise for future consultants since they will work on a contract with RECSAM.

In contrast to the British advisers I received no help in getting settled in Penang. The British Council in Penang helped the British advisers find housing. I was on my own. An American counterpart of the British Council would have been welcome.

The housing allowance was not adequate. I was able to rent a house that was large enough, but it was poorly decorated and inadequately furnished. In contrast the British advisers, whose housing allowance was 2.5 times mine, were able to live in well-decorated and beautifully furnished houses.

The education allowance was also inadequate. My children went to the least expensive private school in Penang, but the allowance did not cover the tuition and transportation costs.

There should be a periodic adjustment of allowances to take account of rising costs of housing and education. An entertainment allowance would have been welcome. The British have one.

7.0 APPENDIX

1 August 1971

BEST AVAILABLE

MEMO TO: Dr. Robert Jacobs, USAID, Bangkok

FROM: Arthur H. Livermore, Training Adviser, RECSAM

SUBJECT: Preliminary Report on activities at RECSAM for the period February through July 1971.

At this point, mid-way in my year as training adviser to RECSAM, I can look back with better perspective than I could just a few months ago at the courses, the participants and the administration of RECSAM. In this preliminary report, I shall attempt to chronicle briefly the courses that have been held, describe the strengths and weaknesses of the courses, discuss the nature and the needs of the participants, comment on problems of organization and administration, and suggest critical areas in which improvements need to be made.

Because I think that one of the greatest needs at RECSAM is a major overhaul of the course program, I shall begin with a discussion of the courses.

The Recsam Courses

Primary Courses.

When I arrived at RECSAM on 3 February, two courses were being conducted. Under the code numbers TCE-1 and TCM-1, they were courses in new developments in primary science and primary mathematics respectively. At the time I arrived, two British consultants (Mr. Edwards in primary science and Miss Hart in primary math) had just left, after having been at RECSAM since the courses started on 11 January. Mr. David Harper had just arrived from England to spend three weeks with the primary science participants. The primary math participants were left without a mathematics consultant for two weeks after Miss Hart left. Since there was no staff mathematician* most of their time until 17 February, when Miss E. Prentice arrived from Scotland, was spent visiting schools and working with Dr. Sim Wong Kooi of the University of Malaysia on evaluation. I worked with the math group for a few sessions, discussing the relationship of math to science in two U.S. elementary science programs - Science - A Process Approach, and the Minnesota Mathematics and Science Project (Minnemast).

I was told by the RECSAM staff when I arrived in February that the purpose of the courses was to expose the participants to as many new and successful science

*RECSAM now has a staff Mathematics Training Officer. He is S. Panchalingam, a Malaysian secondary school math teacher who joined the staff in July.

and math curricula as possible. And indeed that is what the courses did, and did quite well. Each consultant came to RECSAM, talked about his project and got the participants involved in working with his curriculum materials -- and then went away. There was considerable imbalance, with the British curriculum development programs getting the lion's share of the time. In the TCE-1 program, nine of the eleven weeks were spent on British primary math projects, and there was only brief mention of the Illinois Arithmetic Project and none at all of the School Mathematics Study Group (SMSG). The SMSG program has been the major agent for change in primary and secondary mathematics education in the U.S. In primary science, six weeks were devoted to British programs, three to the Philippine elementary science study, and less than two to U.S. projects.

No attempt was made to coordinate the activities of the consultants within each course, and, from conversations with the consultants, I learned that little or no information about what was to be expected of them was sent to them before they came to RECSAM. That is understandable, since the RECSAM staff had no idea of a central theme for each course, falling back instead on the idea that all that was necessary was to expose the participants to new curricula. This was unfortunate, because it resulted in the omission from the courses of work in areas such as "how to conduct an in-service training program", that could be useful to the participants in their home countries.

To give an idea of the imbalance of the courses, Table 1. shows the distribution of time spent on various topics in the primary science course, TCE-1. The topics listed in the table were included in the Report of the Primary Science Planning Workshop that was convened in Manila by RECSAM in June 1969.

Clearly there is need for better balance in the TCE-1 course if one assumes that all the topics listed in Table 1. are important to the participants. There is also a need for better balance in the primary math course and in the secondary school science and math courses that I will discuss later.

I have suggested to Chin Pin Seng (Director of RECSAM) and Lim Tang Seng (Assistant Director - Training) that the staff prepare a clear statement of the various desired outcomes of each course, decide on what percent of the time should be spent developing each topic, and inform the visiting consultants just what their roles are in the total course program. I have also suggested tailoring the programs to account for individual differences of participants. I shall have more to say in that point later in the report.

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Table 1.

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Distribution of Time Spent on Various Topics in the Primary Science Course (TCE-1)

Topic	Percent of Time
Exposure to curriculum projects	50%
Curriculum evaluation - theory and practice	12%
Teaching children	9%
Developing science lessons	8%
Discussing teaching techniques	8%
Discussing aims and objectives of primary science education	5%
Principles of curriculum development and implementation	4%
Improvising apparatus and working with glass and plastic	3%
Science in relation to other school work	2%
Child-learning theories (with the exception of a little Piaget)	0%
Techniques for in-service training of teachers	0%
Relation of science education to regional and national needs	0%

Secondary Courses.

The courses in biology, chemistry and physics began on 8 March, three weeks before the primary courses finished. The first two weeks of the courses were somewhat hectic, since the British Nuffield consultants had not yet arrived. The second week of the courses was further complicated by the fact that I had to spend some time with the primary science group since the last consultant for TCE-1 left on 12 March, and also because I was participating in the seminar for Senior National Administrators which ran from 17 to 22 March.

Since there were no visiting consultants, we began the courses by combining the three groups and discussing techniques of curriculum development and national needs in secondary school science. P. Jesuitas, the primary science consultant from the Philippines, and I conducted the three courses during the first week. Then during the second week, Khoo Tiang Lim (Training Officer - Science) worked with the biology group, and I conducted the combined chemistry and physics courses with the able assistance of young Koh Tau Koon, a recent graduate in physics from Princeton University. During that week, the participants in chemistry and physics worked with selected materials from the U.S. curriculum project Introductory Physical Science (IPS).

In the secondary school science courses, there was a better balance in the exposure to British and American programs than there had been in the primary courses. In physics, three weeks each were spent on Nuffield physics and on Physical Science Study Committee (PSSC) physics, and two weeks on Harvard Project Physics. In biology, two weeks were devoted to the Philippine adaptation of BSCS(Biological Sciences Curriculum Study), one week to BSCS (U.S. version), and three weeks to Nuffield biology. In chemistry, three weeks each were spent on Nuffield and on CHEMStudy (Chemical Education Materials Study), and a few hours on CBA (Chemical Bond Approach Project). As in the primary courses, several days were spent on the techniques and practice of evaluation with Dr. Sim. A report that I prepared for the Director on the chemistry course is included as an Appendix to this report.

There were a few logistic problems with the secondary science courses in addition to the lack of consultants during the first two weeks, but in general supplies and facilities were adequate. The University of Penang laboratories, where the courses were taught, were very fine, and the laboratory assistants were, in the main, helpful. One major problem occurred when the Harvard Project Physics materials did not arrive in time. They came after Sam Standring, the HPP consultant, had left. Also the CHEMStudy films did not arrive until the visiting consultant, John Tseng, had returned to Singapore.

The secondary school mathematics course started in June and is still running. The two visiting consultants were from England and Thailand. There has not been, nor will there be, any work with the U.S. mathematics programs in the course. However, the participants will have an opportunity to read some of the SMSG materials since I have purchased a number of the secondary school level books from that program and donated them to the RECSAM library.

The comments that I made earlier in this report on the need for better balance in the primary science and mathematics courses between exposure and attention to other important topics, apply also to the secondary school courses.

Evaluation of the Courses.

Recognising the need for some sort of evaluation of the courses, the Assistant Director - Training and the Training Officer - Science have prepared a questionaire that the participants answer at the end of each course. The questionaire is not a very good one, though some improvements I have suggested have been incorporated. But what completely invalidates it as a source of strongly negative feelings about the course is that the staff

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insists that it be signed by the participant. I have pointed out this problem to the staff, but so far to no avail.

In spite of the deficiencies in the questionaire, some participants have given helpful hints on improving the courses. Mainly the suggestions concern organization of the courses and the desire for more informal discussions with the consultants. The following quotes from the primary science and math questionaires illustrate this.

On the question of organization:

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"All topics should be linked up rather than to form pockets of knowledge. A flow chart may be prepared for this purpose."

"Need to have a better plan."

"A course of study should be tabled prior to commencement of any future courses so as to enable participants to look up books or references . . ."

"The schemes of work should be planned before the course and consultants should select their areas of study before the course begins."

On the question of more informal discussions:

"Special tutorials conducted by consultants should be encouraged at least once a week."

"There . . . /should be/ a period at least once a week for tutorial or consulting or abolish the word consultants if they merely give lectures."

". . . time for small groups to have tutorials with the consultants would be of great benefit. This would enable the consultant to know participants better and to learn their special or singular problems and difficulties."

And on an interesting and important point:

"It would be better if we are given assignments where we can make a research and exchange views among ourselves."

There are two other points that relate to the courses. One is that the participants are given very little in the way of printed material to take home with them. The secondary school participants are given some of the texts and laboratory guides, but the elementary participants get nothing but a few hand-outs from the consultants. With better planning for the courses should go planning for materials (including simple apparatus) that the participants can take home.

The second point is that there is no follow-up of participants after they leave RECSAM. The Director says that when an Information Officer is appointed information will be obtained about what former course participants are doing --- but that is not enough. There needs to be a two-way flow of information between former participants and RECSAM, and a one-way flow of continuing assistance from RECSAM to former participants (this might even turn out to be two-way!)

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The Administration of Recsam

When I arrived at RECSAM in February, the administrative staff comprised the Director (Chin Pin Seng), the Assistant Director - Training (Lim Tang Seng) and the Training Officer - Science (Khoo Tiang Lim). There was also a Registrar/Bursar and a small supporting staff. The support staff was spread very thinly. For example, one very able young man, a cataloging clerk, also served as librarian, storeroom keeper (for the supplies and equipment for the various curriculum projects) and trouble-shooter in dealings with customs agents. From February to July, Dr. K. Shindo and I were the only long-term visiting consultants.

In July the staff expanded considerably with the addition of a Training Officer - Mathematics (S. Panchalingham, formerly a secondary school math teacher), an Information Officer, and several supporting staff including a full-time librarian and a full-time stockroom man. And J. Dasbach arrived to become Research Adviser.

During the next few months, three long-term consultants are expected to come from England. They will be sent by the Centre for Educational Development Overseas (London) known as CEDO. CEDO is also the organization that provides RECSAM with short-term consultants for the science and math courses. One of the long-term consultants will be in physics*, another in primary science and the third in mathematics. This will insure that British curriculum projects and views on education are well covered in future RECSAM courses.

None of the permanent staff of RECSAM are well-qualified university scientists. They are all former secondary school teachers and training college administrators. They have had no experience in curriculum development, evaluation and implementation in science and mathematics. Hence, they are not qualified to conduct the RECSAM courses themselves, and are forced to rely on visiting consultants. Because the staff is not experienced in curriculum development work, and because, during the months before

* Mr. Everest, the physics consultant arrived from Rugby College, England, on 9 August.

the 1971 series of courses started there were no visiting consultants at RECSAM, it is not surprising that the staff did not make satisfactory advanced plans for the courses, and that some of the participants complained that the courses were disorganized and piece-meal. They were. It is to be hoped that the staff will accept the suggestions of the present advisers and consultants in planning for the 1972 series of courses.

It is perhaps surprising that the 1971 courses were not more disorganized considering that they were held in quarters rented or borrowed from the Malayan Teachers College and the University of Penang. Not infrequently, a class session had to be moved from one room to another because at the last minute the original room was required by MTC. This situation will not improve much in 1972, since the buildings now under construction will not be completed until April, and by that time two of the three-month courses will have been completed and three will be in progress.

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Assuming that the present permanent staff of RECSAM remains, the future success or failure of the organization will hang on the degree of willingness of the staff to accept the recommendations of experts more qualified than they are in science and science education. At present it does not seem probable that these experts will come from SEAMEO countries. I understand that up to now none of the SEAMEO countries have nominated candidates for the positions of Deputy Center Director, Assistant Director-Research, Training Officer - Biology, Training Officer - Physics or Training Officer - Elementary Science, all posts which are supposed to be filled by non-Malaysians. It seems probable that for the next year or two at least the experts must come from non-SEAMEO countries.

A prime concern of the long-term consultants must be to educate the permanent staff in modern concepts and techniques of science and mathematics education to the point where they will at least accept the need for reorganizing the RECSAM courses. The Director and Assistant Director - Training have already told me that they would like to have this sort of assistance, so I am proposing that from September through December, when there will be no courses running, we hold staff seminars or workshops at least weekly and if possible more frequently. In the seminars we will discuss various facets of modern science and mathematics teaching, experiences in curriculum development, evaluation and implementation, and in-service and pre-service teacher education. We will also discuss various techniques of teaching, including individualized instruction. And throughout the series of seminars/workshops we will consider how the topics under discussion apply to the RECSAM courses. I hope that these discussions will produce vestly improved RECSAM courses in 1972.

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The Participants

An almost full complement of participants (the quota was three from each country) attended the primary science and mathematics courses, and, with the exception of Laos which sent only one participant in biology and none in chemistry and physics, the secondary courses as well. The Khmer Republic did not sent participants to the primary and secondary science courses, because it joined SEAMEO only last January. It did send participants, and very good ones, to the secondary mathematics course which started in June. The Indonesian participants in the secondary school science courses did not arrive until the courses were two-thirds over. This was due, I understand, to staff changes in the Ministry of Education in Indonesia which resulted in a communication breakdown.

Almost without exception, the participants seemed eager to learn about and to try out the new curriculum materials. They came to the courses with quite a range of backgrounds and of abilities in their subject matter areas. While most of the secondary science and math participants from the former French colonies communicated from moderately well to quite well in English, the elementary course participants from those countries had great difficulty using and understanding English. I will return to this problem later.

The participants worked hard and seemed to enjoy what they were doing. What they actually learned I cannot say, since no attempt was made to measure their achievements.

There seemed to be considerable unhappiness about housing and food. Complaints about housing came to me through the consultants, but complaints about food came directly from a number of the participants, some of whom refused to take their meals at RECSAM.

It is useful to look at the participants in terms of the positions they hold in their home countries. My reason for doing this is to show the diversity of positions held and the uneven distribution of participations in the various types of positions from country to country. The diversity of positions within each course has implications for the nature of the course. The uneven distribution from country to country to country has implications concerning the use the countries will make of the participants when they return home from RECSAM.

Table 2. shows the distribution of participants by positions held for the primary science and math courses and for the secondary science courses. The Ministry of Education officers were all from Indonesia. In addition Indonesia sent to the primary science course a medical school lecturer.

Table 2.

Distribution of Participants by Positions Held

Category	Primary Science and Math	Secondary Science	Total -- Primary + Secondary
Ministry of Education Officers	3 (7%)	0 (0%)	3 (3%)
Teachers College Lecturers	5 (12%)	8 (15%)	13 (14%)
Inspectors, Supervisors or Coordinators	12 (29%)	9 (17%)	21 (22%)
Principals or Headmasters	7 (17%)	4 (8%)	11 (12%)
Curriculum Developers	4 (10%)	1 (2%)	5 (5%)
Classroom teachers	11 (26%)	30 (58%)	41 (44%)
Totals	42 (100%)	52 (100%)	94 (100%)

The distribution of participants by the categories in Table 2. were quite uneven from country to country. The distribution for primary and secondary classroom teachers by country is shown in Table 3.

Table 3.

Total of Primary and Secondary School Teachers from each Country

Country	Number of Participants
Vietnam	12
Singapore	11
Malaysia	8
Philippines	7
Indonesia	2
Thailand	1
Laos	0
Total	41

The distribution by country for teachers college lecturers is shown in Table 4.

Table 4.

Number of Teachers College Lecturers from each Country

Country	Number of Participants
Thailand	8
Malaysia	2
Laos	1
Singapore	1
Vietnam	1
Indonesia	0
Philippines	0
Total	13

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Since one of the objectives of these RECSAM courses is to prepare teacher-training specialists in science and math education "who can play primary roles in introducing modern science education methods and content to their countries, it is disappointing to see that, with the exception of Thailand, the SEAMEO countries sent very few teacher-training specialists to RECSAM.

There was a better country to country distribution of supervisory personnel (inspectors, coordinators, supervisors, principals and headmasters), though even here Indonesia, with eight, sent four times as many as did Singapore or Vietnam, with two each. The distribution for supervisory personnel is shown in Table 5.

Table 5

Number of Participants in Supervisory Positions from each Country

Country	Inspectors Supervisors and Coordinators	Principals and Headmasters
Indonesia	3	5
Laos	3	3
Thailand	3	2
Philippines	5	0
Malaysia	3	1
Singapore	2	0
Vietnam	2	0
Totals	21	11

I have already said that the diversity of occupational categories among the participants in a course has implications for the nature of the course. In the 1971 courses all participants were exposed to the same materials and worked on the same problems. It is not reasonable to suppose that such a program would serve primary classroom teachers and teachers college lecturers (to take just two of the categories) equally well. Certainly both their interests and their needs are quite different. I think that one of the major changes that must be made in the courses is to tailor them to meet the individual needs and backgrounds of the participants. This does not mean, necessarily, that each participant will be working on something completely different from all the rest. Rather, it means that there should be a common core of information in each course, with a variety of branches for participants to follow either individually or in small groups.

The Consultants

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Course Consultants.

The greatest strength of the RECSAM courses was the consultants. All of those that I have met and worked with have been well informed about new curriculum materials and most of them have been good teachers. Most of them have been unhappy to some degree with the organization of the courses, but all of them have reacted warmly to the participants and have told me how much they enjoyed working with them. I did not meet three of the consultants. Two of them, Edwards in primary science and Hart in primary math had just left when I arrived at RECSAM early in February. The third, Balch from BSCS in Boulder, Colo., was at RECSAM during the last week of April when I was away in Bangkok.

The course consultants are listed below by course, country or program and length of stay at RECSAM.

Primary Science (TCE-1).

G. Edwards (England) - 3 weeks
D. Harper (England) - 3 weeks
P. Jesuitas (Philippines) - 3 weeks

Primary Mathematics (TCM-1).

K. Hart (England) - 3 weeks
M. Prentice (Scotland) - 6 weeks

Secondary School Biology (TCB-1).

J. Churchman (England - Nuffield) - 3 weeks
J. Savillano (Philippines - adaptation of BSCS biology) - 3 weeks
J. Balch (U.S. - BSCS) - 1 week

Secondary School Chemistry (TCC-1).

J. Hartley (England - Nuffield) - 3 weeks
J. Tseng (Singapore - CHEMStudy) - 3 weeks

Secondary School Physics (TCP-1).

R. Fairbrother (England - Nuffield) - 3 weeks
S. Standring (U.S. and International School, Kuala Lumpur - Harvard Project Physics) - 3 weeks
C. Little (U.S. - PSSC) - 3 weeks

Secondary School Mathematics (TCM-2).

B. Raynor (England) - 3 weeks
Dr. Suchart (Thailand) - 5 weeks

In addition to the consultants listed above, two other visiting consultants worked with the participants. Dr. Sim Wong Kooi of the University of Malaysia conducted

the sessions on evaluation in each of the courses. Mr. Koh Tsu Koon, who I mentioned earlier in this report, assisted me in teaching the IPS program during the second week of the TCC-1 and TCP-1 courses.

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Special Consultants.

Two short-term consultants have been at RECSAM recently. One was Dr. Robert Ward of the University of Chicago, who spent one week at RECSAM in June to help us evaluate the primary science course. Ward worked with me in the U.S. for three summers and was for several years Ford Foundation consultant in elementary science at the science teaching center of the University of the Philippines. During May of this year Ward returned to Manila to consult on the present status of the Philippine elementary science program. Learning that he was there, I urged Chin Pin Seng to ask the Ford Foundation to bring him to Penang to help us evaluate our primary science course. They did. While Ward was here we had several profitable discussions with the RECSAM staff. Ward's evaluation report is included in the Appendix.

The second was another friend of mine, Dr. Martin Schein, who for three years was director of CUEBS (Commission on Undergraduate Education in the Biological Sciences) and is now Centenary Professor of Biology at the University of West Virginia. Dr. Schein and his family stopped in Penang to visit with my family en route from a meeting in India to a working session with the Junior High School science project (FAST project) at the University of Hawaii. While he was here I arranged for him to discuss new techniques of teaching biology with the biology faculty and some of the students from the University of Penang as well as with the RECSAM staff. He also discussed the University of Hawaii program with the staff of RECSAM. As a result, Chin Pin Seng made plans to visit the project during his visit to Hawaii later in July.

Long-term Consultants.

Dr. K. Shindo is a biologist and a member of the Faculty of Science Education of Fukuoka University, Hiroshima, Japan. Shindo worked with the participants in each of the science courses on techniques of working with glass and plastic and improvising simple apparatus. Just why he is here is still something of a mystery to me. His English is quite poor and he has difficulty communicating with the participants. He has worked with the lab technicians at the Malayan Teachers College and is supposed to be preparing some teaching slides on the botany of Penang. I have not yet seen any of the slides. Perhaps the best explanation of his presence here is that he may have been sent by the Japanese government to examine RECSAM and advise on whether they should send other consultants and provide some support to RECSAM.

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I was the only other long-term consultant for most of the period covered by this report. I have already mentioned some of my activities in various places in this report. Let me summarize those and other activities here.

Conducted sessions in each of the science and mathematics courses.

Served as course director for the secondary school chemistry course.

Helped find consultants for the biology and physics courses.

Arranged for visits by two short-term consultants -- Schein and Ward.

Participated in the RECSAM Seminar for Senior Administrators in March. Presented a paper and chaired one session.

Met with Ambassador Jack Laydman in Kuala Lumpur to discuss RECSAM.

Discussed RECSAM activities on two occasions with Morris Crawford at the Embassy in Kuala Lumpur.

Prepared a brochure to send with sample course materials to SEAMEO Ministers of Education.

Prepared a list of books that should be added to the RECSAM library.

Purchased and presented to the library a set of SMSG secondary school mathematics books.

Visited INFOTECH and RELC and discussed possible cooperation in developing individualized instructional materials for RECSAM.

Visited Gordon Aylward in Bangkok and discussed the relationship between RECSAM and the Thai science project.

Met with Ruth Wong, director of research in the Ministry of Education, Singapore, and with her visited two primary schools in Singapore.

Conducted a Saturday session on primary science for the Science Masters Association of Penang.

Helped the staff plan for the two research courses (RAG-1 and 2) which are being conducted in August.

Through memos and discussions with Chin and Lim, have suggested ways of improving the various activities (especially the courses) of RECSAM.

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Recommendations

Improving the Courses.

A useful and effective way to start to improve the organization of the courses and to increase their effectiveness in preparing the participants to effect changes in science and mathematics education in their countries, is to prepare a set of specific objectives for each course. To be most helpful to the RECSAM staff, these objectives should be stated as performance objectives -- that is, what should the participants be able to do when they have completed their course at RECSAM. In a memo to the Director last April, I suggested a number of possible performance objectives for the elementary science course.

In the memo I said, "Not only would it be a concise way of informing officials in SEAMEO member countries about RECSAM courses, but the list of objecties should be useful to the RECSAM permanent staff in planning each course. The value of each part of a course as planned could be determined readily by checking the objectives and deciding whether that part of the course really does contribute to the participants' development of one or more of the stated objectives.

"The list could be useful to the visiting lecturers, for it would quickly give them a view of the overall philosophy of the course and would encourage them to adjust their teaching programs to fit in with the objectives.

"Finally, the list could help the participants. It might be given to them on the first day of the course, so that they would know what they are expected to achieve during the course."

Another important way in which the courses can be improved is to tailor the course programs to the participants needs. As I pointed out earlier the participants in a course are a heterogeneous group with different backgrounds, interests and needs. For these reasons it does not seem reasonable to try to make all of the participants jump identical academic hurdles. Instead, their academic programs at RECSAM should be tailored as far as possible to their needs, interests and abilities.

In a memo to Chin, I suggested that we might keep the participants together during the first third of a course, during which time they would be exposed to new science or math curricula, and then during the last two-thirds of the course, letting them work intensively either individually or in small groups, on some topic or topics that would be particularly useful to them in their countries. This period, which might be called the immersion phase of the program, could be used to relate the materials of the

exposure phase more directly to the educational needs of the participant's country.

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Chin reported to me on his return from the UNESCO meeting in Singapore that he had discussed this suggestion with several of the SEAMEO Ministers of Education, and reported that they had reacted favorably to the idea. So I think Chin may be willing to try it during the next round of courses in 1972.

Another improvement that might be made in RECSAM courses is to use individualized instructional materials. Though not essential to an individually tailored program, individualized instructional materials could be especially useful to those participants whose English proficiency is inadequate. I have suggested to Chin that as an experiment we use the audiovisual program that has been prepared by the Far West Regional Laboratory in Berkeley, Calif. That program was designed to introduce teachers and administrators to several of the new U.S. elementary science curricula. It consists of a series of film strips with accompanying audio tapes. The U.S. curricula described in the strips and tapes are those the participants work with in the TCE-1 course at RECSAM.

The experiment will be to translate the tapes into French, first, and then into several of the national languages later, and to use the film strips with the translations to help participants whose English is poor. I have discussed the idea with Chin, with Short and Horst at INNOTECH, and with Muller at RELC. (Muller has administered an English proficiency test to RECSAM participants.) All of them are interested in cooperating in the experiment. If the translate program turns out to be useful, other audiovisual materials in French and national languages might be developed cooperatively by RECSAM and INNOTECH. Such audiovisual materials could not only be useful to participants in courses at RECSAM, but also might be used in pre- and in-service teacher education programs in the SEAMEO countries.

Evaluating the results of the courses.

The ultimate test of the value of the RECSAM courses is what the participants do after they return home. However, some evaluation of what changes occur in the participants while they are at RECSAM would be useful to the staff in planning for course improvement. As a start I am recommending that a short evaluation instrument be prepared and used at the beginning and the end of each course. I realize that many participants will feel threatened by a "test", so it will have to be carefully billed as an instrument to evaluate the program -- not the individual.

I am suggesting to Chin that the instrument contain items that will test the scientific skills, knowledge, attitudes, interests and needs of the participants. I have developed some prototype test items for each of these areas, and plan to use them for discussion in the proposed fall seminars.

Relationship of science and mathematics education to regional and national needs.

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So far there has been almost no concern for what RECSAM should be doing to relate the training courses to regional and national needs. This is unfortunate. If RECSAM is to be truly a regional center, this area must not be neglected.

In each course, the participants prepare and present "country reports" in which they describe the organization of the educational system in their countries and discuss problems such as the low status of teachers, poor facilities, and so on. But these country reports have no effect on the courses.

I hope that the documents that will be prepared by the participants in the course "Primary Science and Mathematics Curriculum Requirements Analysis" (RAG-2) that is being held during August, will serve as the basis for discussions in the fall seminars and for action in the 1972 courses. The documents are supposed to attack the topic of the relation of science and math education to regional and country needs.

Continuity of Consultants.

Until the permanent staff at RECSAM has been brought up to a professional level where they are well qualified to plan and conduct courses themselves, the consultants will have to be the backbone of the organization. For the next two or three years it will be imperative that there be a continuity of consultants in the various science and math areas and in research and training. I recommend strongly that my replacement be at RECSAM at the time that I leave.

I think that it would be unfortunate if the long-term consultant group at RECSAM were to become mainly British. This may sound like chauvinism, but it isn't. The British consultants bring a point of view which is relevant to Malaysia and Singapore where the educational systems are fashioned on the British model, but is less relevant to other SEAMEO countries. I understand that the government of Malaysia is happy to get British consultants (for which they do not have to provide matching funds), and not so happy to have U.S. consultants (for which they do). Nonetheless, I recommend that U.S. consultants in training and research be continued for at least the next three years, and that consultants in biology, chemistry and integrated science be added.

Appendix to Preliminary Report

June 11, 1971.

A REPORT OF AN EVALUATION STUDY OF THE PRIMARY SCIENCE TRAINING COURSE (TCE-1) OF RECSAM

Dr. Robert T. Ward, Consultant - Ford Foundation
Graduate School of Education,
University of Chicago,
Chicago, Illinois.

Introduction

During the period June 7 to 11, 1971, I have had the privilege of visiting RECSAM and studying the program that was presented in the primary science training course entitled, "Modern Methods of Teaching and Evaluating Elementary Science", given January 11 to March 31, 1971. I was given the opportunity to study all documents relating to this course, as well as to have extensive discussions with the RECSAM staff involved. In addition to the various plans and schedules, these documents included the individual reports of the consultants and the evaluation forms filled out by the participants.

During this brief period of one week, I was, of course, only able to get a somewhat superficial idea of this program. Hence I feel some hesitation about making recommendations on possible changes. Still, it seemed useful for RECSAM to receive ideas and suggestions from someone who has not been previously connected with the program. My ideas, therefore, represent tentative suggestions which might be considered by those responsible for the program, not firm statements by someone who feels he knows what RECSAM "ought" to do. My suggestions are, of course, strongly colored by my own background in elementary science curriculum development and implementation in the U.S. and in the Philippines. Since my knowledge of what was included in the last course is second hand and perhaps superficial, my suggestions may represent things already included.

Since I take my role to be to suggest ways of further improving the course I will, necessarily, stress possible changes. I will not try to point out all the many accomplishments and strong points of the program. I have great admiration for what has been developed at RECSAM in so short a period and for the contribution RECSAM has already made to science education in Southeast Asia. I am sure it will make an even greater contribution in the future. I hope that I may give some small assistance to this by these recommendations.

Recommendations

I. My major recommendation is that the course be broadened to put more stress on topics and problems directly related to the activities and roles that are seen for the participants upon their return to their home countries. My concept of these activities and roles is based on the Report of the Primary Science Planning Workshop, June 24-28, 1969 (P5/SCMS/17). On page 1, the second of the "three key factors" listed stresses the idea of action. "Participants at each course will be expected to take definitive action when they return to their home countries."

In the "Detailed Description of Primary Science Training Course" the objectives state that, "the envisioned trainee product is one who will be ready to perform leadership roles in curriculum development; and/or pre-service education; and/or in-service education."

On page 9, the first of the four assumptions is that, "participants . . . would be expected later to play a leading role in the preparation, modification, or adaptation of elementary materials in their respective countries, and in the implementation of the use of such materials."

Certainly making the participants familiar with modern elementary science education philosophies, methods, and content is one major part of preparing people for these types of roles. This is brought out in the second assumption on page 9 of the Workshop Report. Nevertheless, it seems that the course should do more than this. It ought also to prepare the participants to use the knowledge and ideas acquired. I realize that some of this is already being done. To what extent is hard for me to judge from available documents. I would guess it might vary considerably, depending on the consultants or staff involved. Perhaps the main change would be to build more explicitly into the plan of the course preparation of the participants to use the knowledge and ideas acquired.

For completeness I will mention several ideas on what might be included in relation to the question of applying new ideas in elementary science education, without attempting to evaluate how much of this was included in the 1971 course.

1. One topic that might be considered in the course is the special problems and conditions of elementary science education in Southeast Asia in comparison to the U.S. and U.K., which are the source of most of the projects that are considered. In most countries of Southeast Asia, for a large proportion of the population elementary education is the only education. In addition, the needs of society and the state of development of the country make special demands on the school.

   As a simple example, an American child is apt to hear much about germs at home and later in high school. In addition, he is seldom placed in a position where there is even a chance of drinking water from an unsafe source. Yet a child in Asia may get little guidance in such matters from his elders or his society and may be continually faced with having to decide about a convenient but possibly unsafe source of water. Thus the two children have very different needs from their elementary education on this topic.

A final example of a special problem that faces science education in Southeast Asia is the possible conflict between the culture and science. Folk beliefs and explanations of natural phenomena may disagree with what the child finds in science. More importantly, there may be a conflict between what modern science teaching is saying about suitable behavior and the traditional role of authority, especially in relation to the teacher and the child.

2. Another topic that might be considered is the problem of developing or adapting materials for use in various countries. (This might be considered only by those participants who are most likely to be involved in curriculum development. This possibility is discussed further below). Besides general discussions and experiences in curriculum development, the special problems of translating materials into the national language or language of instruction could be at least introduced. This cannot be safely left just to the linguists. The science educators must be closely involved. In addition, the availability or lack of availability of certain materials must be considered. For example physical science materials are often hard to obtain, but living organisms are more readily available in Southeast Asian countries than in U.S. or U.K.

3. Finally, I would suggest some attention be given in the course to question of implementing new programs and to teacher training.

II. Obviously, such topics cannot be added to the existing course or given more stress without reducing the attention given to the present topics. Therefore my second suggestion is that the attention and time given to detailed studies of several different curriculum projects could be reduced. Dr. Livermore reports this as taking 50% of the time. I am not suggesting that the participants should not be introduced to several different projects. In fact this introduction might be extended to other project materials from other countries and regions such as Israel, India, South America, and Africa.

However, I would suggest that the time spent doing activities and looking at specific lessons in several different projects could be reduced. The main stress should be on the central idea of elementary school science -- that the way to find out about the natural world is through experience and experiments. The amount of class freedom and the relative balance between process and content is a secondary though important, issue.

I would also suggest a considerable reduction in the time spent on formal procedures of curriculum evaluation and on teaching in the schools. (Dr. Livermore reports these as 12% and 9% of the time, respectively). I do not believe these are that important for all the participants. As I will discuss further below, it might be possible for those interested to do additional work on these subjects.

III. My third suggestion is that part of the course be, to some extent, individualized. What I mean by this is that for some period of time, perhaps four or five out of the twelve weeks, the participants have some freedom as to what they do, what topics they study and what questions they give their attention to. Most significantly, this will allow the program for each participant to better fit the participant's background (command of English and prior exposure to new ideas), situation (the state of development in science education in his country), special interests, and probable position upon his return (curriculum developer, teacher trainer, teacher, etc.).

I will give some examples of the kinds of variations that might be offered. These are very tentative. Those who are going to be returning to teaching positions, perhaps with the idea of acting as model teachers and running in-service programs for fellow teachers, might benefit from further exposure to existing elementary science materials and to doing more practice teaching in a regular classroom or in micro-teaching situations. Those who are apt to become involved in curriculum development might further study evaluation procedures and the problems of designing materials for a specific country. Those who will be teacher trainers might best study the ideas of interaction analysis and techniques of equipment improvisation.

Many other groups of alternatives are possible. What can be offered in the program must necessarily depend on the availability of staff. With the regular staff, outside consultants, and the resources of Malayan Teachers College and the University of Penang, a considerable choice should be available. The most important point is that it should not be assumed that every participant needs to have the same program. I will, of course, admit that to make such variety available will be a difficult job. However, I think it is necessary if RECSAM is to fully meet the needs of participants from all of Southeast Asia.

IV. My final suggestion, and probably the easiest to implement, is that there should be some real attempt to evaluate the individual participants. There are really three different parts of this.

1) When they first arrive it would be useful to find out about their knowledge of science (both content and process), their knowledge of elementary science education, and their attitudes about science teaching.

2) These same aspects might be evaluated at the end of the program to see the effect of their stay at RECSAM. It is interesting that this is now being done for their English language ability, but not for science education.

3) Such evaluation would also be useful in persuading organizations to give academic credit for RECSAM courses.

In addition, I think it would be very useful to do a follow-up study, six months or one year after the participant returns to his home country. This should look at what the participant has done since his return and what contributions he has made to improve science education. This would help evaluate the RECSAM course in terms of its real goal, to improve the science education in the SEAMEO countries. This would also help familiarize the RECSAM staff with the situation in the various member countries. It would give an opportunity to gather ideas from the participants as to what they think, based on their experience, could be done to make RECSAM more effective. This type of follow-up study should be considered more as an evaluation of the RECSAM programs and its relation to each country's needs and situation than as an evaluation of the individual participant.

Conclusion:

My suggestions for the elementary science training program are mainly directed at making it more related and useful to the primary objective of RECSAM, namely the improvement of science and math teaching in the member countries. Building on the excellent start that has been made over the last few years at RECSAM, and using the knowledge and experience that has been developed from this and other science education projects in Southeast Asia, it is timely now to consider ways to further improve and refine the program. I hope my suggestions can act as a stimulus to further thinking and planning.

It is clear that for effective implementation of these ideas the program will have to depend to a much greater extent on permanent specialized staff, familiar with local situations and offering continuity in planning and running the course. I have assumed that such a permanent person, full time in elementary science education, will be available. I understand that it is generally agreed that a permanent staff from SEAMEO countries are absolutely indispensable for the full effectiveness of RECSAM. The development of such a staff seems to be a prerequisite for all other steps in the development of the Centre.