

Commonwealth Co-operation in Education

1. National boundaries have never been iron curtains for education. The cross-fertilization of educational ideas has been a feature of scholarship over the centuries but whereas in medieval times most of this cross-fertilization occurred through the involuntary journeys which scholars often found themselves compelled to take for the preservation of knowledge, the last few decades have seen developed a conscious and planned effort at international co-operation.

UNESCO's work in the field of mathematics

2. The major instrument now spearheading this development at the international level is the U.N. Educational, Scientific and Cultural Organisation. The Conference in Trinidad was fortunate in having as an observer from UNESCO Professor G. Soos of its Division of Science Teaching in Paris. With Professor Soos was associated Mr. H.L. Rudstrom of the UNESCO Teacher Training Project in Jamaica. Within UNESCO, mathematics is one of the subjects handled in the Division of Science Education. At a session of the Conference devoted to Commonwealth Co-operation Professor Soos gave an account of UNESCO's work in this field. This has included the collection and exchange of information with member states, the publication of surveys and new trends, the design and implementation of experimental programmes in different regions of the world, and programmes of lectures, fellowships, etc. Current projects in mathematics include a postgraduate course on Topology and the Foundations of Mathematics in Poland, a Functional Analysis course in Denmark, a course on Probability and Statistics in Budapest and a European meeting of mathematicians in Bucharest to tackle some problems of mathematics education at the secondary school and university levels. The work of the Organisation in Africa, in Asia and in Latin America in teacher-training and curriculum development involves improving mathematics teaching. In his address to the Conference Professor Soos described a UNESCO project for the improvement of mathematics instruction in the secondary field in countries of the Middle East, launched a year ago. For this project a study group for the modernisation of mathematical education has been set up in each of the eight participating countries.

Bilateral aid within the Commonwealth

3. Commonwealth co-operation in the development of improved methods and new ideas in the teaching of mathematics has up to the present been mainly bilateral in character. Some of these bilateral arrangements have proved a major factor in developing new programmes and projects.

At the Third Commonwealth Education Conference at Ottawa in 1964 (which had recommended a Commonwealth Conference on the teaching of mathematics) the British delegation indicated that Britain would be prepared, if the conference so

wished, to consider securing the services of a team or teams of experts in curriculum planning and research who could make their advice available to other Commonwealth countries on request. It was as a result of the interest shown by other countries in participation in this kind of programme that in October 1966 that Britain set up in London the Centre for Curriculum Research and Educational Development Overseas (CREDO). Reference to the work of CREDO is made in the section of this chapter which deals with the British programme. The Fourth Commonwealth Education Conference at Lagos in 1968, in reviewing these developments and the work of curriculum units in other Commonwealth countries, drew attention to the need for more interchange of information about them. It also emphasized the importance for education generally, that the reasons for success or failure of projects or experiments in curriculum development should be assessed and conveyed to all member countries. The Lagos Conference clearly envisaged the Education Division of the Commonwealth Secretariat being strengthened to enable it to play a more effective role in aiding programmes of curriculum development and in working more closely with national organizations in this field. Summaries of the bilateral programmes of the developed countries of the Commonwealth who were represented at the Conference follow.

Britain

4. The assistance Britain gives to the development of mathematical education in other Commonwealth countries takes two main forms: the provision of information and expert knowledge through the supply of books and equipment, the interchange of personnel etc., and help with training and teaching by means of short or long-term exchange visits.

5. The major agency involved in the provision of assistance is the Ministry of Overseas Development but supplementing the Ministry's efforts are those of the British Council, the Centre for Curriculum Research and Educational Development Overseas (CREDO), the Centre of Educational Television Overseas (CETO), the Oversea Visual Aids Centre (OVAC), the Inter-University Council, the Association of Commonwealth Universities, the Nuffield Foundation, British publishers and many other private and professional bodies.

Teachers and Teacher Training

6. In terms of finance and the number of people involved, a large proportion of Britain's contribution to the development of mathematical education in other Commonwealth countries is the provision of school teachers and lecturers in Colleges and Departments of Education. This kind of help has been given by Britain for many years but the conditions of work and the terms which can be offered have radically changed. Nearly all those now appointed are on a contract basis, many of them for relatively short periods of two or three years in the first instance.

7. In 1967 the Ministry of Overseas Development made 1459 appointments in education, some 70 per cent of these being concerned with English, mathematics and science, and probably about 20 per cent being concerned in one way or another with mathematics.

Voluntary Service Overseas

8. The programme of service overseas by graduate volunteers and school leavers continues to be operated by the voluntary societies with the financial backing of the Ministry of Overseas Development. The growth of the scheme since 1962 has been impressive. Under the 1962/63 programme 320 volunteers, of whom only 32 were graduates, worked in 52 countries. By the end of 1967 almost 2,000 volunteers, of whom about two-thirds were teachers, were serving in 75 countries. Stress is now being placed on the recruitment of volunteers for longer periods. It is realized that any scheme employing young and inexperienced teachers is bound to have its drawbacks, but nevertheless, with mathematics teachers of any kind in such short supply, the volunteer teacher can be of great assistance and there are instances of the gifted and enthusiastic volunteer playing a major role in the establishment of lively centres of mathematical reform.

Serving Teachers

9. One important aspect of teacher training is that given to teachers already in service. Systematic help with teacher vacation courses overseas was instituted in 1961, and in 1967 over 130 teachers from British colleges of education and schools conducted courses in 20 countries for some 1,700 local teachers under the Ministry of Overseas Development's Teacher Vacation Course scheme. Courses on secondary mathematics were held in Ceylon, Kenya, Swaziland and Uganda and on primary mathematics in British Honduras, the Gambia, Lesotho, Nigeria, Swaziland, Tanzania, Uganda and Zambia. In addition to the assistance provided by the Ministry, the British Council and CREDO provided tutors for mathematics courses in Ghana, Tanzania, Malawi and Mauritius. In 1968 for the first time Britain has supplied tutors to an Indian Summer Institute in mathematics.

10. In many countries these teacher vacation courses are now established annual events which can play a most effective part in the introduction of new syllabuses and teaching methods into schools.

Schemes for Study in Britain

11. Assistance of this type, however, must be viewed as a stop-gap until indigenous mathematics teachers can take over the posts at present filled by expatriates. A major contribution to that desired end is made by those schemes designed to encourage study and training in Britain. Over 3,000 students and trainees are brought to Britain annually by the Ministry of Overseas Development. Of these some 600 are Commonwealth Scholars or Teacher Training Bursars who are financed under the Commonwealth Education Co-operation Scheme, the remainder being financed under Regional Technical Assistance Programmes. The training given covers many aspects in addition to education, but courses of special interest to mathematicians are those provided at the Universities of Hull and Southampton (and that which will shortly be provided by the University of Leeds) for Commonwealth Bursars. The value of this scheme is amply demonstrated by the number of former bursars who are now holding positions of great responsibility as inspectors, heads of department in teacher-training colleges, and headmasters. Those bursars from primary schools who are not specialising in mathematics are also given some insight into current developments in primary school mathematics, and an opportunity for bursars to meet some of the

leading personalities involved in the revision of the primary school curriculum was provided at a CREDO-sponsored vacation course held in March 1968.

12. Training of a more specialised nature is provided for overseas students at the Oversea Visual Aids Centre and the Centre for Educational Television Overseas, which, in addition to undertaking pioneering work in the production of educational programmes designed for use overseas (its algebra kit has been purchased by Ghana, Nigeria, Singapore and Uganda, and also by non-Commonwealth countries), also gives two courses annually.

The Exchange of Expert Knowledge and Information

13. The development of the curriculum, of improved teaching techniques and of methods of assessment must continue and must increasingly become a matter of international concern. Indeed, evidence of this concern is provided by the recent establishment of an International Journal of Mathematical Education. At the moment attention is naturally focussed on those countries in which the current wave of reform was initiated, but more countries are now carrying out experiments in mathematical education and it is only reasonable to assume therefore that the traffic in ideas will become more reciprocal.

The Work of CREDO

14. It was partly this demand from overseas countries for information about what was happening in Britain that led to the founding of the Centre for Curriculum Research and Educational Development Overseas (CREDO) which was established in October 1966. CREDO has already been able to provide several types of assistance in the field of mathematics education. For instance, it has arranged visits by British experts to other Commonwealth countries to work alongside developers there. For example, Dr. Geoffrey Matthews of the Nuffield Mathematics Project spent several weeks in Ceylon in Spring 1968. It has also provided tutors for teachers' workshops (Zambia, Guyana, Malawi, etc.), presented sets of texts and teachers guides to schools and training colleges (for example, in Uganda and Tanzania), given financial support to a local project (The Joint Schools Project of the Mathematical Association of Ghana), helped provide apparatus for use in primary schools (Mauritius), made it possible for teachers from Lesotho, Botswana and Swaziland to attend a teachers' course in Malawi and arranged to have draft textbooks and syllabuses criticised by experts.

A Co-operative Scheme in Ghana

15. How various agencies can unite in a large-scale development plan is exemplified by that recently begun in Ghana. In 1967 the Ghana Ministry of Education established a unit for curriculum development and research. This was done after it had received the report of a consultant, whose visit to Ghana had been jointly sponsored by CREDO and the British Council, and had had further talks with a representative of Canada whose Government had also promised assistance. The development of primary mathematics is only one part of the overall plan but it is interesting to see how this development is proceeding. For some years now the Ministry of Education has organised a three week vacation course for some of its teacher training college tutors, local education officers and primary school headmasters. At each of

these workshops two tutors have been provided by the British Council and in an attempt to secure continuity and a uniformity of approach these have recently been drawn from Leicestershire. These workshops provided a bridgehead and now the work is being extended. Four colleges are to take part in a pilot experiment to reform teacher training and a large scale attempt is being made to give additional training to the local education officers who will obviously have a key role to play in any developments in the primary schools. Special arrangements have been made for ten of these officers to come to Britain annually for the next three years. The officers, whose visit will be financed under the Commonwealth Education Co-operation Scheme, will attend a special course at the University of Hull.

16. These are some examples of the projects which are helping to make the teaching of mathematics more effective. Some of the major projects in Britain for reform in this field, such as the Southampton Mathematics Project, the Midlands Mathematics Experiment and the Nuffield Primary Mathematics Project, have attracted world wide attention and in their own ways contributed to co-operation.

Canada

Responsive Assistance by Canada

17. Education programmes financed by Canadian development assistance are responsive in nature, that is to say educational assistance is only given in response to a specific request for such assistance. The types of persons serving abroad under this programme include Advisers to Ministries of Education, Teacher Trainers, Teachers at the senior grades (forms) of Secondary Schools, Technical and Vocational Teachers and University Professors.

The Extent of Aid from Canada

18. In September 1968 approximately 700 Canadian educationists were serving overseas in 46 countries. Of this number 374 were serving in English-speaking countries of Africa, South-East Asia and the Caribbean while 329 were serving in Franco-phone countries of Africa and South-East Asia.

19. In the programme for English-speaking countries 87 teachers and 17 professors were serving in the West Indies and Guyana under the Commonwealth Caribbean Assistance Programme. Serving under the Colombo Plan, in South and South-East Asia, were 27 teachers, 5 technical and vocational instructors and 7 professors. In the special Commonwealth Africa Aid Programme there were 173 teachers, 20 technical and vocational instructors and 37 professors serving in East and West Africa. There is also one teacher in Western Samoa.

20. In the French-speaking programme area there were 249 teachers, 20 teacher trainers and 44 professors serving in the Francophone countries of Africa; in Cambodia and Laos, there were 9 teachers, 3 teacher trainers and one professor currently serving in the area.

21. Before 1960 only a small number of educationists were assigned abroad under the Government of Canada's programmes of educational assistance. That year, however, marked the beginning of the current comprehensive programme through which teachers, university professors and educational advisers are provided for the

developing countries. The increasing number of requests for educationists received from the Governments of these countries is the reflection of the priority that they give to the expansion and improvement of their educational facilities in the light of the critical importance to economic growth of adequate supplies of trained manpower.

The Project Approach to Aid

22. In the past teachers have been sent to the field on individual assignments in response to specific requests for educationists at all levels but particularly in the fields of science and mathematics and industrial arts. However, while teachers will continue to go overseas on individual assignments, increasing emphasis is being placed on the "project approach" to Aid, where Canada provides not only the services of educational advisers but, equally important, also trains counterparts who will replace the Canadians at the conclusion of their assignments. In addition Canada provides, when and where desirable, capital assistance in the form of constructing and equipping schools.

The following are examples of this project approach:

(i) *The University of the West Indies Programme*

involves the supply of Canadian professors, the provision of awards for study in Canada to senior UWI teaching staff members, and undergraduate training awards, tenable at the UWI, for students from the smaller territories. Capital assistance is also provided for the UWI building programme. The Canadian programme for the UWI as a whole extends over five years and is financed by a \$5 million Canadian grant. It is expected that about one-third of the funds will be used for capital assistance, one-third for scholarships in Canada and at the UWI, and one-third for the provision of Canadian professors

(ii) *The Thailand Comprehensive School Project*

under which the University of Alberta provides expertise in terms of educationists currently serving in Thailand, while, at the same time, counterpart Thai students are studying in Canada. This project also includes the provision of equipment.

(iii) *The Accra Trades Training Centre*

where Canada not only supplied the advisers but also aided in the building and equipping of the Centre. The present Principal of the Accra Trades Training Centre is a Canadian and it is expected that not only he but also the other Canadians currently serving there will be replaced by Ghanaian students presently studying in Canada.

23. The Canadians serving overseas under Canada's Educational Assistance Programmes are all university graduates and professionally trained with a number of years of experience in the teaching profession. Normally they serve overseas for a minimum period of two years which may be extended to a maximum of five years by mutual agreement.

24. The Canadian view is that educational assistance to developing countries can benefit Canada as much as the recipient country and that Canadian educationists who have served overseas have come back to Canada better teachers, with a greater degree of understanding of other nations, their hopes and aspirations.

Australia

25. Australia provides educational assistance on a bilateral basis to Commonwealth countries in Africa, South and South-East Asia, the Pacific region and the West Indies under a number of programmes. These programmes are the Colombo Plan, the scheme of Commonwealth Co-operation in Education, the Special Commonwealth African Assistance Plan and the Australian South Pacific Technical Assistance Programme. With the exception of Commonwealth Co-operation in Education, these programmes offer technical assistance in a wide variety of fields which may include education if the Government requesting assistance give priority to that field.

26. The oldest of these programmes, the Colombo Plan, was inaugurated in 1950, and is concerned with the provision of economic aid and technical assistance to countries of South and South-East Asia, including the Commonwealth countries in that area.

27. With the establishment in 1959 of the scheme of *Commonwealth Co-operation in Education*, which includes Australian participation in the Commonwealth Scholarship and Fellowship Plan, Australia began to provide educational assistance to Commonwealth countries outside the Colombo Plan area. Since resources under this programme are fairly limited, however, it was not possible to offer educational assistance to all developing Commonwealth countries not covered by the Colombo Plan. A selection has therefore been made each year of the countries invited to nominate candidates for training or experience in Australia. At first these were countries in Africa and the Pacific, but since 1966 awards have also been available to some countries in the West Indies area.

28. Australian educational assistance under the above programmes takes two main forms, firstly, awards to provide training in teaching and other aspects of education; and secondly, the supply of Australian educational personnel to staff key posts in developing countries.

Awards to provide training

29. It is the Australian view that basic teacher-training is best conducted in the home environment. Where insufficient facilities are available in the nominating countries concerned, however, nominations are accepted for basic teacher-training especially secondary teacher-training consisting of a degree course followed by a postgraduate diploma in education. Such nominations are made principally under the Colombo Plan.

30. Training Awards under the scheme of Commonwealth Co-operation in Education are intended to provide mainly either specialist training for teachers who have completed their basic training, or training in administrative or supervisory aspects of education. Normally the length of course undertaken is one year or less. Similar courses may be made available under the Colombo Plan and other technical assistance programmes if requested.

31. When nominations are invited for Australian awards, no restriction is placed on the fields of education in which a nominating country may request training and places are not reserved in advance for particular courses in universities and colleges.

The fields chosen therefore reflect the interests of nominating countries and the aspects of Australian education which they regard as most relevant to their own needs.

32. In recent years a high proportion of the awards made under Commonwealth Co-operation in Education have been for the special courses organised under the scheme. Apart from these special courses, major fields of interest have been the teaching of trade subjects, domestic science, music, infant teaching methods, agriculture and teaching English as a second language. A number of nominations have been linked with the assignments carried out under the scheme by key Australian educational personnel. Requests for training specifically in the teaching of mathematics have not been common, although the primary methods course mentioned below has proved very popular.

33. To provide specifically for the interest shown by nominating countries in particular fields of study, a number of special courses have from time to time been arranged in Australia, varying in length from three months to one academic year. These courses have included the teaching of English as a second language, school broadcasting, teacher-training methods (Certificate in Education for Overseas Teachers), primary teaching methods, (including mathematics), school inspection and school administration.

34. Visitors Awards enable educationists of experience and standing in the practice and administration of education in their home countries to make short study visits to Australia. Not only do these awards widen the experience of the visitors, but especially in the case of the more senior officers, they also establish liaison between education authorities in Australia and those in developing Commonwealth countries and thus facilitate the most effective kinds of educational co-operation.

Supply of Educational Personnel

35. In general, Australia does not provide school teachers for overseas service, partly because of the prevailing teacher shortage, both in Australia and in the Territory of Papua and New Guinea, and partly because of the desire to apply Australian resources to projects having greater long-term effect.

36. It is the Australian policy to provide the kind of educationist who will start a new course, establish an educational institution, train local teachers, or, through supervisory or inspectorial duties, improve the quality of local teaching over a wide area. Numbers of such experts in different fields have been provided. They include technical education, curriculum development and correspondence education as well as established fields of teacher training.

A Project in Mid-West Nigeria

37. An example of the kind of project Australia is interested in supporting is that undertaken by three Australian educationists in Mid-West Nigeria from late 1964 to the end of October, 1966. During this time these educationists collaborated as substantive officers of the Ministry of Education in developing a system of education designed to meet the special needs of the people in this new political region. From May to September 1966, they were joined by two Australian infant method

specialists who, under the supervision of the senior member of the Australian team, introduced a course in infant teaching method.

Papua and New Guinea

38. A significant proportion of Australia's contribution towards programmes of educational co-operation is being directed towards the territory of Papua and New Guinea. Mr. J.W. Humphreys, of the Department of Education in the Territory attended the Conference as a member of the Australian delegation. With Professor Dienes, formerly of the University of Adelaide and now of the University of Sherbrooke in Canada as consultant and adviser, a primary school course in mathematics covering the first 3 years and based on Professor Dienes' work in South Australia has been introduced in the Territory Area for the period 1964 to 1968 and it is expected that the programme for the final three years of the primary course will have been completed before 1972.

The African Mathematics Programme of the Education Development Center

39. Among the programmes in Africa for the reform of the teaching of mathematics one of the best-known is that introduced by the Education Development Center. This organization was represented at the Trinidad Conference by Dr. Grace Williams, of the University of Lagos in Nigeria.

40. Education Development Center, Inc. (EDC), formerly Education Services Inc. (ESI), is a non-profit organization concerned with research and development in curriculum reform at all levels of education, from kindergarten to university level. The Ford Foundation, and other United States charitable bodies, as well as the National Science Foundation, have provided funds for its work. The overseas operations of EDC in Africa, India, Afghanistan and South America, have been supported by funds from U.S.A.I.D. and from the Ford Foundation and other philanthropic foundations.

41. In 1961 a Conference of African, British and American educators made firm proposals that EDC should initiate curricular reform programmes for Africa. In particular programmes in mathematics, science, social studies and teacher training were recommended. EDC agreed, initially, to try to act upon a programme for the reform of the teaching of mathematics from Standard I up to School Certificate. It was felt that the work of curriculum reform in mathematics in the U.S.A. and in Britain was sufficiently advanced to make possible a positive contribution to African education.

42. Under the direction of Professor W.T. Martin of the Massachusetts Institute of Technology, the programme was initiated and, after six months of activity including conferences in Accra and Ibadan with African mathematicians, a mathematics workshop was held at Entebbe, Uganda, in July and August 1962. A plan for the African Mathematics Programme was drawn up and the pattern of work has been followed since. There were fifty-four participants representing 13 countries, with 24 participants coming from eleven African countries. It was decided to produce materials using the new approach to teaching mathematics in four areas: text materials for the primary school, for the secondary school, text materials for

use in African teacher training colleges, and also tests and examinations based on these materials.

43. Since the programme started a total of 61 volumes of textual materials have been published. In these five years some 70 Africans, 20 expatriates, serving in Africa, 50 Americans and 5 British have helped to write the mathematical texts. In this EDC programme we see an example of an element of co-operation which might well be extended in future planning.

Examinations

44. In 1967, the West African Examinations Council set a School Certificate Examination on the work of the Entebbe Mathematics Series and the Cambridge Overseas Examination Syndicate has promised that when there is a demand a suitable examination will also be offered in East and Central Africa. Similar examination facilities are also available for the School Mathematics Project (Britain) and the Ghana Joint Schools Project.

Teacher Training

45. It became clear that it was necessary to introduce teachers to the new pedagogical approaches written into the new texts. This has been done through Institutes lasting from ten days to three weeks and staffed by visiting American mathematics educators and by their African counterparts who have participated in the programme. They are organized by the Ministry of Education in the participating country.

46. In addition to the in-country institutes described above a two-year institute, known as the ABC Institute, was started during July 1966, at the University College, Nairobi. This institute concerned itself with the mathematical education of the senior mathematics tutors of the participating countries. By the summer of 1969, these countries should have a small cadre of people knowledgeable about modern mathematics, capable of making adaptations of the materials to suit local conditions, and ready with suitable material to give help within their own countries to their fellow tutors in teachers' colleges, who in turn will give suitable training to their students and to teachers in the schools.

Co-operation within the Commonwealth

47. The large-scale EDC programme for improving and enlarging mathematical education in so many African territories pointed the way to the fuller development which a policy of co-operation between members of the Commonwealth could bring about. In general discussion, delegates at the Conference urged that Commonwealth countries should establish better communications with one another with regard to their experiments and achievements in the reform of mathematics teaching in schools, exchanging information about their schemes, the evaluation of experimental teaching, and the books and other materials that had been found useful. Exchange of personnel was suggested as a means of securing the cross-fertilization of ideas. Professional associations of mathematics teachers could well be of great service in fostering these means of communication, particularly if reciprocal affiliation could

be arranged between the various national associations. The help of the Commonwealth Foundation should be sought in facilitating these inter-association links. There was seen to be a need also for co-operation on a scale which would be beyond the resources of teachers' associations, especially in arranging exchanges of personnel, exhibitions of publications, films, video tapes etc. It was hoped that the Commonwealth Foundation, with its inter-Commonwealth structure, would be able to provide the channel through which such active collaboration could operate.

Co-operation in Aid within the Commonwealth

48. Some Commonwealth countries had already initiated new mathematical schemes, provided a large measure of further training for teachers and equipped many schools with the necessary apparatus and materials. These fortunate countries, in addition to the aid they now give in independent schemes to those less fortunate, could co-operate in the planning and establishment of similar enterprises in those countries which have too few resources to carry out, unaided, new programmes adapted to their local needs, as recommended by the Conference. If there could be a fusion of the contributions which could be most aptly made by several countries, there would be a unity of effort which would greatly benefit the receiving country. Not only would the aided country benefit by the coherence of planning and the greater strength of the united team of helpers; the contributing countries would be sharing ideas and experiments and thus enlarging the possible scope of their own programmes.