INTRODUCTION

The importance of science, mathematics and technical/ vocational education to national development has been recognised by successive Commonwealth Education Conferences. Actions to implement recommendations from these Conferences have been a notable feature of Commonwealth co-operation in education.

The Seventh Commonwealth Education Conference held in 1977 recognised the rapid developments taking place in the approaches to and content of science, mathematics and technical subjects. As the Conference pointed out, these developments make it expedient for member countries to discuss and review curricula and teaching techniques at all levels of the educational system. Two years later a meeting of Senior Education Officials, drew attention to the affinity between science, mathematics, and technical and vocational training, and stressed the advantages to be gained by linking science and technology subjects in a Commonwealth Specialist Conference (a Commonwealth meeting at which a major professional educational issue is studied in depth and appropriate recommendations formulated). This view was shared by the Eighth Commonwealth Education Conference (8CEC) held in 1980 which recommended that: "the next Specialist Conference should be designed to review the experience of member countries in devising curricula that draw upon the subject matter of science, mathematics and technical and vocational subjects with a view to enabling the generality of boys and girls to profit from the study of these subjects both for their personal development and as a preparation for the world of work. It further recommended that this Specialist Conference should be preceded by two interrelated meetings of experts who would identify issues in preparation for its work programme."

Interrelated Meetings of Experts

In response to the 8CEC recommendation, the Commonwealth Secretariat organised two interrelated planning meetings of experts in Cyprus from 22-26 March 1982. The meetings were jointly opened formally by H. E. Mr. Nicolaos Konomis, Minister of Education of the Republic of Cyprus and met at the Philoxenia Hotel, Nicosia. They had the following broad objectives:

(a) to identify issues relating to (i) science and mathematics education and (ii) technical and vocational education which should be considered by a pan-Commonwealth Specialist Conference;

(b) to study the professional implications and provide guidelines for subsequent consideration by the Specialist Conference on strategies and implementation policies for the integration of these curriculum areas.

After meeting separately to address issues of (i) science and mathematics and (ii) technical and vocational education the two groups of experts met together and agreed that:

1. The education of teachers is crucial to the implementation of the proposed guidelines which demand an understanding of the relationships between science, mathematics and technology.

2. A problem-solving approach should be used so that the inter-relationships are clearly seen and used as an integrating factor.

3. Any curricula designed should make use of locally available materials so as to keep educational costs at a minimum.

4. It would be useful if the Commonwealth Secretariat would commission a study using a few topics as examples of how an interrelated curriculum can be designed and implemented. Topics suggested were measurement, resources/materials, energy, and communication.

Following this the experts divided into four inter-disciplinary groups. Each group was assigned one topic to consider how it could be taught in an interrelated way.

The following strategies were identified as contributing to the interrelationship:

(a) The extensive use of estimation. This helps in acquiring a feeling for various measures and for understanding proportionality.

(b) Co-operation and co-ordination between mathematics, science and technical education. This should be pursued both at the level of the teams developing curricula and at the level of school teachers. Also, it is helpful to develop a relation between primary and secondary school teachers.

(c) Examples of various quantities given in teaching materials should be realistic and reasonable.

(d) The collection and presentation of data in various forms.

Finally the experts urged that recommendations to be made by the Specialist Conference should be addressed to the Ninth Conference of Commonwealth Education Ministers (9CCEM) and that of the Specialist Conference should include sample professional papers as annexes.

The Planned Specialist Conference

The Government of the Bahamas kindly offered to host the pan-Commonwealth Specialist Conference in Nassau in April 1983. Unfortunately, however, it had to be postponed, and later cancelled, owing to an insufficient number of member countries indicating that they would be able to attend it. Had it been held, the Conference's* task would have been to recommend practical measures which governments could adopt to:

1. Improve the interrelation of science, mathematics, technical and vocational subjects with particular emphasis on the interaction between such curricula and the world of work.

2. Develop strategies for teacher education systems for assisting the interrelated teaching and learning of such subjects.

3. Increase local self-reliance in the provision of resources including laboratory, workshop and physical facilities used in the teaching of science, mathematics, technical and vocational subjects.

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*See Appendix III for the provisional agenda.

4. Identify forms of bilateral and multilateral co-operation to support the implementation of interrelated science, mathematics, technical and vocational education curricula.

In preparation for the Conference, the Commonwealth Secretariat commissioned ten working papers. They were prepared by authors from all regions of the Commonwealth, several of whom had participated in the experts' meetings in Cyprus.

Following the cancellation of the Conference, two of the papers were modified for use as working papers at the Africa Regional Workshop on Communication in Science, Technology and Mathematics Education.*

These two papers have been revised for the present volume (see chapters 1 and 3) and appear with five others originally prepared for the planned Specialist Conference (and also used as a background document at the workshop in Malawi). All seven are presented in this volume with the hope that member countries can use them as a basis for discussion and follow-up work in the field.

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*This workshop, in Blantyre, Malawi from 9-13 April 1984, was organised by CASTME with funds provided by the Commonwealth Fund for Technical Co-operation of the Commonwealth Secretariat and by the Commonwealth Foundation. It was originally planned as an in-depth professional meeting to follow-up the topic of "communication" planned to be discussed at the Specialist Conference. In the event, the workshop programme was designed to achieve an independent and a more comprehensive treatment of communication in science, technology and mathematics education and the teaching of the subjects in an interrelated way. With the exception of the Seychelles, all Commonwealth countries in the Africa region were represented.