COMMISSION INTERNATIONALE DE L'ENSEIGNEMENT MATHÉMATIQUE

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SUMMARY OF THE SECOND INTERNATIONAL CONGRESS
ON MATHEMATICAL EDUCATION

by Sir James LIGHTHILL

From 29 August to 2nd September 1972 the 2nd International Congress on Mathematical Education was held in the University of Exeter with over 1400 full members from about 70 different countries. The Exeter campus on its broad grassy hill, with capacious working buildings close to comfortable halls of residence, proved ideal for a large, complicated residential congress of this kind. In the sunny weather experienced all the week, members could enjoy going on foot from one building to another alongside the fine Devon trees. The decision taken in February 1970 to invite ICMI (the International Commission on Mathematical Instruction) to hold its 2nd International Congress in Exeter and to plan for a membership over a thousand was fully justified by the members' keenness of response, appreciation of the campus and active work throughout the Congress.

Positive participation by all members was ensured principally by one unusual organisational feature: a splitting-up of the large membership into some 38 Working Groups so that each had time to discuss in depth, with a real sense of continuity, some detailed aspect of the subject-matter of the Congress. The timing permitted every member to concentrate his activities within a selection of two Working Groups. Here, brief references will be made to the work of half of them (19 in all), preceded by the assurance that those in the half not here mentioned were in many ways just as interesting!

There was especially full and lively discussion in three Groups concerned with the presentation of particular branches of mathematics at school level: Probability and Statistics; Algebra; Geometry. " Thinking Geometrically " (the title of one presented paper) was widely regarded as a goal to be aimed at much more than has commonly been the case in recent years, and ICMI decided to arrange a specialised Symposium on this theme in 2 to 3 years' time.

In my Presidential Address at the outset of the Congress I had reminded members of the importance of viewing mathematical education within the context of the total education of the individual, and gone on to recommend teaching methods based on integrated pure and applied mathematics. These themes were actively pursued in many Working Groups. Great interest in the rapidly widening areas and methods of application was exhibited in the Group on application of mathematics; an ICMI Symposium on their relevance in school teaching was later decided upon for 1973 in Luxembourg. A Group concerned with integration of studies in mathematics and in other subjects at school level was able to bring about the adoption by ICMI as a whole of a resolution aimed at further encouragement of such integrated studies.

University teaching of mathematics was discussed at length in three Groups concerned with teaching either to specialists in mathematics, or to engineers and physical scientists, or to social scientists and biologists. There was welcome evidence of more professionalism going into discussions of content and method in university teaching, and a clear recognition of the very different approaches needed to stimulate mathematical interest and activity in these 3 different categories of students.

At the other end of the educational spectrum, the Group on Pre-School and Primary Mathematics proved extremely popular, and strong interest in this field was a general feature of the Exeter Congress. Two ICMI Symposia on this theme were decided upon for 1973/74: one in Poland with emphasis on method, and one in Hungary with emphasis on curriculum. There was good attendance also at the Group on Middle-School Mathematics (ages 9 to 13). It was this whole area of learning in young children that was the main theme of another especially successful Group, that on the Psychology of Learning Mathematics. An excellent foundation for its work had been laid in a special paper which Professor Jean Piaget had been good enough to prepare for circulation to all Congress members, as well as in a short paper by an honoured guest of the Congress, Professor George Polya.

The special problems at each end of the range of mathematical abilities were not neglected at the Congress: one Group studied the value of Mathematical Competitions as a stimulus for the exceptionally able and proposed a resolution encouraging their more widespread use that was later adopted by ICMI. On the other hand a Group on Mathematics and the Slow or Reluctant Learner attracted an excellent attendance and many able presentations. This Group and that on Mathematics and the Socially Disadvantaged Child made far more widely known than before a valuable range of techniques

for overcoming special educational difficulties. This was one of many areas where classes of children had been made available for demonstration lessons to very great effect.

The Congress emphasised the variety of new equipment and new materials now available for mathematics teaching; partly through a fine exhibition given by the Education Equipment Association and Educational Publishers Council, and partly through the work of particular Groups. That on the Mathematics Workshop (the Use of Apparatus, Games and Structural Materials) proved of very general interest. Another group concentrated on Papygrams and the other imaginative material for helping in the acquisition of ideas of mathematical structure derived from the work of Professor and Madame Papy, while yet another Group concentrated on the educational role of tessellations, space-filling, point-lattice geometry and their applications.

Access to computers has begun to grow rapidly within the schools of many of the most highly developed countries. Accordingly, great interest was shown in the work of the Group on the Place of Computers in Mathematical Education. Subsequently ICMI decided to approach the International Federation of Information Processing Societies (IFIPS) to investigate the possibility of a jointly sponsored Symposium devoted to integrated mathematical education and computer studies at school level.

A most satisfactory feature of the Exeter Congress was the remarkably good attendance from the developing countries, in spite of the very considerable distances and costs generally involved. Activity in the Group on Mathematics in Developing Countries was particularly fruitful in widening the recognition of three important educational matters:

(i) dangers of using imported educational material unless it has been subjected to careful scrutiny and modification by citizens of the country concerned to make it suitable for use in the general cultural background of that country (ICMI subsequently adopted a resolution to this effect);

(ii) the strong relevance of linguistic background to mathematical education, a subject on which ICMI later decided to hold a specialised symposium in Africa;

(iii) the need to ensure a closer relationship of curriculum content to the development needs of developing countries, also adopted as the subject of a future specialised ICMI Symposium, this time in India.

Achievement of a globally international future for ICMI requires that it should sponsor meetings like those just mentioned outside the usual centres in Europe and America. With that in mind, a further symposium with strong regional interest was planned for 1974 in Japan.

Members of the Exeter Congress obtained a more generalised view of current international developments in their subject from 17 National Presentations by different participating countries. These included exhibitions of classroom materials and pupils' work, as well as films and talks. The host country was fortunately able to offer an extensive presentation that attracted numerous visitors, and was supplemented by independent presentations from particular projects (S.M.P., Schools Council, Nuffield, Open University). These were areas where demonstration lessons, and even demonstration « in-service training » sessions, proved most effective. The USA was another country offering a particularly extensive national presentation, and every one of the 17 offered much interesting material.

It will be seen that this was a Congress which kept to a minimum the old-fashioned expository method of the general lecture. That was used only with the aim of presenting to the members some outstanding figure: among eminent mathematicians Academician S. L. Sobolev of Novosibirsk gave a general description of mathematical education in the USSR, Professor René Thom gave a profound analysis of the concept of " modern mathematics ", Professor Hans Freudenthal (my predecessor as President of ICMI) described group theory in relation to its educational value; while among eminent practitioners of the human sciences, Dr. Edmund Leach showed how different societies in the past viewed the ideas of time and number systems, Professor David Hawkins related a child's mathematical development to the development of its perception of nature, and Professor Hugh Philp described the researches that were enabling educational methods in developing countries to be evaluated and compared.

Above all, this was a meeting crammed with possibilities for those attending to make personal contacts with colleagues from many countries and learn about ideas and practices from all over the world, but something of its flavour will be preserved in the Proceedings to be supplied to all members and to be on sale to the general public by Cambridge University Press. This will contain all the general lectures and a selection of papers presented to Working Groups, together with an extended summary of the work of all the Groups. Even this condensed account of some of the happenings at a remarkable Congress should prove of very great value to mathematical educators generally.

SYMPOSIA

The following note gives information known at the start of January 1973. It concerns symposia discussed and given ICMI sponsorship at the meeting of the General Assembly at Exeter.

1. *Luxembourg.* 3rd Mathematical Seminar at Echternach; 4-9 June, 1973. New aspects of mathematical applications at school level. Languages: French, German, English. Apply before February 15, 1973, to

   SÉMINAIRE CIEM, c/o MR. JOS. HALLÉ, LYCÉE CLASSIQUE, ECHTERNACH, CCP 34 540 LUXEMBOURG.

2. *Hungary.* International Colloquium at Eger; 18-22 June, 1973. Theoretical problems of teaching mathematics in primary schools. Languages: English, French, Russian, German. Apply as soon as possible (forms were requested for 30 September, 1972) to

   A. RECSKI, BOLYAI JANOS MATHEMATICAL SOCIETY, SZABADSAG TÉR 17.II.203, BUDAPEST V, HUNGARY.

3. *Poland.* Symposium at Warsaw; 1974. Mathematics in Primary Schools (Children from 6 to 11 years of age.)

   PROFESSOR Z. SEMADENI, INSTITUTE OF MATHEMATICS, POLISH ACADEMY OF SCIENCES, UL. SNIADECKICH 8, WARSZAWA 1, POLAND.
   (Please mark envelopes, " Warsaw Symposium, 1974 ".)

4. *Africa.* Regional Conference. Probably Nairobi, 1974. Interactions between mathematical education and linguistics.

   DR. D. SAINT-ROSSY, UNESCO HOUSE, MALIK STREET, PO BOX 30592, NAIROBI, KENYA.

5. *Japan.* ICME-JSME Tokyo Conference: 1974. Preliminary proposals: 5-9 November, 1974; main subject, Curriculum and teachers' training. Wide membership from Asia and Australasia is proposed, so that the meeting may be truly regional.

   PROFESSOR S. IYANAGA, 12-4, OTSUKA 6-CHOME, BUNKYO-KU, TOKYO, JAPAN.

6. *India.* Regional Conference; late 1974. The development of an integrated curriculum in mathematics for the underdeveloped countries.

   PROFESSOR P. L. BHATNAGAR, DEAN OF STUDIES, DEPARTMENT OF MATHE-MATICS, HIMACHAL PRADESH UNIVERSITY, SIMLA 5, INDIA.

7. *Copenhagen.* Symposium; 1974 or 1975. Planning is at a preliminary stage. The theme will be on aspects of geometry at school level.
   PROFESSOR H. G. STEINER, 8580 BAYREUTH, GESCHWISTER-SCHOLL-PLATZ 3, GERMANY GFR.

8. *IFIP Conference.* Marseille; August 1975. Plans are in hand for ICMI to be closely associated with this conference of the International Federation for Information Processing — the Second World Conference on Computer Education.

PROFESSOR J. HEBENSTREIT, ECOLE SUPÉRIEURE D'ELECTRICITÉ, 10 AVENUE PIERRE LAROUSSE, 92 MALAKOFF, PARIS, FRANCE.