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The International Commission on Mathematical Instruction

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Legend: IMU stands for *The International Mathematical Union*; ICSU stands for *The International Council of Scientific Unions*; CTS stands for *The Committee on the Teaching of Science* (of ICSU).

The ICME-7 Opening Address by the President of ICMI

given on 17 August, 1992, Université Laval, Québec, Canada

Miguel de Guzmán

Monsieur le Maire de cette Ville de Québec,
Monsieur le Recteur de l'Université Laval,
Autorités,
Cher Collègues,
Mesdames, Messieurs,

En ma qualité de président de la Commission Internationale de l'Enseignement Mathématique, au nom de son Comité Exécutif et de son Assemblée Générale, au nom de tous les participants à ce Septième Congrès Internationale de l'Enseignement Mathématique, et de l'ensemble de la communauté mathématique, particulièrement de tous ceux qui sont engagés dans l'enseignement mathématique, je désire exprimer nos remerciements les plus chaleureux en premier lieu au gouvernement du Canada, à celui de la Province et de la ville de Québec, et à l'Université Laval, pour l'hospitalité qu'ils nous ont offerte et pour toute l'aide qu'ils ont apportée aux organisateurs de ce Congrès.

It is a strong indication of the high esteem a country has of education, of mathematical education, and of culture in general: its eager disposition to cooperate to such an extent in the organization and funding of this Congress, from which so many fruitful consequences are derived throughout the whole world concerning mathematical education. To the people of Canada and also to the different organizations from Canada and from other countries which have collaborated in and sponsored this magnificent event, our most hearty thanks and our warmest congratulations for your wonderful disposition towards culture and towards mathematics.

I wish also to express our warmest thanks to those inside the organization of the Congress, the Canadian team as well as the international team, who have made this Congress possible through their constant dedication for several years. I would like to mention in particular the names of Professors Bernard Hodgson, Claude Gaulin, David Wheeler, and David Robitaille. To all of you who have participated in the preparation of this event, so important and full of consequences for the whole mathematical community around the world, and especially to all the members of the different committees, I would like to say in the name of all of us: Please, be sure that we appreciate very warmly all the efforts you have made on our behalf and on behalf of the whole mathematical community. We congratulate you on your evident success in the preparation of this Congress.

I wish also to express my thanks to all participants, to all of you who have come here to share your educational experiences in one way or another, through your presentations, talks, posters, and participation in the different activities. All of us are here with

a common wish, that of serving the mathematical community concerned with education in the most effective way possible, working together towards a betterment of mathematical education in all countries in the world, with the deep persuasion that this work will greatly influence the progress of human culture.

This Congress is a manifestation of the increasing vitality of the ICMI, due in recent years very significantly to the efforts of Profs. Jean-Pierre Kahane and Geoffrey Howson, who have enriched its activity in many directions in the last decade - to mention just one, through the very influential idea of the ICMI Studies, of which quite a few have already been completed, with some still in preparation.

The present world circumstances impel us to keep working in the directions in which ICMI has been successfully acting up to now and also to try to give a stronger impetus to one action which in the mind of our Executive Committee requires at this moment a firm priority. This is: **solidarity in mathematical education.**

The United Nations Programme for Development has issued a few months ago an impressive Report on Human Development. With an extraordinary wealth of information, and after several years of study by a very competent team, it examines carefully the present problems of the distribution of human and material resources in the world. According to the report, the last decade has been characterized by a drastic enlargement of the gap between rich countries and poor countries, between rich people and poor people in the world.

Two pieces of information are quite conclusive:

- * At this moment one can say that a fifth of the world population (the rich part) owns more than 80 per cent of the total material resources, while another fifth of the population (the poor part) owns less than 1.5 per cent of those resources.

- * This situation of imbalance has been rapidly deteriorating in recent decades, and especially during the 1980s. In 1960, the richest fifth of the world population was 30 times richer than the poorest fifth. In 1980 it was 45 times richer, and in 1989 it was 60 times richer.

This could also be expressed in the following way: There was a family of five brothers. Everywhere it was proclaimed that they were equal in rights. But one of the brothers had made himself the owner of almost everything the family owned (80%). And another brother had almost nothing (1.5%). Some time ago the rich brother was 30 times as rich as his poorer brother. But now he is 60 times as rich.....**this is our world. This is our inhuman development.**

Of course, human development, educational and cultural opportunities, social structures, and so on, are in a great measure conditioned by the economic situation, and so the disparity between poor people and rich people in these aspects is at least as great as the economic figures show.

From this rapidly deteriorating situation in the distribution of material and human resources in the world, we can infer several conclusions:

- * The actions and the efforts performed by global institutions in the last decade have been intense and well applied in many cases, but clearly they have been totally insufficient.

- * We need to think of imaginative new ways to try to improve this situation, which is becoming unbearably unjust. Otherwise, global conditions will become still worse than they are at this moment.

- * We cannot rely only on what global organizations are trying to do. We cannot silence our consciences with the excuse that there are already organizations in charge of trying to remedy the injustice of this situation. **We need to foster in us and around us a personal commitment. We need to take an active and personal part to improve this situation. What can we do?**

Ours, of course, is an educational task. And this task is based on two fundamental pillars: human resources and material resources. Our personal involvement can take many different forms:

- * We can actively look for places in our own environment where our personal cooperation in education might be very much welcomed and needed. There is a South in every North. There are many undeveloped groups of people inside every country. Perhaps for too long we have been looking just for places where we could find some profit for our own development. The time might already have come to look for places where we could offer something of ourselves.

- * For some of us the barriers of language with many of the countries in need of development in mathematical education do not exist. We may offer some of our time to cooperate with them. Perhaps we should take the initiative, not waiting to be called, to be asked, to be invited, but looking ourselves for places to go and for funds to finance our work in those countries - not imposing upon them our way of looking at their problems, but asking the people there with an open disposition where, when, and in what ways we could be of any help.

- * Many of us who live and work in those countries with better economic conditions could and should personally offer some of our material resources in order to help others to achieve a better development in mathematical education.

ICMI could help, ICMI should help, to articulate this personal commitment. I am sure there will be many people in many countries who would like to find concrete ways to act. ICMI, working together with the Committee on Exchange and Development of the International Mathematical Union, could establish a panel to channel the

offers and to receive the requests for help. All of you who would like to contribute with your ideas and with your personal time and effort to this solidarity programme are invited to get in contact with any of the members of the ICMI Executive Committee. To all the persons who can think of effective ways to contribute to the betterment of the educational conditions in mathematics in particular regions or concrete groups of people in the world, I would like to ask: Please share your ideas with us.

Regarding the material resources needed for getting ahead with this **Solidarity Programme**, some of us in the Executive Committee have been working towards the initiation of what we have called a **Solidarity Fund for Education in Mathematics** and have tried to start collecting some funds from personal friends around us. They have agreed to start collaborating with ICMI in this form. It is a pleasure to express our thanks to the persons in different countries who have generously contributed to this **Solidarity Fund**, which has started with an amount of US\$ 20,000. I have no doubt that many of you will wish to collaborate personally to increase this amount through your own contributions or through your active participation to obtain funds from different sources, personal or institutional. This **Solidarity Fund** will be administered for the moment by the Treasurer and Secretary of ICMI, Professor Mogens Niss. All of you who wish to contribute to this **Solidarity Fund** are invited to send your contributions to his address.

There are many other ways in which we can also contribute. An example: Perhaps many people coming here have thought that the registration fee of US\$ 300 we all have paid for this Congress was far from being inexpensive. If many of you, who come from rather affluent countries, are inclined to think that this is expensive, imagine what the professors and teachers of mathematics will think in many countries where their monthly salary is below this amount. If you keep this situation in your mind, I am sure that many of you would agree to pay together with your own registration a portion of the registration of one less affluent person whose attendance at the Congress would be made possible in this way. Maybe we should introduce this not just as an option, but as a very reasonable and just solidarity tax. Achieving solidarity is not a matter of charity. **Achieving solidarity is a matter of justice.**

For this Congress there has been a Grants Committee for helping participants coming from countries where the economic conditions are not good at all. About 90 participants have received some kind of support in order to attend it, with all continents being represented. This has been possible thanks to the efforts of the Canadian International Development Agency, with funds coming from UNESCO, the ICME 7 Organization, the IMU, and the ICMI. Altogether, 75,000 Canadian dollars have been distributed. I would like to express our most hearty thanks to all these sponsors and also to those in charge of the Grants Committee for the delicate and intense work they have done.

But we should try to reach still more ambitious goals. Perhaps, with the personal contributions we are suggesting, we shall be able in the future to have several hundred participants from many countries who are in urgent need, much more than most of us, of opportunities for development and exchange like the ones this Congress is going to offer.

The Executive Committee of the ICMI would like to submit this idea to our Spanish colleagues who will be in charge of organizing the next International Congress, ICME 8, 1996, in Seville, in order to explore its feasibility. For that, we still have time.

We could also proceed in a similar way with the Proceedings of this Congress and with many other publications related to ICMI. Persons in sufficiently good economic situation could very willingly pay a little more in order that the publications they find useful can reach persons, places, and centers in less affluent countries at a drastically reduced price. Otherwise, perhaps people in these countries will be wholly unable to buy them. We should introduce a new style of life, a spirit of austerity - austerity not just for itself, but for sharing. Perhaps a new slogan would make sense: TAKE ONE, PAY TWO.

Of course, this **Solidarity Programme** and **Solidarity Fund**, which is intended to be based primarily and above all on **personal commitments and personal contributions** of all people around the world, will have to be given some structure if it is going to be efficient. It will have to try by all means to take good care that personal resources and material resources go in fact to the places where they are really needed and most effective, exploring with diligence what are in each case the right ways to achieve this goal. As many of you know, this is not an easy task, since in some cases resources come with strings and restrictions, and in some others they are channeled through organizations whose honesty, impartiality, and integrity one can rightfully doubt.

This **solidarity** spirit is in complete agreement with the goals of the programme proposed by the International Mathematical Union for the year 2000, declaring it **WORLD MATHEMATICAL YEAR 2000**.

As you know, on the sixth of May 1992, the IMU, together with UNESCO and other institutions, decided to declare the year 2000 the World Mathematical Year 2000. In the second objective of its programme, it decided to proclaim mathematics as one of the central keys for understanding the world and for the progress of our human culture. ICMI, our Commission on Mathematical Education, together with the Commission on Development and Exchange, was charged with the task of fostering an adequate development of mathematical education in all countries of the world. We can be sure that such a development is going to become impossible unless we take some innovative and drastic measures, which include a personal commitment like this one the Executive Committee has agreed to stimulate within the entire mathematical community.

If this Seventh International Congress serves to launch such a solidarity spirit, first of all among its participants and through them in their particular communities, it will have done a great service to mathematical development in our world. Let us look forward to it.

To conclude:

Je déclare ouvert ce Septième Congrès International de l'Enseignement Mathématique.

I declare open this Seventh International Congress on Mathematical Education.

Queda inaugurado este Séptimo Congreso Internacional de Educación Matemática.

Miguel de Guzmán

On ICME-7

The 7th International Congress on Mathematical Education was held at Université Laval, Québec, Canada, 17-23 August, 1992. It was the culmination of four years of increasingly intensive work done by the hundreds of people from all over the world who were responsible for designing and carrying out the scientific programme, in preparing meetings attached to the congress, in organising social and related activities, and in solving the thousands of technical, administrative and financial problems inherent in planning a conference of this size. Of course, the seven congress days were specially intensive to those of our Canadian colleagues ultimately in charge of the entire congress, as chairs of the complex structure of committees, working teams etc.

More than 3300 delegates from more than 75 countries greatly enjoyed the scientific and social programmes of ICME-7, the splendid hospitality of Université Laval and of the most charming city and province of Québec. New experiences, insights and impulses were gained. The tremendous extent and intensity of the formal and informal congress activities constitute one of the factors that made ICME-7 such an important and unforgettable event to all those who participated in it. Quite a few contacts, working groups, germs of research projects etc. were initiated during the congress. And last, but definitely not least, participants met old friends and made new ones.

On behalf of ICMI - and we are convinced of every single congress delegate - it is our great pleasure to express our deepest gratitude and appreciation to our Canadian colleagues and friends who made all this happen. Our warm thanks also go to every one of those who contributed to the congress in one form or another. Without their enthusiasm and dedication ICME-7 would not have been the true success it was.

Miguel de Guzmán Mogens Niss

Minutes of the General Assembly of ICMI **held at ICME 7, Québec, Canada, Tuesday 18th August, 1992, 6-8 pm**

The General Assembly, the GA, consists of the ICMI *Executive Committee* (the EC), of which the following members were present:

Miguel de Guzmán (President), Jeremy Kilpatrick (Vice-President), Lee Peng Yee (Vice-President), Mogens Niss (Secretary), Yuri Ershov (member), Eduardo Luna (member), Anna Sierpiska (member), Jean-Pierre Kahane (ex officio member, Past President), Jack van Lint (ex officio member, ICSU/CTS),

and *National Representatives* (NRs), of Adhering Organisations, of which the following (or their substitutes) were present:

Argentina (J.C. Dalmasso), *Australia* (J. Mack, for M.F. Newman), *Austria* (F. Schweiger), *Belgium* (G. Eryvnc), *Brazil* (U. D'Ambrosio), *Canada* (D. Wheeler), *China-Beijing* (Zhang Dianzhou, for Pan Chengdon), *China-Taipei* (Hsi-Muh Leu), *Czechoslovakia* (V. Burján, for M. Kolibiar), *Denmark* (O. Skovsmose, for B. Hirsberg), *Egypt* (W. Ebeid), *Finland* (I. Laine), *France* (J-P. Labrousse), *Hungary* (T. Nemetz, for J. Szendrei), *Iceland* (K. Jónsdóttir), *Iran* (A. Rejali, for M. Toomanian), *Italy* (B. Scimeni), *Ivory Coast* (S.Touré, for P. Nezit), *Japan* (H. Murakami, for H. Fujita), *Kuwait* (M. Hussein), *Mexico* (E. Wenzelburger), *Mozambique* (A. Ismael), *The Netherlands* (J. van Lint), *New Zealand* (M. Clark), *Nigeria* (A. Kuku, for S.O. Ale), *Poland* (Z. Semadeni), *Russia* (Y. Ershov, for A.S. Miscenco), *Singapore* (Lee Peng Yee, for Cheng Kaih Nah), *South Africa* (J.H. Webb), *Spain* (C. Alsina), *Sweden* (G. Wanby), *The United Kingdom* (A. Bishop, M. Brown), *USA* (S. Willoughby).

The following countries adhered to ICMI were not represented:

Bangladesh, Botswana, Bulgaria, Cameroun, Costa Rica, Cuba, Germany, Ghana, Greece, India, Ireland, Israel, Luxembourg, Malawi, Malaysia, Norway, Pakistan, The Philippines, Portugal, Romania, Sénégal, South Korea, Swaziland, Switzerland, Tunisia, Yugoslavia, Zambia.

In addition, representatives of Affiliated Study Groups participated as follows:

HPM (F. Fasanelli, outgoing Chair, J. Fauvel, new Chair). No officers of *IOWME* or *PME* were present at the GA.

Finally, a number of invited guests and observers - from Canada, Chile, Egypt, Guatemala, Indonesia, Japan, Qatar, Saudi Arabia, UK, USA, and Yemen - were present at the GA as well.

The President of ICMI (MdG) welcomed the participants to the General Assembly which was gathered according to the agenda published in the ICMI Bulletin, No. 32, June 1992. The items on the agenda were dealt with as follows.

1. ICMI Finances

The accounts for 1991 had been published in the ICMI Bulletin, No. 32, and were received previously by the IMU EC which had not raised any objections to it. The Secretary (MN) added a few comments on the current situation which was described as reasonably satisfactory in general terms. There were no further questions or comments concerning ICMI's financial situation.

2. Debate on ICMI activities 1988-92

As far as a general picture of ICMI's activities for the years 1988-92 is concerned, reference was made to the Secretary's report in No. 32 of the Bulletin.

Internal affairs

The President drew the GA's attention to the resolution passed by the IMU General Assembly in its Kobe (Japan) session in August 1990. According to this resolution, Adhering Organisations are requested to normally re-elect their National Representatives only once.

MdG also encouraged member countries to consider establishing National Sub-commissions of ICMI in order to stimulate as wide a spectrum of activities at all levels of mathematics education in their countries as possible. To illustrate how different segments of the mathematics education community in a country can cooperate to establish a balanced National Subcommission, the NR from Belgium, Gontran Ervynck, agreed to describe briefly the Belgian experiences. Similar experiences were reported to be found in Finland.

Some GA participants suggested that perhaps strategies should vary with the country since in some countries a National Subcommission could well be subject to government control to an extent that might be unhealthy for mathematics education. In such cases mathematical societies might be able to act more autonomously. In other countries the problem may be the converse, namely that the mathematical societies/-national academies may take a less enthusiastic interest in mathematics education and appoint their NRs accordingly.

Several NRs wished that clearer specifications were given to describe the role of an NR in relation to ICMI and the types of activity expected from him or her. Perhaps it might even be worthwhile to consider establishing guidelines or rules. EC members stated that the main task of an NR is to be a two-way communication channel between the mathematics education community of his or her country and ICMI as an international body. As a minimum this implies disseminating the ICMI Bulletin to national quarters of mathematics education. To the extent that NRs could play a leading part in stimulating cross-fertilisation on a larger scale between their countries and the international community, the EC would welcome this very much indeed. Besides, the EC would like to know NRs opinions on a number of issues. Thus, NRs were encouraged to share their views on the structure, content and organisations of the ICMEs - in particular ICME 6 & 7 - with the EC.

Affiliated Study Groups

Written reports by *HPM* (the International Study Group for the Relations Between the History and Pedagogy of Mathematics), *IOWME* (the International Organisation of Women and Mathematics Education), and *PME* (the International Group for the Psychology of Mathematics Education) were published in the Bulletin, No. 32. During ICME 7 all three groups appointed new officers whose names and coordinates are given in the Bulletin, No. 33.

ICMI Studies

The situation concerning ICMI Studies was outlined briefly by MN. The study on *Assessment in Mathematics Education and Its Effects* (the corresponding conference of which was held in Spain in April 1991 with the generous support of various Spanish sponsors and of UNESCO) was in the final stage of being made ready for publication. Two volumes, 'Investigations into Assessment in Mathematics Education', and 'Cases of Assessment in Mathematics Education', are to appear with Kluwer Academic Publishers by the end of 1992. The next study will be on *Gender and Mathematics Education*. The international Programme Committee is chaired by Gila Hanna (Toronto, Canada). The study conference will take place 7-12 October 1993 in Southern Sweden with generous financial support by the Swedish government. A study on *What is Research in Mathematics Education and What are Its Results?* is in an initial stage of planning. The international Programme Committee (jointly chaired by Jeremy Kilpatrick (Athens, GA, USA) and Anna Sierpiska (Montréal, Canada) met for the first time during ICME 7.

Regional meetings

The VIII IACME (Inter American Conference on Mathematics Education) took place 3-7 August 1991, in Miami, FL, USA. Also the ICMI-China Regional Conference on mathematics education was held in August, 5-8, in Beijing.

3. Future plans and developments

ICME 8 & 9

Already in 1991 the EC had the pleasure of accepting Spain's offer to host ICME 8 in 1996. The congress will be held in July-August in Seville on dates that are yet to be determined. Information materials and promotion activities were presented to ICME 7 participants during the congress. GA delegates were encouraged to express their ideas and suggestions concerning ICME 8 by writing to the Secretary.

ICME 9 is going to be held in the year 2000. As this congress is expected to call for extraordinary preparation efforts, invitations to ICMI countries to consider submitting bids to host ICME 9 had already been issued in Bulletins No. 30 and 31. No bids had been received yet but delegates from Brazil and Japan informed the GA that in both countries preliminary discussions had been conducted on the matter.

World Mathematical Year 2000

MdG informed the GA that in May 1992 in Rio de Janeiro, IMU announced the World Mathematical Year 2000 (the declaration can be found elsewhere in this Bulletin) as a major effort of the international mathematical community of bringing

mathematics as a multi-dimensional entity to the attention of the world. As a result of several contacts between the Presidents and Secretaries of IMU and ICMI, respectively, ICMI was assigned an important role in preparing WMY 2000 and a variety of its activities.

Of course, ICME 9 is going to be a crucial component in this complex. One of the ideas discussed between IMU and ICMI was to organise ICME 9 as a central congress accompanied by a number - say 5 - of regional satellite congresses connected to the centre by global communication channels (TV and electronic networks). This would make it possible to strengthen the global character of ICME 9 by allowing for the participation of delegates who were not able to attend a traditional one-site congress because of, typically, financial constraints.

Quite a few GA delegates expressed reservations towards this idea, because they saw the essential attraction of a congress as lying with the opportunities to meet people from different places of the world and exchange information, experiences, and views etc. in a stimulating environment. Besides, it was said, the centre-satellite structure may tend to create a hierarchy between those who could afford to attend the central congress and those who could "only" go to a satellite congress. Finally it was mentioned that previous experiences seem to indicate that technology-based conferences might well turn out to cost more than it would cost to bring people to a traditional congress.

Against this background the EC was requested to reconsider the centre-satellite concept for ICME 9.

Future ICMI studies

In addition to the studies in progress, MN mentioned that the following topics/themes are likely to be the next ones in focus: *new perspectives on the teaching of geometry, the role of history in the teaching of mathematics* (in cooperation with HPM), and *teacher training*. Several other ideas are under development, e.g. the teaching of *probability*.

Affiliated Study Groups

A number of international groups, each focussing on special aspects of mathematics education had approached the EC with the aim of becoming an Affiliated Study Group. Necessary criteria for affiliation of a new group were discussed. As a minimum the group has to be a genuine *study* group - not just an organisation with a special interest - i.e. it has to conduct investigations designed to identify and analyse problems, issues, phenomena, etc. Naturally, the group also has to work at a truly international level. A set of guidelines for affiliation as an ICMI Study Group will be published in the Bulletin.

Regional meetings

So far, the following future regional meetings have been scheduled: SEACME 6, the 6th South East Asian Conference on Mathematics Education, will take place in 7-10 June 1993 in Surabaya, Indonesia. II CIBEM, the Second Iberoamerican Conference of Mathematics Education, will take place in Blumenau, Santa Catarina, Brazil, in 1994.

One of the NRs urged the EC to ensure that ICSU rules will be observed with future meetings. ICSU rules imply, among other things, that no restrictions due to race, religion, gender, etc. may be imposed on *bona fide* scientists to prevent their participation in conferences associated with ICMI. The President confirmed the EC's agreement with this position.

Solidarity Programme

GA delegates were requested to react to the proposed mounting of an ICMI Solidarity Programme as put forward in the Presidential Opening Address to ICME 7 (see this Bulletin). Delegates received this proposal very favourably, and some of them referred to similar reactions from many congress participants with whom they had had conversations on the matter.

On this basis the GA went on to discuss possible concrete initiatives that could be part of the Solidarity Programme. Suggestions included:

- * More emphasis on and support of regional conferences;
- * Urge international publishers to introduce substantial rebates for mathematics educators in non-affluent countries on books and journals in mathematics education;
- * Raise more funds to help the participation in ICMEs of mathematics educators from non-affluent countries, for instance by introducing an extra registration fee (a "solidarity tax") to be paid by participants from affluent countries, either on a general basis or as a voluntary contribution. Perhaps associations or societies of mathematicians or mathematics educators could be asked to donate special solidarity contributions as well;
- * Approach airlines and hotels to request whether they would be willing to give discount fares/room rates to participants from non-affluent countries in return for being appointed official ICME sponsors;
- * Increase the print-run of the ICMI Bulletin to allow for individual subscription at a non-profit payment level.
- * Particular attention was devoted to the following proposal, "save a book", presented by AS on behalf of the EC:

In many universities and research institutions access to appropriate up-to-date literature - in particularly Western literature published commercially - is a severe problem. Colleagues in such places often say that it would help their institutions greatly if they could obtain spare books from colleagues or institutions in countries that are more well off. One of the advantages of the proposed project is that it can be handled on a decentralised, and even on an individual, basis with very limited organisational, administrative and financial requirements.

Although some hesitation towards the proposal was expressed - thus it was emphasised that the quality of materials should not be inferior to those in the developed

countries (the Third World Academy of the Sciences was quoted to have stated: "Third World countries won't have trash") - there was general support of the proposal among GA delegates. It was suggested that ICMI could collect and coordinate the exchange of information about needs and supplies, respectively, between institutions. It was further suggested that ICMI might join already existing book distribution programmes, and join forces with ICSU and the Third World Academy of Sciences.

MdG thanked for all the positive and helpful comments and suggestions which will be explored carefully by the EC.

4. Any Other Business

One delegate proposed that ICMI should organise an international clearing house for national teacher organisations. It was mentioned by another delegate that such a thing existed already for Europe. It was developed in connection with the establishment of the Committee for Mathematics Education of the European Mathematical Society.

Another delegate suggested that ICME 7 participants be encouraged to write brief articles in the Bulletin about what they had found to be *new*, from the point of view of scientific content, in ICME 7. (Editor's remark: such articles would be very welcome indeed!)

A third delegate proposed to the EC to consider whether time has come to establish a permanent and stationary ICMI Secretariat at which ICMI's files could be kept, an ICMI library be established, publications or videos sold, and so forth. Even if several immediate objections (mostly of a financial nature) were raised to this proposal, EC members agreed that there is much sense in it and that it certainly deserves further exploration.

Finally it was asked whether it would be possible to obtain the Bulletin via e-mail. The Secretary answered that only a few technical details needed to be in place before this is possible.

The General Assembly was closed by the President of ICMI who thanked all delegates for their most valuable contributions and support.

Miguel de Guzmán

Mogens Niss

Rio de Janeiro Declaration on Mathematics

On the 6th of May 1992, during the celebration of the 40th anniversary of Instituto de Matematica Pura e Aplicada (IMPA), which enjoys world renown, Professor J.L. Lions, President of the International Mathematical Union (IMU), in the name of this Union declared the year 2000 the *World Mathematical Year*.

WMY 2000 (the **World Mathematical Year 2000**) is placed under the patronage of UNESCO (Professor Federico Mayor), the Third World Academy of Sciences (Professor Abdus Salam, and Professor Carlos Chagas who participated in the Rio de Janeiro Declaration), the Ministre de Recherche et de l'Éspace de France (Professor H. Curien), the Secretary of State of Science and Technology of Brazil (Professor Helio Jaguaribe), the Brazilian Academy of Sciences (Professor Israel Vargas), and of the Federal Counsellor Flavio Cotti, Switzerland, the country which is organising the next International Congress of Mathematicians in Zürich 1994.

The Rio de Janeiro Declaration identifies three aims.

Aim 1: The Major Challenges of the 21st Century

In his lecture in 1900, in Paris, the mathematician David Hilbert established a list of major problems for the century which is now coming to an end.

The American Mathematical Society in 1990 proposed to the General Assembly of IMU in KOBE (Japan) that the best mathematicians in the world, represented in the core of the *Turn of the Century Committee*, organise efforts to identify the main challenges of the year 2000. This Committee is chaired by Professor J. Palis Jr., IMPA, Secretary of IMU.

Aim 2: Mathematics, Key to Development

Mathematics, pure and applied, is one of the principal keys to understanding and developing the world.

It is therefore essential that, gradually, the member states of UNESCO become enabled to attain a level allowing them to join the IMU, of which the number of member countries, for the time being, is 50.

The second aim of the Rio Declaration is that the majority of the UNESCO member states attain such a level by the turn of the century.

This presupposes major supplementary efforts in the domain of *teaching and education* and *access to scientific information* - the latter point being particularly sensitive for countries whose currency resources are restrained.

These efforts, already undertaken to a large extent, will be in charge of and reinforced by the two large commissions of the IMU, i.e. **ICMI** (the International Commission

on Mathematical Instruction), of which the President and the Secretary General are Professor M. de Guzmán, Madrid (Spain), and Professor M. Niss, Roskilde (Denmark), respectively, and CDE (the Commission on Development and Exchange), of which the President and the Secretary General are Professor M.S. Narasimhan and Professor P. Berard, Grenoble (France), respectively, in liaison with UNESCO, represented in Rio de Janeiro by Professor A. Marzollo (Responsible for Mathematics).

Aim 3: The Image of Mathematics

The **Rio de Janeiro Declaration** has as its third aim - that too of the greatest importance - to achieve a systematic presence of mathematics in the "information society", for instance through examples of the multitude of scientifically exact and accessible applications available.

This will be developed in connection with similar efforts already undertaken in several IMU member states.

The **Rio de Janeiro Declaration** announcing the World Mathematical Year 2000 received warm support not only from the mathematicians present from all continents, certainly including several of the most eminent Brazilian mathematicians, but also by professors of other disciplines, and in particular by Professor Carlos Chagas who has been, among other things, President of the Pontifical Academy of Sciences.

(Translated from French by the Editor).

What is Research in Mathematics Education, and What Are Its Results?

Discussion Document for an ICMI Study

The following people have contributed to the present document: N. Balacheff, A.G. Howson, A. Sfard, H. Steinbring, J. Kilpatrick, and A. Sierpinska.

As mathematics education has become better established as a domain of scientific research (if not as a scientific discipline), exactly what this research is and its results are have become less clear. The history of the past three International Congresses on Mathematical Education demonstrates the need for greater clarity. At the Budapest congress in 1988, in particular, there was a general feeling that mathematics educators from different parts of the world, countries, or even areas of the same country often talk past one another. There seems to be a lack of consensus on what it means to be a mathematics educator. Mathematics education no longer means the same as *didactique des mathématiques* (if it ever did). French *didacticiens* refuse to translate their *didactique des mathématiques* into "mathematics education": a special English edition of the journal *Recherches en Didactique des Mathématiques* bears the title "Research in Didactique of Mathematics." *Die Methodik* (or the Polish *metodyka*, the Slovak *metodika*, and the like) have become obsolete. Does *research* mean the same as *recherche* or *investigación*? How do these words translate into other languages? Standards of scientific quality and the criteria for accepting a paper vary considerably among the more than 250 journals on mathematics education published throughout the world.

Despite this lack of consensus, publications appear that endeavor to depict the "state of the art" in mathematics education research. Individuals try to construct didactical theories. But reviewers never have trouble demonstrating the one-sidedness or incompleteness of such publications. Attempts to describe research in mathematics education or *didactique des mathématiques* or whatever other name is used may resemble the accounts of the legendary blind men exploring the legs of a huge elephant.

The ICMI study *What is research in mathematics education, and what are its results?* does not seek to describe the state of the art. Nor does it intend to tell anyone what research in mathematics education is or is not, or what is or is not a result. Instead, the organizers of the study propose to clarify the different meanings these ideas have for mathematics educators - to pinpoint the different perspectives, goals, research problems, and ways of approaching problems. The study will bring together representatives of the different groups of researchers, allow them to confront one another's view and approaches, and seek a better mutual understanding of what we might be talking about when we speak of research in mathematics education.

Some Questions About Research

Such a wide-ranging discussion is badly needed in a community increasingly divided into

specialized groups and cliques that are not always tolerant of each other. Besides mutual understanding within the community, however, there is also a need to explain the domain to representatives of other scientific communities, among which the community of mathematicians seems to be the most important. Nicolas Balacheff has observed:

Most of us want to develop this research field within the academic community of mathematicians; this implies both the explanation of our purpose on a social ground (is there any need to develop such research?) and its relevance within the narrow academic world. For this reason, although it is not my sole concern, I have in mind the question of scientific standards, theses, publications, congresses, the employment of young academics in the field, and the connection between our research and research done in other fields.

Thus we need an "inner" identification of the research domain of mathematics education, as well as an outer vision from the perspectives of other domains.

One external domain, for example, is sociology. How is mathematics education organized and institutionalized? Where is research on mathematics education conducted? Where are theses on mathematics education defended? If a mathematics educator employed by a mathematics department has acquired his or her habilitation degree in, say, a department of pedagogy or philosophy (such a degree being unavailable at the employing institution), is he or she accepted as a full member of the community of mathematicians that awards doctoral or master's degrees in mathematics? Are mathematics educators viewed as a part of the mathematics community? Similar questions arise when research in mathematics education is surveyed from other domains, including history, philosophy, anthropology, and psychology.

An approach from both within and outside the field of research in mathematics education raises the following questions, among others, to be discussed:

1. What is the specific object of study in mathematics education?

The object of study (*der Gegenstand*) in mathematics education might be, for example, the teaching of mathematics; the learning of mathematics; teaching/learning situations; didactical situations; the relations between teaching, learning, and mathematical knowledge; the reality of mathematics classes; societal views of mathematics and its teaching; or the system of education itself.

If a mathematics educator studies mathematics, is it the same object for him or her as it is for a mathematician who studies mathematics? What is mathematics as a subject matter? What is "elementary mathematics"? Analogous questions could be asked concerning the learner of mathematics as an object of study. Is it the same object for a mathematics educator as it is for a psychologist or a pedagogue? Is the mathematics class or the process of learning in the school viewed in the same way by a mathematics educator and a sociologist, anthropologist, or ethnographer? Are questions of knowledge acquisition viewed the same way by a mathematics educator and an epistemologist?

The variety of activities offered at the ICMEs certainly distinguishes these congresses from, say, the international congresses of mathematicians. ICMI 7 was compared by

some to a supermarket. Is there a unity in this variety? What gives unity to different kinds of study in mathematics education? Is this the object of research? Or is the object of research perhaps not even something held in common? Might the commonality lie in pragmatic aims of research in mathematics education?

2. What are the aims of research in mathematics education?

One might think of two kinds of aims: pragmatic aims and more fundamental scientific aims. Among the more pragmatic aims would be the improvement of teaching practice, as well as of students' understanding and performance. The chief scientific aim might be to develop mathematics education as a recognized academic field of research.

What might the structure of such a field be? Would it make sense to structure it along the lines of mathematical subject matter (e.g., the didactics of algebra or the didactics of geometry), of various theories or approaches to the teaching and learning of mathematics, or of specific topics or *problématiques* (research on classroom interaction and communication, research on students' understanding of a concept, etc.)?

Both kinds of aims seem to assume that it is possible to develop some kind of professional knowledge, whether that of a mathematics teacher, a mathematics educator, or a researcher in mathematics education. The question arises, however, whether such professional knowledge can exist at all. Is it possible to provide a teacher, say, with a body of knowledge that would, so to say inevitably, ensure the success of his or her teaching? In other words, is teaching an art or a profession (*un métier*)? Or is it perhaps a personal conquest? As Luigi Campedelli used to say, "*La didattica è, e rimane, una conquista personale*".

What does successful teaching depend on? Are there methods of teaching so sure, so objective, that they would work no matter who the teacher and students were? Are there methods of teaching that are teacher-proof and methods of learning that are student-proof? If not, is there anything like objective fundamental knowledge for a researcher in mathematics education - something that any researcher could build upon, something accepted and agreed upon by all? Or will the mathematics educational community inevitably be divided by what is considered as belonging to this fundamental knowledge, by philosophies and ideologies of learning, by what is considered worth studying?

Many mature domains of scientific knowledge have become highly specialized into narrow subdomains. Is this the fate of mathematics education as well? Or rather, in view of the interdisciplinary nature of mathematics education, must every researcher necessarily be a "humanist," knowing something of all domains and problems in mathematics education?

Although we aim at clarifying the notion of research in mathematics education as an academic activity, we should be careful not to fall into needlessly "academic" debates. After all, the ultimate goal of our research may be for a specific teacher in a specific

classroom to be better equipped to guide his or her students as they seek to understand the world with the help of mathematics.

3. What are the specific research questions or *problématiques* of research in mathematics education?

Mathematics education lies at the crossroad of many well-established scientific domains such as mathematics, psychology, sociology, epistemology, cognitive science, semiotics, and economics, and it may be concerned with problems imported from these domains. But mathematics education certainly has its own specific *problématiques* that cannot be viewed as particular cases or applications of those from other domains. One question the ICMI study might address is that identifying and relating to each other the various *problématiques* specific to mathematics education.

There are certainly two distinct types of questions in mathematics education: those that directly or almost directly from the practice of teaching and those generated more by research. For example, the question of how to motivate students to learn a piece of mathematics (inventing interesting problems or didactical situations that generate a meaningful mathematical activity), or how to explain a piece of mathematics, belong to the first kind. The question of identifying students' difficulties in learning a specific piece of mathematics is also directly linked to practice. But questions of classifying difficulties, seeing how widespread a difficulty is, locating its sources, or constructing a theoretical framework to analyze it already belong among the research-generated questions. The problem is, however, that a difficulty may remain unnoticed or poorly understood without an effort to answer questions of the latter type; that is, without more fundamental research on students' understanding of a topic. Is it, therefore, possible to separate so-called practical problems from so-called research-generated problems?

Is it possible to admit the existence of two separate types of knowledge: the theoretical knowledge for the scientific community of researchers and the practical knowledge useful in applications for teachers and students? It might be helpful to reflect on the nature of these two types of knowledge, on relations between them, and on whether it would be possible to have a unified body of knowledge encompassing them both.

4. What are the results of research in mathematics education?

Any result is relative to a *problématique*, to the theoretical framework on which it is directly or indirectly based, and to the methodology through which it was obtained. This relativity of results, though commonplace in science, is often forgotten. One often interprets findings from biology, sociology, or mathematics education as if they were a kind of absolute truth. The reason may be that in these domains we really want to know the truth and not simply whether, if one proposition is true, some other proposition is also true. Questions of biology, sociology, or mathematics education can be of vital importance and fundamental to survival and well-being.

Two types of "findings" can be distinguished in mathematics education: those based on long-term observation and experience and those founded on specially mounted studies. Are the former less "scientific" than the latter? Geoffrey Howson offers an example:

In the seventeenth century, Spinoza set out three levels of understanding of the rule of three (which, incidentally, can be viewed as an elaboration of the instrumental-relational model of Skemp and Mellin-Olsen expounded over three centuries later). This, like the well-known levels of the van Hieles, was based on observation and experience. On the other hand, for example, CSMS [Concepts in Secondary Mathematics and Science] used specially mounted classroom studies to develop and investigate similar hierarchies of understanding. Do we rule out the work of Spinoza as research in mathematics education? If we do, then we lose much valuable knowledge, especially that resulting from curriculum development. If we do not, then it becomes difficult to find a workable definition [of research in mathematics education].

Balacheff points out that it may be difficult to contrast, in this way, the hierarchies obtained by the van Hieles and the CSMS group. Besides the different ways in which these hierarchies were obtained, the van Hieles and the CSMS group may not have been asking the same kind of question. "What are these questions?" asks Balacheff. "What is the validity of the answers they provide? How is it possible to relate them?"

Can a new formulation of an old problem be a research result? Can a problem be a result? Or a questioning of the theory related to a problem, a methodology, or a whole *problématique*? Can a concept be a result? It might be useful to have a definite categorization of the things we do in mathematics education, and of the things we thereby "produce."

Most people would probably agree that *making empirical investigations* is research. But is the *doing of practical things* research? Is *thinking* research? Can these activities be separated? Can a result be obtained without thinking and the doing of practical things? Should mathematics education be considered a science? Perhaps it is a vast domain of thought, research, and practice. What qualifies a domain of activity as scientific is the kind of validation and justification methods it uses. Proofs and experiments are considered scientific. But there are thoughts not validated in either of these ways that are valuable because they are filled with meaning.

What examples are there of what we consider results in mathematics education to be? What do we know today that we did not know before? What have we learned about the processes of learning and teaching? What do we know about mathematics that mathematicians were not aware of before?

Can we identify some categories of results? One category might be *economizers* of thought. Any facts, laws, methods, procedures, or theories that are general enough to direct our experience and predict its results will give us increased power over our teaching and learning. Another category might be *demolishers of illusions*. Results that undermine our beliefs and assumptions are always valuable contributions to the field. A third category might be *energizers of practice*. Teachers welcome research that helps them understand what they teach and provides them with ideas for teaching. The development of teaching materials, activities, and challenging problems belongs to this category. Other categories of results might emerge from epistemological, methodologi-

cal, historical, and philosophical studies.

5. What criteria should be used to evaluate the results of research in mathematics education?

How do we assess the validity of research findings? How do we assess their worth? Should we use the criterion of relevance? What about objectivity? Or originality? Should we consider the influence research has had on the practice of teaching? What other criteria should we use?

The first problem is to clarify the meaning of terms such as *truth*, *validity*, and *relevance* in the context of mathematics education. A related issue is the question of what is knowledge as such. This is an even more fundamental question than that of validation. If we knew what kind of knowledge mathematics education aims at, we would be better equipped for answering the question of methods of validation.

It is also useful to understand the ways in which research results are used. How have the results of research in mathematics education been applied? How do teachers use the research? How do policy makers use it? By clarifying the uses to which research is put, can we develop better criteria for assessing its validity?

Call for Papers

An ICMI Study on What is Research in Mathematics Education, and What are Its Results? will investigate the questions above, as well as others raised by various contributors, over the next year or so. The study will have two components: an invited *study conference* and a *publication* to appear in the ICMI Study series that will be based on contributions to and outcomes of the conference. The conference will be held in the spring of 1994 at a site to be determined (two possibilities are Japan and the USA), and the major outcomes of the study will be presented at the International Congress of Mathematicians in Zürich the following summer.

The International Program Committee (IPC) for the study invites readers to submit papers on specific problems or issues stimulated by this discussion document no later than **1 September 1993**. Contributors may wish to address either questions raised in the document or questions that arise in response to it.

Papers, as well as suggestions regarding the content of the study and the conference program, should be sent to *both* co-chairs of the IPC:

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Other members of the IPC include:

Nicolas Balacheff, IMAG & Université Joseph Fourier, Grenoble, France
Willibald Dörfler, Universität Klagenfurt, Austria
Geoffrey Howson, University of Southampton, UK
Fidel Oteiza, Universidad de Santiago, Chile
Toshio Sawada, National Institute for Educational Research, Japan
Anna Sfard, Hebrew University, Israel
Heinz Steinbring, Universität Bielefeld, Germany

The secretary of ICMI, Mogens Niss, Roskilde University, Denmark, is a member *ex officio*.

(The above quotations from Nicolas Balacheff and Geoffrey Howson stem from the exchange of views during the preparation of this Discussion Document.)

ICMI Study on Gender and Mathematics Education: Supplementary Information

In No. 32 (June 1992) of this Bulletin, the Discussion Document of the forthcoming ICMI Study on Gender and Mathematics Education was published. Since then the international Programme Committee has been reconstructed, for a variety of reasons. The final committee is composed as follows:

Gila Hanna, University of Toronto, Canada (*Chair of the Programme Committee*)

Geoffrey Howson, The University of Southampton, UK

Barbro Grevholm, Malmoe College of Teacher Education (*Chair of the Local Organising Committee*)

Christine Keitel-Kreidt, Freie Universität Berlin, Germany

Carlos Bosch, Instituto Autónomo Tecnológico de México, México, D.F.

Gilah Leder, Monash University, Melbourne, Australia

The Secretary of ICMI, Mogens Niss, Roskilde University, Denmark, is a member *ex officio*.

The site and dates of the study conference have now been settled. The conference (participation by invitation only, cfr. Bulletin No. 32) will be held **7-12 October 1993**, in **Höör** in Southern Sweden, close to Malmoe and Lund, and close to Copenhagen Airport (Denmark). The deadline for submission of contributions and suggestions to Gila Hanna is **1 February 1993**.

For matters concerning the content of the study and the scientific programme of the conference, please contact

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ICME 8: The International Programme Committee

In its session at ICME 7, in Québec, August 1992, the Executive Committee of ICMI appointed the International Programme Committee for ICME 8 to be held in Sevilla, Spain, July-August 1996 (exact dates yet to be determined). The IPC is composed of fifteen ordinary members, plus the President and Secretary of ICMI as members *ex officio*. Of the fifteen mathematics educators who have been invited to become ordinary members thirteen have replied and accepted to join the Committee. So, thus far the IPC consists of the following members

Claudi Alsina (Spain), *Chair*
Luis Balbuena (Spain)
Lida Barrett (USA)
Werner Blum (Germany)
Milan Hejny (Czechoslovakia)
Bernard Hogdson (Canada)
Jeremy Kilpatrick (USA, and ICMI)
Colette Laborde (France)
Antonio Pérez (Spain)
Luis Rico (Spain)
Toshio Sawada (Japan)
Anna Sfard (Israel)
Saliou Touré (The Ivory Coast)
Zhang Dianzhou (China)
Miguel de Guzmán (ICMI, Spain), *ex officio*
Mogens Niss (ICMI, Denmark), *ex officio*

A Glimpse of SEACME

1. The beginning

The first Southeast Asian Conference on Mathematical Education (SEACME) was held in Manila 1978. Thereafter it was held once every three years at different centres in Southeast Asia. This series of conferences was initiated by Professor Yuki Yoshi Kawada, who was the secretary of ICMI (1975-1978). It was in April 1976 that I met Professor Kawada in Tokyo. We talked for many hours concerning his proposed regional conference on mathematical education in Southeast Asia. On my way home to Singapore and as an emissary of Professor Kawada, I went to Manila. I was treated by Professor Nebres with a sumptuous Chinese dinner. Before the end of the dinner, it was agreed that the Philippines would host the first SEACME. The conference took place in Manila 1978.

It was a time when we all were badly disturbed by the new maths movement. The

conference was timely, and it helped put us back on the road to basics again. There were over one thousand participants including primary teachers. In fact, it was not just a conference. It was a series of activities leading to the conference. Even if the conference had never taken place, it would already have been worthwhile. Furthermore, there were many follow-ups after the conference. This is something which a regional conference could accomplish that no international conference could do. Also, we found that we could learn a lot from each other perhaps even more so than from the developed countries. This becomes the best attended and the most successful series of conferences sponsored by Southeast Asian Mathematical Society (SEAMS), jointly with ICMI.

2. From 1978 to 1996

Due to the success of the first conference, SEACME was held once every three years thereafter at the places and in the years as follows:

Manila (the Philippines)	1978
Kuala Lumpur (Malaysia)	1981
Haad Yai (Thailand)	1984
Singapore	1987
Brunei	1990

Further, the following will take place or is being planned:

Surabaya (Indonesia)	1993
Hanoi (Vietnam)	1996

These conferences were also attended by mathematicians and mathematics educators outside the region of Southeast Asia. Papua New Guineans came to our earlier conferences. Two speakers from China, Professor Wang Shou Ren and Professor Gong Sheng, were at the Kuala Lumpur conference. We invited Japanese speakers at Haad Yai conference. Many Australians attended the Singapore conference. Two New Zealanders came to SEACME-5 in Brunei.

As a result, the country at which a conference was held benefited from the conference, sometimes not in a small measure. For example, a national mathematical society was formed in Brunei at SEACME-5. The sultan of Brunei declared that year to be the year of mathematics. During and after a conference, an exchange of information is made among the participants, particularly those coming from Southeast Asia. This series of conferences has also helped stimulate research in mathematical education in the region.

The support of ICMI, SEAMS, the local organizers, the UNESCO Jakarta office (in the person of Mr. Kuroda and recently Mr. Zhang), and the participants at the conference together has made it possible for SEACME to carry on until now.

3. The philosophy

A conference, when held, is basically a national conference. It should first of all benefit the country at which the conference is held. So, the theme of the conference is set according to the need and wishes of the local organizers. Then the host is asked to share the conference with others in the region. In short, it is a national conference with a regional participation.

Such arrangement has served well to stimulate a great amount of activities in the country where the conference is held. As shown, it is very important to bring the conference to a place where there was no such activities before. Also, the conference should focus on local issues but with a regional perspective. For example, SEACME-4 in Singapore concentrated on research of mathematics teaching at the primary level, whereas SEACME-5 in Brunei focused on the enchantment of mathematics to the secondary students. In each case, they address an issue of national interest and share it with others in the region in such a way that others also provide input to the conference.

Again, in Indonesia at SEACME-6 the emphasis will be on the undergraduate mathematics at the university level. Since the graduate study in mathematics has become increasingly active in Indonesia, what to teach, how to teach, and the common core, are all of great relevance and importance.

4. SEACME-6 and beyond

The next conference SEACME-6 will be held in **Surabaya, Indonesia, from 7th to 11th June, 1993** (see No. 32 of this Bulletin, June 1992). The one after, SEACME-7, is being planned to take place in Vietnam in 1996. When asked what is the top priority in mathematics education in Vietnam today, Professor Hoang Tuy replied that it is to put some order into the schools. This is not difficult to understand when we consider the local situation in Vietnam. Hence it has a special significance to hold SEACME-7 in Vietnam.

So far, the member countries taking part in SEACME are Brunei, Hong Kong, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. It is hoped that in 1996 at SEACME-7 the membership will be extended to include Cambodia and Laos.

By 1996, the series of SEACME will have completed a full cycle. If the series is to go on, it will mean that roughly each member country will host a conference once every twenty-one years. Perhaps by 1996 the series may be mature enough to extended to encompass the whole of East Asia.

Lee Peng Yee,
Vice-President of ICMI,
National University of Singapore, Republic of Singapore.

CIEAEM 45

The 45th International Meeting of the *Commission internationale pour l'étude et l'amélioration de l'enseignement des mathématiques* will be held in **5-10 July 1993**, in **Cagliari, Italy**. The theme of the meeting is "Assessment focused on the student" (*l'Évaluation centrée sur l'élève*). The official languages of the conference are English and French. For further information please contact

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PME XVII

The Seventeenth Psychology of Mathematics Education Conference will be held **18-23 July, 1993**, in **University of Tsukuba, Japan**. For information please contact

Nobuhiko Nohda, Conference Secretary
Institute of Education,
University of Tsukuba,
Tenno-dai 1-1-1, Tsukuba, Ibaraki 305
JAPAN

ICTMA 6

The Sixth International Conference on the Teaching of Mathematical Modelling and Applications will be held **15-19 August 1993** at the **University of Delaware, Newark, Delaware, USA**. The main purpose of the conference is to provide a forum for the presentation and exchange of information, experiences, views and ideas between people engaged in research on, or practice in, the teaching of mathematical modelling, models and applications. The focus of this conference will be on the teaching of mathematical modelling. Middle school, high school and college levels will be included.

The second announcement is estimated to appear in December 1992. For additional information please contact

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The First Scientific Conference on The Future of Science and Mathematics Teaching and The Needs of Arab Society

The conference, which will be held **28-30 October 1993** in **Beirut, Lebanon**, is sponsored jointly by the Arab Development Institute, the UNESCO Education Bureau in the Arab States, and the American University of Beirut.

The main objective of the conference is to discuss and analyse the needs of society in relation to: the current situation, new trends in the development, and the future of teaching Science and Mathematics in the Arab World.

The official language of the conference is Arabic. However, in special cases papers may be submitted in English or French; translation to Arabic will be available. The deadline for submission of abstracts of papers (of a maximum of 400 words) is **15 January 1993**.

For further information please contact

Mohamad Debs, Conference Coordinator,
Science and Technology Division
Arab Development Institute
P.O.Box 5300-14, Beirut,
LEBANON

How to join ICMI?

From time to time it happens that representatives of mathematical societies, teacher organisations etc. in non-ICMI countries, or individual mathematics educators approach ICMI officers with queries of how to join ICMI. This article aims at clarifying the circumstances and conditions.

First of all, ICMI is not an organisation that operates with individual membership. ICMI is a commission established by the **International Mathematical Union, IMU**. Basically, membership of ICMI is identical to membership of IMU. IMU members are *countries* who are adhered to IMU through so-called *Adhering Organisations*, most often national academies, mathematical societies, or similar bodies. Any IMU member state is automatically adhered to ICMI as well and is entitled to appoint a *National Representative* on ICMI, who then is a member of the *General Assembly of ICMI* (see p. 9). (For details of the ICMI system, see the article "ICMI and Its Relatives" in No. 30, June 1991, of this Bulletin.)

So, the principal way for a country to join ICMI is to apply for admission to the International Mathematical Union. This is done by contacting the President (Jacques Louis Lions) or the Secretary (Jacob Palis Jr.) of IMU who are also *ex officio* members of the Executive Committee of ICMI (see p. 2).

However, in view of the fact that not any country is in a position to become a member of IMU, IMU in its *Terms of Reference* for ICMI has made it possible for a country, on an individual basis and if special circumstances call for it, to become adhered directly to ICMI without joining IMU as a member state. Direct adherence to ICMI according to such a procedure requires a special application and the acceptance of the ICMI EC and of the IMU EC.

In practical terms, a country that would like to join ICMI should normally attempt to join the IMU, i.e. the potential Adhering Organisation for the country (whether its national Academy of Sciences, its national Mathematical Society, or another appropriate body) should contact IMU officers. If this procedure turns out to fail or to be inappropriate in other ways a direct adherence to ICMI may be considered. In any case, countries interested in joining ICMI are advised to approach IMU as the first step, while at the same time informing ICMI officers.

Mogens Niss

ICMI-Chile

In Chile, which is a member state of IMU, the Adhering Organisation, *la Sociedad de Matemática de Chile* has decided to establish a committee on mathematics education called ICMI-Chile. It is composed of Professors Oscar Barrigo, Victor Cortes, Renato Lewin, Samuel Navarro, Sergio Plaza, Gonzalo Riera, and Rubi Rodriguez (*Chair*).

The Second IEA Mathematics Study (SIMS)

The series of publications in which SIMS has been documented is now complete. The final volume *The IEA Study of Mathematics III: Student Growth and Classroom Processes* (edited by Leigh Burstein) was published in the autumn of 1992 by Pergamon Press (Oxford, New York, Seoul, Tokyo) (416 pp, price (hardback): US\$ 110.00/ £ 55.00). The two previous volumes were edited by Kenneth J. Travers & Ian Westbury (volume I, 1989) and David F. Robitaille & Robert A. Garden (volume II, 1988).

Published: The ICMI Study on Assessment in Mathematics Education and Its Effects

The ICMI Study on assessment - based on the study conference held in Calonge, Spain, April 1991 and related materials - will be published December in 1992/January 1993 in two independent books:

Investigations into Assessment in Mathematics Education: An ICMI Study,
Mogens Niss (ed.) (about 270 pages)

and

Cases of Assessment in Mathematics Education: An ICMI Study,
Mogens Niss (ed.) (about 220 pages).

Both books are published by Kluwer Academic Publishers, Dordrecht, the Netherlands, 1992.

A special agreement between ICMI and Kluwer Academic Publishers has made it possible for *individuals* to obtain the books at a substantially reduced price, DFL 80.00 for each book, postage included, if ordered *through ICMI*. The ordinary list price will be at least 50% higher. For further information, please contact the Secretary of ICMI.

The ICMI Study series is published under the general editorship of Miguel de Guzmán and Mogens Niss.



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