

## ICMI's past four decades: consolidation and diversification

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### *Abstract*

*Since the 1960's ICMI has played an increasingly significant role in the international development of mathematics education. In this presentation, the past four decades will be surveyed by means of key events and structural growth.*

### **1. Introduction – the sixties**

The sixties was a time of new ideas, new horizons, and new challenges. The Russians had surprised everyone in 1957 by sending a man into space, and suddenly the 'space-race' took off. The Americans were aghast – "We must improve our science and mathematics teaching" they said. So 'New math' appeared along with 'new science', together with a plethora of new initials – SMSG, UICSM, PSSC, etc. It was curriculum development at high speed, based on the RDD model used by successful industries in the USA. As a Grad student at Harvard in the 60s, I found myself studying Modern Algebra and Geometry in the Grad. School of Mathematics at the same time as I was teaching 'new math' through SMSG at a local High School - often exploring very similar mathematical problems (like trying to prove that  $2 \times 2 = 4!$ )

But what had all this to do with ICMI? It had been a kind of sleeping giant ever since its creation in 1908, there in principle but not doing a great deal internationally in practice. In 1952 a reformed IMU met in Rome and decided to formalise the relationship between the two organisations in 1954, just in time to meet the new curricular challenges of the 60s. Twenty-seven countries linked with IMU at that meeting (and through their sub-commissions, with ICMI), and they formed the basis of ICMI's future international network. Since then, the relationship has developed from one where ICMI was very much a younger cousin to the IMU, to one of mutual respect as ICMI has developed its various professional and academic activities, and as it has ventured into aspects of mathematics education which the IMU had never considered.

In the 60s communication technologies had been growing, CCTV was becoming much more accessible, computers were growing in number, and B.F. Skinner was developing programmed instruction and teaching machines. Behaviourism and technological developments were all the rage, and mathematics educators were responding and adapting their practices accordingly, albeit reluctantly in some cases. But change was in the air, and ICMI was part of the change.

The 60s were also a time when international academic conferences were becoming the norm for any academic subject, and mathematics education was starting to be a discipline in its own right, and not just an appendage to the world of mathematics. Hans Freudenthal led the charge against the assumptions of certain mathematicians in the IMU who believed that mathematics instruction (called this because they had never considered the idea of 'mathematics education') was also their area of expertise.

By the end of the 60s, not only had *L'Enseignement Mathématique* been published for 70 years, but Freudenthal had also begun a new journal, *Educational Studies in Mathematics*, in 1968, and it published articles on mathematics education in English, French and German.

In this paper I will consider three aspects of ICMI's activities which contributed to the international development of mathematics education – the 4-yearly International Congresses on Mathematics Education (ICME), some structural developments in ICMI, and ICMI's role in internationalising communication in mathematics education.

## **2. The International Congresses on Mathematics Education**

International organisations such as the Commission for the Study and Improvement of Mathematics Teaching (CIEAEM) which started in 1950 had demonstrated the usefulness of international conferences and collaborations in mathematics education. CIEAEM was a European-based grouping with English and French as its 2 principal languages. The IMU had also held annual conferences, at which the ICMI representatives attended the Education section and presented reports, but in the late 60s ICMI decided to put its own toe into the water of international conferences. The first International Congress on Mathematics Education (ICME) took place in Lyon, France in 1969 with some 650 participants, and since then the ICMEs have become regular 4-yearly conferences. To many mathematics educators around the world, the ICMEs are the public face of ICMI.

Two words are significant to me in the ICME title – the word 'Congress' signifies more than just a conferences, and recognises that if one is to facilitate international exchange of ideas in mathematics education, one needs to organise a meeting where people don't just deliver academic papers 'at' each other. Also it recognises that mathematics education is a professional practice, not just an academic pursuit, and if the meeting is to facilitate the sharing of practical ideas, other communication vehicles should be found. The other significant word is 'Education'. This was hugely important in the early days of the ICMEs as it signalled the wider canvas which ICMI was drawing on rather than the narrower 'instruction' which IMU considered relevant when it created the International Commission on Mathematics Instruction.

Despite the importance of these two words in the title, the program of the first ICME, held in France, very much followed the traditions of those of the IMU. As Howson (1973) says: "Thus the meeting was built around a series of one-hour invited lectures supplemented by a number of short (15 minute) contributions by congress members. The limitations of this procedure were soon apparent. Mathematical education is a topic totally different in nature from mathematics."(p.4) However in the planning for ICME2, this problem was noted and the format changed. Plenary lectures remained but this time there were only 6, compared with 20 at Lyons. The 15 minute contributions were scrapped completely, and in their places were national presentations. Additionally, to facilitate exchanges of ideas, Working Groups were established, 39 in all, with topics ranging from "Vocational mathematics for technicians and business personnel", to "Mathematics in developing countries."

In the 60s and 70s the core of ICMI's activities was principally European, although certain key American mathematics educators also played a strong role. This core was reflected in the fact that following the 1969 ICME in Lyons, France, the 1972 one was held in Exeter, UK, in 1972, and the 1976 one in Karlsruhe, W.Germany. This European focus built on the previous connections of international groups like CIEAEM, on the various European national meetings, and on the general cooperative frameworks being created following the disaster of World War 2. These included meetings supported by UNESCO, and the famous 1959 seminar in Royaumont under the aegis of the Organization for European Economic Cooperation (OEEC).

The 80s were a time of expansion of the international ideas and activities of mathematics education. In 1980 the ICME was held in Berkeley, USA, and not only did this increase the participation and involvement of US math educators, it also increased the number of attendees from Canada, South America, and the 'Far East'. For example, China sent a large group of delegates including a senior person Hua Lokeng who gave a plenary address. For many participants it was the first time they had heard about some of the outstanding mathematics achievements of students and their teachers from the Far Eastern countries.

The 1984 ICME was held in Adelaide, Australia, and although it attracted a smaller number of participants, it did encourage the greater participation of colleagues from the Pacific-rim countries, such as from the Philippines, South America and China. 1984 was the ICME where for the first time, the concept of 'ethnomathematics' was described internationally by Ubi D'Ambrosio. This concept highlighted not just the increasing internationalisation of ICMI's activities but also the increasing multiculturalism of mathematics education, by challenging the accepted views of the nature of mathematics itself.

This international development was given an extra boost in 1988 when the ICME in Budapest, Hungary, contained a whole day devoted to the theme of "Mathematics, Education, and Society". There were many debates about that title, with much attention being paid to the role of the two commas! During that Fifth Day Special not only were there topics related to ethnomathematics, but also there were topics focusing on historical aspects, social justice issues, policy issues and political discussions, as well as multilingual and multicultural educational situations. In terms of attendees in 1988, the fact that Budapest was the location meant that many more colleagues came from Eastern Europe, bringing their rich histories and excellence in mathematics achievements onto the international stage. The contrasts and synergies were exciting to explore.

By this time also, the Congresses in general had a well-developed structure. The Working Groups in Exeter 1972, had developed into three groups: Action Groups, which considered issues related to different stages of education, Theme Groups, which were based on general themes such as "The profession of Teaching", and "Computers and the Teaching of Mathematics", and Topic Areas and International Study Groups. More will be said about these below.

The 1990s were a time to consolidate the achievements of the ICMEs in the 70s and 80s. In 1992 the ICME was held in Quebec City, Canada, and it achieved the highest number of participants of any ICME so far – 3407, from 94 countries. In 1996 the

ICME was held in Seville, Spain, and in 2000 it was held in Tokyo, Japan. In this latter ICME the program consisted of the usual elements, with some additions – there were 4 Plenary lectures and one Plenary Round Table, there were 55 Regular Lectures, 13 Working Groups for Action and 23 Topic Study Groups, 360 Short Presentations (incl. Posters), National Presentations, Official meetings, Projects and Workshops. As can be seen, the program reflected not only the increased number of participants, but also their diversity, and the desire to increase the possibilities for sharing ideas. Over 2000 people from 70 different countries attended.

### **3. The international consolidation of ICMI's structure**

The international structure of ICMI is built on the fact that its members are not individuals but countries, and currently ICMI has some 72 member states, who generally have appointed national commissions in their own countries. This structure has facilitated the development of regional groupings in mathematics education, as well as regional congresses.

In general, as can be imagined, as the size and complexity of the ICMEs has increased, so has the cost of attendance. Given also that these congresses are organised in first-world countries (using predominantly English), participants from developing countries have to pay a high price to attend. Also it is often the case that the proceedings from these ICMEs are expensive, and also that they inadequately represent the ICME activities and outcomes. This has meant not only that the number of participants from developing countries is low, but also they cannot easily get access to the content of the congresses through the proceedings.

In part this situation has helped to stress the importance, and increase the number and range, of regional international groupings and congresses. Two excellent examples are the Inter-American Committee on Mathematics Education (IACME), and the Southeast Asian Mathematical Society (SEAMS). IACME was created in 1960 and was the first sub-group established by ICMI. It has held a number of congresses throughout North and South America and has published its proceedings widely, and in Spanish. It is an active organisation and, as it has links with the Ibero-American Congresses of Mathematics Education (CIBEM), its influence is wider than just with the Americas.

SEAMS was formalised in Singapore in 1972, and has established contacts and links throughout the ASEAN region, and beyond. Originally a grouping of mathematicians, it held its first Southeast Asian Conference on Mathematics Education (SEACME) in Manila in 1978 with a focus on the training of mathematics teachers. It has overlaps with the East Asia Regional Conference On Mathematics Education (EARCOME) which has just celebrated its 4<sup>th</sup> conference this year in Penang, Malaysia. These are only two of the active regions, for example Africa has also hosted two regional conferences with the support of ICMI.

A second general way that ICMI has widened its international structure has been through the development of International Study Groups. As has been shown, ICMI has consistently emphasised the role of Working Groups within its ICMEs, and these have sometimes grown into semi-autonomous groups, or have allied themselves with other existing discipline or academic groups.

Two of the earliest groups were the International Study Group on the Relations between the History and Pedagogy of Mathematics (HPM) group, and the International Group for the Psychology of Mathematics Education (IGPME or PME as it is better known) both of which were created in 1976 following their strong and active involvement in the first two ICMEs. In part the reason for their existence is that participants at these ICMEs felt that 4 years was too long to wait between meetings, and so PME for example now meets every year, a situation which creates its own logistical and organisational problems. Another reason was that it was possible to diversify the range of locations for such annual conferences, thus making them more internationally accessible.

Later examples of international groupings have been the International Organisation of Women in Mathematics Education which started in 1987, the World Federation of National Mathematics Competitions founded in 1994, and the International Conference on Technology in Mathematics Education founded in 2003. These organisations not only hold their own international and regional conferences, but they also run sessions and report at the ICMEs.

Thus through these two kinds of sub-groupings, ICMI has facilitated the gradual internationalisation of mathematics education. However we should recognise that these subgroups do not necessarily solve the problems of international isolation for all countries. The regional groups do not cover the globe, the costs of attendance can still be prohibitive, and the languages used can also discriminate. The same can be said for the Study Groups.

#### **4. ICMI's contribution to international communication in mathematics education**

Over the years since its inception, ICMI has contributed to internationalising mathematics education through publications which it has fostered or with which it has been associated. Its initial contributions were reports on aspects of mathematics education, for example, an ICMI Study on the preparation of mathematics teachers was presented by Gino Loria in 1932. This tradition continues to this day with the process of writing such Study reports having been formalised in an attempt to achieve a greater degree of internationalisation in them. Nowadays one begins with appointing one or two editors, who will share the organisational and editorial responsibility for the final book. They will write the first Discussion Document, arrange the details of an invitational meeting, at which the topic is discussed in detail, and organise the writing of the final report.

The fact that now these reports are published by the international publishers Springer, has made them more accessible to the international public, and has also added to their status. The range of topics is impressive, numbering 14 now, and often builds on previous discussions at ICMEs or regional conferences. Despite the fact that the language of these reports is English, the spread of writers and editors is internationally broad, and the ICMI Studies provide an important resource for those colleagues seeking to influence policy-writers in their countries, to ensure that mathematics education gets a significant hearing when educational decisions are being made.

Another way that ICMI contributes to international communication in mathematics education is through producing proceedings of the ICMEs. As has been pointed out above, trying to summarise the activities of a huge congress in a normal sized book is all but impossible, but nevertheless it has been done and the proceedings are significant documents with important policy and historic potential. As a record of the ICMEs they are undoubtedly valuable but it was clear early on in their life that more frequent and informative material; was needed. The ICMI Bulletin has fulfilled that function, and serves both to influence externally and internationally, with reports and comments from the President and Secretary, as well as to give an account internally so to speak of its activities.

It plays a most helpful role by publicising future conferences, both regional and international, announcing relevant publications, giving information on up-coming Study Groups and other significant events. The fact that it is now available on the Web makes it a much more international document, plus this ensures that colleagues in developing countries can get easy access to it also.

## **5. Increasing ICMI's international contribution**

It is clear that through its publications, through its member states, through its 4 yearly ICMEs and through its ever increasing range of international and regional affiliates and networks, ICMI has come a long way internationally since its second coming in 1954. But is there still a way to go? Can we be satisfied that ICMI has done all it can?

There is still language discrimination for example. It is still the case that in promoting mathematics education through its publications, it is restricting its public language to English. Others would argue that this is the way of all academic areas, to which the reply could be that mathematics education is both an academic discipline, but also a professional practice, which takes places in specific cultural and social contexts. ICMI would reply that (a) it does try to reach other language groups through its regional affiliates, who publish their reports in other languages, and (b) it does not have the human or financial resources to do anything more in that way. The problem exists in reverse also, in that it is difficult for someone not speaking English (or one of the major languages) to inform others about developments in mathematics education in their countries. Thus we are all impoverished by this problem.

I have already alluded to the financial problems for someone wanting to attend ICMEs or Regional conferences. There have been attempts to help to fund colleagues from developing countries to attend ICMEs but it is difficult to achieve a satisfactory outcome for many colleagues from those countries. The establishment of a Solidarity Program in Mathematics Education in 1992 by the then President Miguel de Guzman was based on a 10% levy on all participants at that ICME. It was a splendid initiative, but as Atweh, Clarkson and Nebres (2003) said: "Undoubtedly this subsidy has assisted many mathematics educators to participate in the conferences... However, it did little to solve the under-representation from the poorest of developing countries." (p.192) There have however been some successes with specific support being given for specific conferences, but without regular funds it has been difficult to achieve consistent results. The Program is still an important one to support and develop.

Finally there are still areas of the world that international mathematics education fails to reach. The prime example of a rather neglected region is Africa, which despite the activities of the African Mathematics Union (AMU) and the Southern African Mathematical Sciences Association (SAMSA), is still not well served by international or regional groups and conferences concerned with mathematics education. As Jacobsen says: "Africa has been less fortunate in its organisation of mathematics education, in part due to the ever more stressing economic realities on the continent. Mathematics has been well served, but mathematics education much less so." (p.1245). There has never been an ICME in Africa, and regional conferences are few and far between. I believe that improving this situation is one of the most important challenges facing ICMI.

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