

# Mathematics Education in the ICMI perspective

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My contribution to the WG 5 in Rome Symposium for celebrating the ICMI centenary is an outline of the development of mathematics education seen as discipline. I hope that this historical contribution helps to clarify some points of the origin and nature of this discipline. In my story there are many chief characters: The journals *L'Enseignement Mathématique* and *Educational Studies in Mathematics*, the communities of professional mathematicians (IMU) and of mathematical educators/instructors (ICMI), the international congresses of mathematicians (ICM). The idea of communication, internationalization and solidarity are the red scarlet that at the beginning roused those bodies and movements. These ideas were spreading in society of those times: from one hand the industrial development was promoting the world exhibitions, from the other hand there were political movements oriented to socialism; moreover, societies based on mutual assistance and cooperation were founded. It is remarkable that Laisant, the man who conceived the ideas underlying *L'Enseignement Mathématique* and ICM was strongly involved in these social movements, see (Ortiz, 2007).

The modalities of the births of the journals in question, of ICMI, ICM, and later IMU (International Mathematical Union) illustrate how these bodies are intermingled. The journal *L'Enseignement Mathématique* was founded by the French C. A. Laisant and the Swiss H. Fehr in 1899. It was not the first journal devoted to mathematics teaching, but it is remarkable because its aims, clearly stated in the editorial of the first issue are just communication, internationalization and solidarity, see (Furinghetti, 2003). Laisant together with É. Lemoine was the editor of a journal aimed at establishing contacts between mathematicians. In the first issue of this journal (1894) Laisant launched the idea of an international congress of mathematicians. The idea was well received and the first ICM happened in Zurich in 1897. In 1905 the journal *L'Enseignement Mathématique* hosted a debate on the need of making the problems of mathematical instruction really unbound and the germs of the idea of having an international body carrying of these problems began to sprout. The complete reification happened in 1908 during the ICM held in Rome when ICMI (in those time indicated with the French acronym CIEM or the German IMUK) was officially founded, with an outstanding mathematician (F. Klein) as president, see (Howson, 1984; Lehto, 1998; Schubring, 2003). From then the lives of ICM, of ICMI and later the International Mathematical Union are intermingled. The journal *L'Enseignement Mathématique* was (and it is until now) the official organ of ICMI. Of course, for their international nature these bodies were affected by the international political situation: the two World Wars,

the dictatorial regimes, the iron curtain, the divide between developed and under developed countries, ... ICMI, in particular, had period of lethargy due to the two World War and resurrections.

Circumstances and modalities of the birth of both ICM and ICMI show the link between the communities of mathematicians and mathematics educators. This link has affected the life of ICMI. Just to mention the most relevant facts, we note that:

- originally the International Congresses of Mathematicians were the privileged occasion for presenting the results of ICMI inquiries and for deciding ICMI activities
- until 2006 (ICM of Madrid) the ICMI Executive Committee has been appointed by IMU
- the 1970 IMU General Assembly decided that the Past President of ICMI, the Secretary of the IMU, and the representative of the Union in the ICSU Committee on the Teaching of Science (CTS) are members *ex officio* of the Executive Committee of ICMI.

Then the stages of the life of ICMI are marked by the quadrennial ICMs and we may grasp the trend of the relation between mathematicians and mathematics educators by examining the presence and the role of some educational section in the ICMs.

Except the first ICM (Zurich, 1897) in all Congresses there was a section on Didactics, alone or joint with history, philosophy. Inside these sections there were reports of the activities of ICMI. These sections were the last or the one before the last in the proceedings.

The world in the second after-war was really changed: mathematical research and the role of mathematics in society were changed. Scientific (mathematical first of all) competences had acquired a new relevance due to the new settlement of the world and the space race.

In this new context the developments of society and school made the mere study and comparison of curricula and programs – which was the initial objective of *L'enseignement Mathématique* and of ICMI - inadequate to face the complexity of the educational problems. In the title of the short lecture delivered by L. N. H. Bunt (from the Institute of Education of Utrecht) at the ICM-1954 in Amsterdam there is the new expression “didactical research”, which reveals the emerging orientation in mathematics education. Mathematics education was no more a national business; it became a personal business.

After the Second World War several international organizations came into being. With at least three of them ICMI had ties by virtue of common memberships – namely, with CIEAEM (Commission Internationale pour l'Étude et l'Amélioration de l'Enseignement des Mathématiques), the Inter-American Committee on Mathematical Education, the Committee on Mathematics in South Asia. There were some forms of cooperation with UNESCO. Several members of ICMI made important individual contributions to Royaumont Seminar in 1959 sponsored by OEEC, the Organisation for European Economic Co-operation, later OECD (Organisation for Economic Co-operation and Development) and on the work on its Dubrovnik Report in 1960. The 1960s were years of great ferment in the world of mathematics education. New curricular projects were springing up in many countries. The debate on modern mathematics was alive. As regards this debate *L'Enseignement Mathématique* published

important papers, such as (Freudenthal, 1963; Piaget, 1966), but other arenas existed for this discussion, CIEAEM for one. This commission, officially founded in 1952, had begun its activities in 1950, with C. Gattegno as a promoter and animator. CIEAEM was independent from IMU and from national organizations: the members were a group of people (including school teachers) sharing common objectives as regards mathematics education and working in an atmosphere of friendly relationship. Over the years CIEAEM kept a rather informal character (only in 1996 it had a 'constitution') and new members were co-opted. In her short history E. Castelnuovo (1981) says that the aim of the commission was to stress that the mathematicians alone were not sufficient for a deep study of the teaching problem: a wider view was necessary and it required the help of psychologists and pedagogists. She mentions also the influence of the young's movement in 1968 as an element influencing the view of mathematics teaching.

In spite of all these activities in the sixties ICMI was losing its centrality as regards mathematics education. An evidence of these difficulties is the SCOTS (Special Committee on the Teaching of Sciences) affair. In 1960 UNESCO's Department of Natural Sciences began discussing with IMU the possibilities of formal co-operation in the field of mathematical instruction at the university level. These discussions resulted in the conclusion of a contract for this purpose between UNESCO and IMU early in 1962, but the executive committee of IMU decided to create a Special Committee on the Teaching of Science (SCOTS) to handle its obligations under the contract as well as its developing general interests in the broader field of science education. It is likely that ICMI would have wished that SCOTS had been appointed as a sub-commission of ICMI.

The SCOTS affair is a step in the long-lasting history of frictions between IMU and ICMI. The point was, in the very words of Lehto (1998, p. 110)

The Executive Committee of the IMU had mixed feelings about the steps the Commission had taken. On one hand, the activity of the Commission was welcomed. But the Executive Committee wished to exercise some control over its sub-commission, which was supposed to be a link between research mathematicians and teachers and which did not possess financial resources of its own.

There were frictions with the community of mathematicians. Financial autonomy from IMU was a main concern of ICMI. But also there was a need of autonomy as for the policy of the two bodies. Just to mention a fact: ICMI was older than IMU but only in 1964 ICMI (with the agreement of IMU) decided to acknowledge the status of national sub-commissions also to some national commissions representative of countries not belonging to IMU. Thus it was officially recognized that ICMI had a far wider target population than did its parent body IMU. In spite of the wide scope of ICMI activities, the proceedings of the ICMs held in the 1960s (1962 in Stockholm and 1966 in Moscow) dedicated little space to ICMI. *L'Enseignement Mathématique* hosted some reports that were not published in the proceedings of ICMs. When became president of

ICMI H. Freudenthal acknowledged the inadequacy of ICM as an arena to discuss mathematics education problems and created the ICME (International Congress on Mathematical Education) Congresses, a permanent institution which after the second ICME in 1972 was arranged regularly every four years between.

Another action taken by Feudenthal was the foundation of the journal *Educational Studies in Mathematics* (first issue May 1968), as a publication independent from ICMI.

The two initiatives (ICME and the journal ESM) were inspired by the opinions already expressed by their creator (my translation):

it should be needed that the inquiries raise a work in depth; for example, it should be desirable that secondary teachers may let know their works, the results of their experiments; then a comparative study could be organized based on precise data. Commission..., 1955, p. 200)

and

History has shown the sterility of the problems of mere organization. In the recent years the attention has been directed to the programs. This activity of programmers is worrying. Repeatedly I insisted on studies actually didactical. It is true that until now the result of my efforts is very poor.

Both these initiatives provoked a friction with IMU. Lehto (1998, p. 259) reports that

At the meeting of the IMU Executive Committee held in Paris in May 1968, President [H.] Cartan and Secretary [O.] Frostman complained of the lack of information about the activities of ICMI. [...] The Executive Committee had not been told of the creation by ICMI of the new journal *Educational Studies in Mathematics*, which seemed to compete with *L'Enseignement Mathématique*. A financial contract had been signed between ICMI and UNESCO without the IMU having been informed.

ICME-1, which took place thanks to financial subventions from the French government and UNESCO, was received by IMU with coldness, as evidenced by the sentence “it seems that ICMI decided to hold an international congress in Paris in 1969” reported in (Lehto, 1998, p. 259) from the *ICMI-Bulletin of the International Commission on Mathematical Instruction* (January 1984, n. 15, pp. 17-20).

A new academic discipline was emerging and this roused, I suppose, another problem in the relation with mathematicians: the concern about academic positions. As a matter of fact the fifth of the ‘Resolutions of the First International Congress on Mathematical Education’, published in the proceedings of ICME-1 (*Educational Studies in Mathematics*. 1969-1970, 2, 135-418) claims:

The theory of mathematical education is becoming a science in its own right, with its own problems both of mathematical and pedagogical content. The new science should be given a place in the mathematical departments of Universities or Research Institutes, with appropriate academic qualifications available. (p. 416)

The intertwining of the scope of IMU, ICMI, *Educational Studies in Mathematics*, *L'Enseignement Mathématique* had as a central question the relationship between

mathematicians and mathematics educators. The tear provoked by the foundation of *Educational Studies in Mathematics* had the merit of fostering a clarification of the domains of actions of these two communities. From one hand ICMI received new impulses, from the other hand the discipline ‘mathematics education’ acquired a cultural autonomy. Journal specifically devoted to ‘research’ in mathematics education began to appear: *Journal for Research in Mathematics Education* in 1970, *For the Learning of Mathematics* in 1980. Old links were renewed and strengthened by the ICMI president J. P. Kahane through the creation of the ICMI Studies (the first was held in Strasbourg in 1984).

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