ICMI in the post-Freudenthal era: moments in the history of mathematics education from an international perspective

Bernard R. Hodgson
Département de mathématiques et de statistique. Université Laval. Québec. Canada

Abstract
The recent celebration of the centennial of the International Commission on Mathematical Instruction (ICMI) has provided opportunities to reflect on various episodes in the life of ICMI. The term of Hans Freudenthal as the President of ICMI, from 1967 to 1970, is often presented as a turning point in the history of the Commission, as regards both the links between ICMI and its mother organisation, the International Mathematical Union (IMU), and also the contribution that ICMI may then have brought to the emergence of mathematics education as a bona fide academic field.

In the first part of this paper, I briefly review some background information on the history of ICMI, especially on the years that followed the rebirth of ICMI in 1952 as a Commission of IMU, and I present some of the main characteristics of the actions introduced by Freudenthal during his presidency. But my presentation mainly concentrates on the decades that followed that period and highlights important aspects of the current activities of ICMI and of the philosophy supporting these. In particular I comment on issues such as the links between the community of mathematics educators and that of mathematicians, as reflected in the contacts between ICMI and IMU, the uneven relationship with bodies such as UNESCO, and the fostering of the development of mathematics education in less affluent parts of the world.

Introduction

A major event occurred recently in the life of the International Commission on Mathematical Instruction (ICMI), namely the celebration in the beautiful premises of the Palazzo Corsini in Rome of the one hundredth anniversary of the founding of ICMI — this venue being both the home of the Accademia Nazionale dei Lincei and the very birthplace of the Commission during the Fourth International Congress of Mathematicians held in 1908. The symposium organized on this occasion (Menghini, et al., 2008; Schubring, 2008a) provided ample opportunities for reflecting on various moments in the life of the Commission and on some important trends that may be seen as emerging from its actions over the years.

This event was preceded in 2000 by another one of an historical nature, namely the celebration of the centennial of the journal *L’Enseignement Mathématique*, launched in Geneva a few years before the birth of ICMI and which has been serving as its official organ since the inception of the Commission, see (Coray et al., 2003). The two resulting Proceedings volumes constitute an important addition to the literature on the history of ICMI, which already comprised documents such as the short report prepared by de Rham (1976), the historical survey of former ICMI Secretary(-General) Howson (1984) published on the occasion of the seventy-fifth anniversary of ICMI, some sections from the book on the history of the
International Mathematical Union (IMU), ICMI mother organisation, due to former IMU Secretary Lehto (1998), or ad hoc papers such as that written by Bass & Hodgson (2004a) on the occasion of the ICME-10 congress. To these documents must be added an important on-going project: the website devoted to the history of ICMI under the editorship of Furinghetti and Giacardi (2008) and launched on the occasion of the ICMI Centennial.

The purpose of this paper is to reflect on some selected aspects of the history of mathematics education seen, from an international perspective, through the lens of ICMI. I first want to highlight, on the basis of some recent publications, a few moments in the history of ICMI, putting in particular the emphasis on the years that followed the rebirth of ICMI in 1952 as a Commission of IMU, after a period of dormancy resulting from the World War. I will also present some of the main characteristics of the innovations introduced by Hans Freudenthal during his term as President of ICMI from 1967 to 1970, and see how these have greatly influenced the actions of ICMI in the following decades. While underlining important aspects of the current activities of ICMI and of the philosophy supporting these, I will comment, on the basis of my experience as ICMI Secretary-General since 1999, on issues such as the evolution of the practice and research about the teaching and learning of mathematics, the links between the community of mathematics educators and that of mathematicians, as reflected in the contacts between ICMI and IMU, the uneven relationship of ICMI with external bodies such as UNESCO, or the fostering of the development of mathematics education in less affluent parts of the world.

Glimpses into the history of ICMI: from Klein to Freudenthal

One has witnessed recently an important amount of research devoted to the origins of ICMI and analysing both the context in which the Commission was established during the Fourth International Congress of Mathematicians (ICM) held in Rome in 1908 — following a call made in 1905 in the then newly created journal *L’Enseignement Mathématique* by David Eugene Smith, see (Coray & Hodgson, 2003) —, as well as the kind of actions initiated in the following years and decades. As detailed expositions on the early period of ICMI have been published, see for instance (Schubring, 2003) and (Schubring, 2008b), I will simply stress here a few highlights from this part of the history of ICMI.

In the talk he presented at the ICMI Centennial Symposium, former ICMI President Hyman Bass used the expression “Klein Era” to designate the first decades of ICMI, spanning from its beginning up to the Second World War. Among the characteristics of this period, see (Bass, 2008b, p. 9), is the fact that most of those involved in ICMI circles were mathematicians with *a bona fide*, albeit in practice often rather marginal, interest in issues of education. Also, in accordance with the initial mandate adopted by the General Assembly of the 1908 Rome Congress, the focus of the early years of ICMI was on international comparisons of curricula as well as on teaching practices. Moreover, in spite of
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efforts made to include countries outside Europe and the USA in the work of the early ICMI, the core of the Commission was from those two regions, at least as regards the voting members, see (Schubring, 2003, p. 56). Diffusion of the outcome of the inquiries made by ICMI was mainly via the journal *L’Enseignement Mathématique* or sections devoted to teaching in the quadrennial International Congresses of Mathematicians. In his Rome talk (2008b), see also (2008a), Bass presented the eminent German mathematician Felix Klein, the founding President of ICMI, as an exemplary figure of that period of ICMI life, i.e., a highly distinguished mathematician getting deeply engaged with mathematics education.

Under Klein’s impetus, the first years of ICMI were remarkably productive. For instance, by 1920, the Commission has produced 187 volumes containing 310 reports from eighteen countries (Lehto, 1998, p. 14). But the World Wars and the related societal and political tensions have had, for obvious reasons, a major impact on international cooperation and collaboration and, consequently, on ICMI itself. Much could be said about the turbulence surrounding ICMI life in between the two Wars, see (Schubring, 2008b) or (Howson, 1984), but a pivotal event in the history of ICMI that I wish to stress is its rebirth in 1952 as an official commission of the newly created International Mathematical Union, at a time when the international mathematical community was being reorganised. This framework still defines the formal position of ICMI today, so that the Terms of Reference of ICMI, for instance, are under the jurisdiction of IMU. Already in the version of the Terms adopted in 1954 (ICMI, 1951-54), the mission of ICMI receives a very general definition; it was slightly amended as follows in 1960 (ICMI, 1975):

> The Commission shall be charged with the conduct of the activities of IMU bearing on mathematical or scientific education and shall take the initiative in inaugurating appropriate programmes designed to further the sound development of mathematical education at all levels, and to secure public appreciation of its importance. In the pursuit of this objective, the Commission shall cooperate, to the extent it considers desirable, with effective regional groups which may be formed spontaneously, within, or outside, its own structure.

As commented by Furinghetti (2008, p. 49), the first activities of the ‘second life’ of ICMI “followed the old ICMI’s tradition, being based on international inquiries and production of national reports”. But very quickly various factors brought a shift from mathematics education issues being considered at a national level, as in the tradition of ICMI, to issues linked with the needs of the individuals — a shift from a “national business” to a “personal business”, to use the words of Furinghetti (2008, p. 50). This shift is connected to the emergence of a new vision on issues related to the teaching and learning of mathematics, as crystallised in the expression “didactical research” used by L. N. H. Bunt in his talk delivered in the 1954 ICM held in Amsterdam (Furinghetti, 2008, p. 49). But other factors were fostering this emerging orientation of mathematics education, a major one being the arrival of a new player in the field, the CIEAEM. In their paper presented at the ICMI Centennial Symposium dwelling on the context that lead to a
“Renaissance” of ICMI concomitantly with the development of mathematics education as a scientific discipline, Furinghetti et al. write (2008, p. 134):

In those years other arenas were opening with the aim of finding new approaches to mathematics education suitable to the changed mathematical and social contexts. An outstanding arena was the Commission Internationale pour l'Étude et l'Amélioration de l'Enseignement des Mathématiques (CIEAEM). This commission was born as a study and working group, tied to the experimental mentality of its founder and animator Caleb Gattegno, who succeeded in putting together people from different backgrounds.

In the same paper, the authors explain how the “old ICMI”, with its structure based on member countries and their representatives, was not considered by many inside CIEAEM quarters as flexible enough to meet the new needs related to “the growing attention to the student and to the process of teaching that would be a main concern of CIEAEM” (Furinghetti et al., 2008, p. 134). A substantial change of mentality was happening among many of those involved in mathematics education, in particular via the forum offered by CIEAEM, and this evolution eventually had an impact inside ICMI itself. Part of this impact may be seen as connected for instance to André Lichnerowicz, one of the founding members of CIEAEM, becoming ICMI President in 1963, see (Furinghetti et al., 2008, p. 139).

But the ‘renewal of ICMI’ took a much more dramatic turn under the presidency of Hans Freudenthal. As was then the tradition — and is now officially a rule with the revision of the ICMI Terms of Reference adopted in 2007 —, Freudenthal occupied the seat of President for a single four-year term, from 1967 to 1970. But those were quite evidently rather intense and fruitful years — in the words of Lehto (1998, p. 259), “[t]he active President Freudenthal felt strongly that the profile of ICMI had to be raised”.

To contrast with the first decades in the life of ICMI — the “Klein Era” — and the kind of actions then typical of ICMI, Bass (2008b) has introduced the expression “Freudenthal Era” to refer to the period I am now describing, where ICMI was at times being influenced by or accompanying the evolution in the world of mathematics education, and at times even fostering this evolution. By opposition to the previous period, Bass sees the main characteristics of the Freudenthal Era as based on a fundamental shift, namely that “[t]his period witnessed the emergence of mathematics education (didactics) as an international academic discipline, and of the corresponding scholarly community, for which ICMI was a major resource and agent” (2008b, p. 10). Consequently those involved in the activities of ICMI are no more mathematicians with occasional educational interest, but rather professional researchers in mathematics education, i.e., ‘didacticians’, or eventually “research mathematicians becoming professionally engaged with mathematics education even at the scholarly level” (Bass, 2008b, p. 10) — to the name of Hans Freudenthal suggested by Bass as the first major example of this latter phenomenon, one must of course add that of Hyman Bass himself as a more recent case. Moreover the actions of ICMI gradually took a substantial outreach flavour, having as targets countries in Asia, Afrique, Latin
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America, and developing countries in general, much beyond the two original poles of Europe and USA. But what probably has to be considered as the most striking ingredient of this period is the establishment, during the presidency of Freudenthal and under his personal initiative, of both a new journal and a new congress specifically devoted to the emerging discipline of mathematics education, namely, the journal *Educational Studies in Mathematics* and the first *International Congress on Mathematical Education*. Furinghetti et al. interpret these two events as marking “the prelude” to “a genuine ICMI Renaissance” through which “new issues found their place in the international discussion on mathematics education and opened new lines of research and forms of action inside ICMI” (2008, p. 132, 131).

The rationale behind this decision of Freudenthal to launch a new journal and a new series of congresses, as well as the emerging spirit of the time, can probably be best understood by referring to a resolution adopted at the first ICME congress held in 1969 (Editorial Board of ESM, 1969, p. 284):

> 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.

Under the impact of Freudenthal’s presidency, the period that followed can possibly be described as ‘years of abundance’, as regards not only the success of the newly established journal *ESM* in better serving the needs of the community of researchers in mathematics education, but also the number and the type of actions launched by ICMI. For instance ICME-1 was the first in a series of events — quadrennial starting with ICME-2 — which have become landmarks among the community of those interested by an international perspective on the teaching and learning of mathematics. Moreover, already at ICME-2 held in 1972, the notion of ‘Working Groups’ was introduced in the programme of the congress and still remains a crucial component of today’s ICMEs. From two of the ICME-2 WGs sprang the first so-called ‘Affiliated Study Groups’ to ICMI, namely the *International Study Group on the Relations between the History and Pedagogy of Mathematics* (HPM) and the *International Group for the Psychology of Mathematics Education* (PME), both of whom were officially established at ICME-3, in 1976. This notion of Study Groups affiliated to ICMI has proved to be a most valuable addition and strongly reflects the variety inside the community as regards the interest for specific aspects of the field (besides the two topics mentioned above, the current ICMI ASGs also concern women and mathematics education, mathematics competitions, and applications and modelling). Another sign of the vitality of ICMI at that time can be seen for instance in the regular collaboration between ICMI and UNESCO. This is reflected for example, see (Howson, 1984, p. 88), in subsidies provided by UNESCO to some ICMI symposia, or by the UNESCO support in connection with ICME-3, which resulted in having the outcome of sections at that congress presented as chapters of a book in the series *New Trends in Mathematics Teaching* (UNESCO, 1979). Also one must stress the success met in having ICMI activities...
outreach to parts of the world other that those typically served up to then. This
had as an impact that ICMI-related activities were organised not only in Europe, as
traditionally, or in Latin America — following the establishment in 1961 of the
Comité Interamericano de Educación Matemática, CIAEM, at the initiative of ICMI
President Marshall H. Stone —, but also in Africa, India or Southeast Asia.

The Freudenthal legacy can thus be characterised as the outcome of having
ICMI undergo a very substantial evolution — the “Renaissance” discussed in
(Furinghetti et al., 2008) — which contributed to a very large extend to define
ICMI as it exists nowadays. Still one has to bear in mind that this evolution meant
having ICMI take some distance with its previous philosophy and scope of action,
in order to accompany and even foster the ambitions of those mathematics
educators supporting the development of a new academic discipline going much
beyond the mere methodology of teaching or curricular comparisons. Both the
size of the gap thus created between mathematicians and mathematics educators,
as well as the personal style of Freudenthal in handling ICMI affairs, provoked
quite notable tensions with IMU, the mother organisation of ICMI, in particular as
IMU was often being faced with ICMI decisions that were fait accomplis (as was the
case for instance with the launching of the first ICME congress) — this episode is
documented in the IMU history by Lehto (1998, section 11.2). It is however of
interest to examine how this change in the climate of the relations between ICMI
and IMU has in fact still be an evolving matter in the post-Freudenthal era.

ICMI today: the post-Freudenthal era

The recent decades have witnessed, after the turbulence of the Freudenthal
years, a stabilisation and a consolidation of the situation of ICMI, and an
expansion of its scope of activities. This can be seen as regards ICMI programme
of actions as well as its links with other groups, both inside and outside the IMU
framework. I will now review some of the main components of the life of ICMI
today, thus addressing in turn the following three aspects: membership and
governance; ICMI vs other organisations; and the programme of activities of ICMI.

Membership and governance

ICMI currently has 85 member countries, of which 72 are members of IMU
and are thus de facto members of ICMI. That leaves a total of 13 countries members
of ICMI and not of IMU. The total number of members of ICMI is rather low, at
least when compared to the 192 member states of the United Nations (as of
today). Increasing the membership in ICMI may be seen as a most valuable goal, as
every country has some system and culture of mathematical education and as such
would be potentially eligible for participation in ICMI. Experience however
indicates that this has to be done with care, as the contacts between ICMI and the
Representatives of its member countries are sometimes problematic, especially for
those countries that are not members of IMU. This problem is often connected to
the absence in the country of a stable infrastructure representing all the relevant
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This issue of the infrastructure in support to the ICMI membership in a given country points to the difficulties sometimes encountered as regards the relationship, within the country, between the community of mathematicians and that of mathematics educators. More generally the issue of the links between these two communities within ICMI member countries can be transposed to the links between ICMI and IMU. At stake of course is a basic question of mutual understanding and respect. Looking at recent decades one can see various moments taking place, each bringing a flavour of its own.

There were what I would call ‘quiet’ times, i.e., times of reasonably stable and positive ICMI-IMU links, or maybe also times of soft indifference. The links then include in particular the administrative routine between one body (IMU) and one of its commissions (ICMI) as well as good regular contacts, but there are no deep or enthusiastic connections between the two bodies (this could be partly perceptible for instance through the frequent absence of the IMU president and secretary to the ICMI Executive meetings, in spite of the fact that they are *ex officio* members of that Committee). Some moments of the recent decades are possibly of this type. But there have also been times of real crisis in the ICMI-IMU connection. I already mentioned the turmoil related to the Freudenthal presidency. ICMI President Michèle Artigue, in her lecture at the ICMI Centennial Symposium, also speaks of the “increasing distance” that crept in between ICMI and IMU during the 80s and 90s (Artigue, 2008, pp. 188–189). She connects this situation to what may be seen as an increase in the ‘strength’ of the math education community, as reflected, on the one hand, by the emergence of an increasing number of different ‘sub-communities’ among mathematics educators — this can be seen for instance in the development mentioned above of various Affiliated Study Groups inside ICMI —, but also, on the other hand, by the strong representation on the ICMI Executive Committee (EC) of more and more mathematics educators with a diversity of fields of expertise — including in the positions of officers of ICMI, but with the notable exception of the president who, by tradition, has always been a first rank mathematician (but more on that matter below). Artigue explains in the following manner why, when the 1999-2002 ICMI Executive started its term, the tension between the communities of mathematicians and mathematics educators “was as its maximum”, in particular in connection with decisions about the scientific programme of the 1998 International Congress of Mathematicians held in Berlin:

> New tensions also arose all the more as at that time [i.e., during the 1990s, under the ICMI Presidency of Miguel de Guzmán] the supposed influence of mathematics educators was considered by some mathematicians as an important, if not the major, source of the observed difficulties in mathematics education, leading to such extremes as the so-called Math War in the USA. [...] At the 1998 International Congress of Mathematicians in Berlin, the project proposed by ICMI for the section on the Teaching and
Popularisation of mathematics had been partially rejected, \(^5\) and the Math War in some sense had entered the section. Voices asking ICMI to take its independence from a mother institution that expressed such mistrust were becoming stronger and stronger. (Artigue, 2008, p. 189)

Artigue notes that the 1999-2002 ICMI EC (and the succeeding ones) had “to deeply reflect on the nature of ICMI and what we wanted ICMI to be” (2008, p. 190). In order to help restoring the mutual confidence and links between ICMI and IMU, a series of direct contacts between the newly elected presidents and secretaries(-general) of IMU and ICMI was started, see (Hodgson, 2008b, p. 201), a first event being the invitation extended to Hyman Bass and myself to attend the IMU Executive meeting in Madrid in May 2000 (such participation of ICMI officers to an IMU EC meeting had then been rather rare in recent times). A set of actions related to the governance of ICMI was then straightaway identified, as reported by Bass (2001b), dealing in particular with the presence of IMU president and secretary to the ICMI EC meetings, the reciprocal presence of the ICMI president and secretary-general to the IMU EC meetings, when matters pertinent to ICMI were being discussed, as well as their \textit{ex officio} participation to the IMU General Assembly as observers, and finally the framework for the contribution of ICMI to the ICM programme, and that of IMU to the ICME programme. An immediate outcome of this episode was a radically improved atmosphere as regards the links between the two bodies: ICMI and IMU were entering a time of harmony and eventually intense collaboration.

When IMU was requested by its 2002 General Assembly to redesign the election procedures for its various elected committees in order to make these more transparent and avoid conflicts of interests in the preparation of the slate of candidates, the floor was thus staged for an agreement on ICMI election procedures specially tailored to the specificities of the Commission. The discussions between the IMU and ICMI Executives on that matter, including the setting up of a distinct ICMI Nominating Committee representative of the ICMI community, took time, especially as the original proposals drafted by IMU in 2003 did not pay sufficient attention to the specificity of ICMI and were \textit{de facto} moving away from a context where the ICMI community could play a significant role in the selection of its governing body. Discussions on this issue were finalised at the ICMI EC meeting held during ICME-10 in 2004, to which IMU President Sir John Ball participated (it had then been a long time since an IMU president actually attended an ICMI EC meeting — but IMU secretaries would have occasionally participated in such meetings). It is also on that occasion that the discussions were brought to their ultimate conclusions, namely to consider the transfer of the actual ICMI EC election from the IMU General Assembly to the ICMI General Assembly. A preliminary report on this extraordinary development was presented by Bass & Hodgson (2004b), the principle being of having the election happen in a context of a close collaboration between the IMU and ICMI communities, but with ICMI making the final decision. This proposal soon afterwards received the support of the whole IMU Executive Committee and was finally adopted by the
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IMU General Assembly held in Santiago de Compostela in August 2006. I wish to add my voice to that of Artigue (2008, p. 190) in stressing that such a fundamental change in the governance of ICMI could not have happened without the outstanding role played by ICMI President Hyman Bass who, on the basis of his credibility as an eminent research mathematician, was in an exceptional position to convince the IMU General Assembly of the à propos of the new election scheme for ICMI and of the fact that this was in no way a first step in ICMI going out of IMU — as a matter of fact quite the opposite, as this scheme was ensuring an appropriate governance context for ICMI to stay within IMU. It is at the same IMU GA that Michèle Artigue was elected as the 2007-2009 ICMI President, marking the first time since ICMI was re-established as a commission of IMU that the credentials of the incoming ICMI president were not based on reputation as a research mathematician (and only the second since the founding of ICMI, after David Eugene Smith (1928-1932)) — and representing of course the election of the very first woman as president of ICMI. The first election of the ICMI Executive by the ICMI GA took place in 2008 during ICME-11.

In my opinion, one could hardly have envisaged, at the time of the ICM-98 crisis, that less than a decade afterwards the relation between ICMI and IMU would have evolved to such an extent so as to allow such a dramatic and historic change in the governance of ICMI as the election of its Executive by its own General Assembly. Of course this is an exceptionally positive evolution and shows ICMI as a Commission whose relationship with its mother institution IMU has matured and overcome the tensions of the past. Still, as I commented at the ICMI Centennial,

much of the relationship remains somewhat fragile, and it is crucial that these stronger links between IMU and ICMI become fully institutionalised, so that they do not depend just simply on the good will of some individuals who have official responsibilities at a given time, but really become part of the life and institutional memory of both bodies. (Hodgson, 2008b, p. 201)

Other positive outcomes of the new phase that ICMI and IMU are now experiencing are discussed in the papers presented at the ICMI Centennial by Artigue (2008, pp. 190–191) and Hodgson (2008b, pp. 201–202). They concern joint projects such as the so-called Pipeline Study and Klein Project, collaborative actions in the developing world via IMU Developing Countries Strategy Group and the future Commission for Developing Countries, the support offered by IMU to ICMI, beyond the annual grant, with the maintenance of the website and the development of the ICMI Digital Library, as well as the inclusion of ICMI in the project of a permanent secretariat that IMU is currently setting in place — a much welcome support to the quite substantial administrative needs of ICMI.

ICMI vs other organisations

ICMI at times enters into collaboration with various bodies that exist outside the IMU framework. Interesting examples of such situations are for instance the ICMI/IASE Study (ICMI Study 18) on Statistics Education in School Mathematics:
Challenges for Teaching and Teacher Education, organised jointly with the International Association for Statistical Education (IASE), or the ICMI/ICIAM Study (ICMI Study 20) on Educational Interfaces between Mathematics and Industry, organised in collaboration with the International Council for Industrial and Applied Mathematics (ICIAM). ICMI has also been looking for some time into possible collaborative projects with the CIMPA (Centre International de Mathématiques Pures et Appliquées — International Centre for Pure and Applied Mathematics), a French body whose vocation is to organise schools and seminars and to sustain networks of researchers in mathematics for the benefit of developing countries, see (Jambu, 2006). The contribution of ICMI in such a context is to explore possibilities as regards for instance the education of mathematics teachers.

Other potential developments are connected to the establishment of links of a structural nature with bodies such as CIEAEM or CIAEM, mentioned above. An affiliation of CIAEM to ICMI was adopted by the ICMI EC in 1974 (ICMI, 1975, p. 6), but with apparently vague outcome. In spite of the historical connections ICMI has had with CIEAEM and CIAEM, the current ICMI infrastructure does not yet propose a specific niche for such collaborations to be formally developed.

Another context for collaboration with other organisations is related to ICSU, the International Council for Science, of which IMU is a Scientific Union Member. One aspect of ICMI being under the umbrella of ICSU, via IMU, is that ICMI is to abide by the IMU statutes, one of which establishes the fundamental principle of universality of science, based on non-discrimination and equity. In a different connection, ICSU may also be seen as a potential framework for facilitating collaboration with other scientific bodies and developing joint actions around the teaching and learning of mathematics and science. However it must be recognised that success on that account over the years has been slim, as efforts to find educational counterparts to ICMI inside other Scientific Union Members of ICSU, and establish joint actions on common grounds of interest, were of little avail. It is worth nothing that from 1971 to 1993, the Committee on the Teaching of Science (CTS) of ICSU was represented by an ex officio member on the ICMI Executive Committee. This person was in fact the representative appointed by IMU on CTS, see (ICMI, 1983). Lehto speaks of the “murderous” comments made by Freudenthal, when he ended his term on CTS in the mid-70s after his ICMI presidency, concerning the lack of interest in CTS not only for mathematics education, but even for mathematics which “is not considered as a science proper by the majority” (Lehto, 1998, p. 256). Still former ICMI President Sir James Lighthill (1977) reported on a project of collaboration between ICMI, CTS and UNESCO, in a follow up to actions launched at ICME-2 and pursued at ICME-3, see also (Christiansen, 1983).

As regards recent episodes, ICMI collaborated closely to the organisation of an International Conference on Science and Mathematics Education in Rio de Janeiro on the occasion of the 2002 General Assembly of ICSU, see (Hodgson, 2004, p. 43). But recent efforts to have ICMI contribute to an educational event organised
in Mozambique around the 2008 ICSU General Assembly were unsuccessful. However it is worth noting that ICMI has just been invited by IMU to propose a candidate for an ad hoc committee in charge of a strategic review of ICSU’s action in relation to science education and define its future role, thus opening the door to potential new collaborations between ICMI and members of ICSU.

I have kept UNESCO as a final, but extremely important, component of the links between ICMI and other organisations. This is obviously a major chapter of the history of ICMI that may well deserve a paper of its own. I wish here to point to a few salient moments in this relationship and indicate promising directions. Important sources of information on the links that ICMI and UNESCO have developed over the years are the report by ICMI Vice-President Bent Christiansen (1978), published after he left his position as programme specialist in mathematics education at UNESCO, as well as (Howson, 1984) and (Lehto, 1998).

Lehto (1998, p. 113) observes, as regards financial matters, that ICMI has for a long period been relying to a large extent on subventions from UNESCO for its scientific activities. When reviewing the actions of Freudenthal during his presidency, Lehto emphasises (1998, p. 259) both the contract signed between ICMI and UNESCO in connection with the creation of *Educational Studies in Mathematics*, as well as the support provided by UNESCO (and the French Government) for the organisation of ICME-1 in Lyon in 1969.

Howson (1984, pp. 84, 85, 88) provides information about the ICMI-UNESCO collaboration on actions such as the launching of the series *New Trends in Mathematics Teaching* (the first volume was published by UNESCO in 1967 and the fourth is closely connected to ICME-3) or the support provided by UNESCO for various conferences. Christiansen (1978) describes at length the process that lead to the publication of volume 4 of *New Trends* and how it was articulated using input from ICME-3. He also speaks of specific meetings (with few participants) convened by ICMI, under contract with UNESCO, with the purpose of advising UNESCO on its programmes, current and future, in mathematics education.

To these must be added a major component of the more recent ICMI activities: the ICMI Study programme, inaugurated in the mid-80s by the ICMI Executive Committee with Jean-Pierre Kahane as President and Geoffrey Howson as Secretary-General. The first Studies were organised with the financial support of UNESCO. Moreover UNESCO was instrumental in having an updated edition of the volume resulting from the first ICMI Study be prepared and appear in its *Science and Technology Education* series (Cornu & Ralston, 1992). In a similar vein, one should mention the publication (Keitel et al., 1989) resulting from the so-called “Fifth Day Special” held during ICME-6 and whose programme addressed the main social and political issues surrounding mathematics education.

These are vibrant examples of the strong links and efficient collaborations that ICMI and UNESCO have enjoyed for a number of decades. However, by the early 1990s these links were beginning to fade away, and eventually came to a complete stop, basically for two reasons. One is connected to the well-known financial
difficulties of UNESCO at that time, a substantial cause being the withdrawal by the USA of their funding to UNESCO, so that UNESCO was hardly in a position to provide financial support to conferences and meetings. But another crucial event was the retirement in the early 1990s of Edward Jacobsen, see (Jacobsen, 1993), who, for 18 years, had occupied the position of mathematics education specialist at UNESCO. Because of financial constraints, his post was abolished, so that no one anymore on the staff was identifiable as the “math ed” person whom you could look for in connection to mathematics education projects.

The 1999-2002 ICMI Executive Committee saw the decline of the links with UNESCO as an important loss for the ICMI community and made it as a goal to restore these. In my 2004 Secretary-General report of activities to the ICMI General Assembly (Hodgson, 2004, pp. 43-44), I indicated various steps taken by the ICMI EC in order to renew contact with UNESCO and to gradually find grounds of common interest allowing concrete actions to be implemented. A major component of this renewed collaboration is the UNESCO exhibition Experiencing Mathematics! to which ICMI brought his contribution, scientifically, financially and logistically. It is estimated, see (Hodgson, 2008a, p. 28), that since its launching in 2004 during ICME-10, this exhibition has been visited by more than 800 000 young people, their teachers and parents. It has travelled to some 50 cities in 20 countries, a strong majority of which are developing countries. It is now accompanied by a virtual exhibition initiated and supported by UNESCO. Artigue, in her ICMI Centennial lecture (2008, pp. 193-194), presents such a joint action with UNESCO as instrumental in facing one of ICMI’s “crucial challenges”: fostering the development of new relationships between centres and peripheries.

One consequence of the renewed links between ICMI and UNESCO is that in recent years, UNESCO found itself again in a position to support financially some activities of ICMI, such as the conference for Study 17 on technology held in Hanoi in December 2006 and the regional conference Espace mathématique francophone organised in April 2009 in Dakar. Of course the outreach to developing countries was central in each of these cases.

The programme of activities of ICMI

Space prevents me from examining in details here the various activities of ICMI and their specificities in this ‘post-Freudenthal’ era. The interested reader may consult reports such as (Hodgson, 2004; or 2008a) to know more about recent and on-going activities. I would like to present here a few important developments of the recent decades.

ICMI currently has three main programmes of activities: the ICME congresses, the Studies and the Regional Conferences. About the International Congresses on Mathematical Education, I will just add to what I previously said that ICMI faces, among others, a major challenge connected to outreach: how to ensure a balanced representation from all over the world among the presenters and among the general participants at ICMEs? In order to achieve this goal, ICMI has instigated, under the leadership of President Miguel de Guzmán (1992, p. 6), a general policy
of forming for each congress an ICME Solidarity Fund based on a portion of the registrations fees (typically 10%), in order to provide grants assisting delegates from non-affluent countries to attend the ICME congress. This tradition started with ICME-8, held in 1996, and at each of the recent ICMEs, some 100 to 150 participants from economically challenged regions of the world have been given financial support to facilitate their presence at the congress.

The ICMI Studies programme, initiated in the mid-80s, has acquired over the years a growing importance and influence in mathematics education and represents undoubtedly one of the most successful additions to the ICMI landscape in recent decades. The variety of the themes of the 21 Studies launched up to now clearly testifies to the vitality of the field. As mentioned above, two recent ICMI Studies are organised jointly with other institutions, another sign of vitality. Still Artigue (2008, pp. 192-193) presents as a challenge for ICMI to ensure that the Studies are not restricted to those interested by research, but can be a source of inspiration for educational action by a wider group, in particular those closer to practice.

In a report he presented for the years 1971-1974, ICMI President Sir James Lighthill speaks of “a new policy” adopted by ICMI “of holding Regional Symposia to facilitate wider discussion of mathematical education outside those areas of Europe and America where international meetings on the subject have mainly been held hitherto” (Lighthill, 1975, p. 330). This notion of Regional Conference may in a way be traced back to the launching of CIAEM, in the early 60s. But clearly with the decision reported by Lighthill, the ICMI EC was aiming at creating a more robust and open concept. Besides various ad hoc regional conferences, it is interesting to see four regional networks, including CIAEM, that have emerged over the years. EARCOME (East Asia Regional Conference in Mathematics Education) was started in 1998 in Korea, but it grew out of a series of earlier conferences in the region (the South East Asia Conferences in Mathematics Education) launched at the end of the 70s. Initiated on the occasion of the World Mathematical Year 2000, the series of Espace Mathématique Francophone conferences (EMF) is built on a notion of ‘region’ defined in linguistic rather than geographical terms, French being a common language among participants. It has been organised twice in Africa, thus furthering some networking among mathematics educators from francophone countries in Africa. This is in parallel to another African network, AFRICME (Africa Regional Conference of ICMI on Mathematics Education), launched in 2005 and gathering particularly Anglophone countries of Africa. A natural goal may be to see how to use these new African networks to facilitate contacts inside Africa, independently of the language.

A common and fundamental theme underlying these three types of ICMI activities is the issue of developing countries. I already mentioned earlier the needs of developing countries in relation to the collaboration of ICMI with both IMU and UNESCO. But ICMI also has actions of its own where developing countries are central. This is obvious in the ‘Solidarity Tax’ imposed at ICMEs, and something similar also exists, at a different scale, for Studies or Regional
Conferences. Artigue (2008, pp. 193-195) provides multiple examples of recent situations where ICMI has been sensitive to the specificity of developing and emerging countries, using as a framework for her comments the relations between the 'centres' and the 'peripheries'. But she also stresses the importance of ensuring a progressive evolution of mentalities, moving away from the traditional model of actions directed towards the developing countries (the typical North-South vision) to a more balanced context for solidarity and collaboration based not only on a South-South approach, but also looking for opportunities for a South-North vision inspired by specific progresses reached in some developing or emerging countries.

The scope of actions of ICMI, as suggested above, is quite large. But in order to successfully support such a programme, ICMI needs to have access to various tools and to monitor their necessary evolution over the years. Some of these tools are of a structural nature, such for instance as the notion of Affiliated Study Groups or the regional networks themselves: these provide some niches where specific segments of the ICMI community may feel at home. But other essential tools are of a more practical nature, concerning either financial needs (for instance the capacity for ICMI of offering support to less affluent countries via a 'Solidarity' programme), or the necessary dissemination of information about the actions of ICMI and the various publications resulting from these. Communication tools are thus necessary in order to allow efficient information to the community. The *ICMI Bulletin* was launched in 1972 precisely to meet such a need, in response to requests made at ICME-2 for improved methods for the dissemination of information. With the evolution of technology, the role of the *Bulletin* today has evolved to that of an archival tool for various ICMI-related documents, in particular formal documents such as annual reports, etc. As an efficient and prompt tool for communication, it has been replaced by *ICMI News*, the recently established (and highly successful) electronic newsletter of ICMI. The ICMI website of course plays a central role in the communication palette of ICMI, being in particular the home for the ICMI Digital Library, recently launched by ICMI with the technical support of IMU. As mentioned in (Hodgson, 2008b, p. 202), the objective of the Digital Library is that eventually 'all' the literature produced in the context of ICMI activities will thus be made freely available on the Internet.

**Concluding remarks**

I have tried in this paper to show how deep has been the influence on ICMI of Hans Freudenthal, both during and after his presidency. Of course, each of the ICMI presidents, starting with the great Felix Klein, has left a mark of his own on the Commission. But Freudenthal stands out as a truly exceptional figure whose heritage is still strongly alive among the ICMI community. It is thus no accident that when faced with the necessity of choosing names for the awards established to recognise outstanding contributions in mathematics education research, the ICMI EC decided to use both Klein and Freudenthal as emblems, see (Hodgson, 2002).
The recent history of ICMI, from the Freudenthal presidency to today, shows a Commission which is at times accompanying and reflecting the evolution in the field of mathematics education, at times influencing and fostering it.

Among international organisations devoted to mathematics education, ICMI is unique because of its close ties both with the professional community of mathematicians and that of mathematical educators, as well as its breadth — thematic, cultural and regional. But as distinctive as they may be, these characteristics remain rather fragile and need to be nurtured. Or to put matters differently, all those belonging to the ICMI community must be aware of these characteristics, convinced of their merit and sensitive to the need of ensuring that they are not abandoned or forgotten along the years.

The importance of the first characteristic had been stressed by former President Hyman Bass in various contexts, notably when arguing in favour of the new mode of election of ICMI, as indicated above. But already in 2001, as he was invited to reflect on testimonies prepared by his three predecessors as presidents on the occasion of the 50th issue of the *ICMI Bulletin*, he wrote: “ICMI provides one of the rare environments where mathematicians and mathematics educators are bound by both cultural and structural ties, and few of us would want to risk losing this precious legacy”, see (Bass, 2001a). It is an important heritage of Bass himself that these ties are now in remarkably good health.

In her ICMI Centennial lecture, ICMI President Michèle Artigue also celebrates this “new phase” of the relationship between ICMI and IMU, its mother organisation, see (Artigue, 2008, pp. 190-191). But she then points to a series of “crucial challenges” that ICMI must face when looking at the future. These challenges (see pp. 191-197) are essentially related to the second characteristic of ICMI, namely to the thematic, cultural and regional underpinnings of ICMI when facing its mission. She comments that among the issues at stake are for example the consolidation the field of math education as a field of both research and practice and the importance of accessing a wider audience; the needed improvement and extension of ICMI outreach, in particular in connection with solidarity and networking; or the need to develop sensitivity to cultural diversity. Much still needs to be done, of course, but as pointed out clearly in the concluding words of Artigue (p. 197), ICMI as an institution has in the past “progress[ed] modestly and slowly, but (…) with coherence”. It is still moving, and “will go on moving and improving”.

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Notes

1 See (Furinghetti et al., 2008) for a thorough analysis of the relationship between ICMI and CIEAEM over the years, with its ups and downs.

2 It is possibly a somewhat annoying fact that in English, as opposed to a variety of other languages, the designation of this new academic discipline by a name based on the word ‘didactics’ — such as in the expression ‘didactics of mathematics’ proposed as early as 1968 by H.-G. Steiner (Furinghetti et al., 2008, p. 132) — has not come into common use because of linguistic subtleties. Consequently this scholarly field of research is designated by the rather general term ‘mathematics education’ which in some circumstances may be a source of impreciseness or even confusion — at least for non-native English speakers.

3 Lehto concludes his analysis of the ICMI-IMU relations at the time of Freudenthal with the following comments: “From the point of view of the Executive Committee of the IMU, the child had come of age and behaved accordingly. Yet the parent was understanding. At its meeting in 1969, the IMU Executive Committee, after ventilating its feelings about insufficient contact with ICMI, formulated its basic policy as follows: ‘The IMU should continue its policy of paying special attention to educational questions through ICMI, in order to ensure that the creative mathematician and the educator do not work isolated from each other.’” (Lehto, 1998, p. 259)

4 The possibility for a country not member of IMU to be officially involved in ICMI has been introduced in the 1960 revision of the ICMI Terms of Reference, see (ICMI, 1975, p. 5, item g). This was reaffirmed by the ICMI Executive Committee at a meeting held in 1964 (Delessert, 1964, p. 264).

5 There was a tradition at that time, which is still the case today, that for each International Congress of Mathematicians, the ICMI Executive Committee members are directly involved in the ‘panel’ in charge of setting up the programme of the education section of the ICM, either by appointing those on the panel or by serving themselves on it. It appears that for the ICM-98 in Berlin, the nominations made by the education section panel were largely overthrown by the global Programme Committee of that ICM which, setting aside in practical terms ICMI as the IMU official commission, and therefore expertise, on mathematics education, acted to a non-negligible extent as if it possessed independent and scholarly expertise in that field. While some of the resulting problems for ICM-98 were resolved by a second round of decisions about the programme, this episode provoked a crisis around the decision-making process for the education section and the degree of autonomy that ought to be given to the education panel, in tune with the autonomy recognised de facto to the panels for the other sections on the ICM programme, since the Programme Committee essentially always accepts the recommendations made by these panels. (Remarks based on a personal communication from Mogens Niss, ICMI Secretary-General, 1991-1998.)

6 In the words of Lehto: “Since 1931, ICSU’s principle of nondiscrimination has remained the basis of international science policy.” (Lehto, 1998, p. 43)

7 Lehto also mentions subventions from ICSU and ad hoc support from the IMU EC, in the period that followed its rebirth in 1954. He writes: “This state of affairs was not changed until much later. From 1987 on, a part of [IMU’s] budgeted expenditure for mathematics has been allocated for the free use of ICML.” (1998, p. 113)
References


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