

# A Bridge across the Americas: The History of the Inter-American Committee on Mathematics Education

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The origin of the Inter-American Committee on Mathematics Education<sup>1</sup> is closely linked to the New Math reform of Mathematics teaching, a wave that swept most of the world in the 1960s and 1970s. The reform was essentially a response to a reality: there was a widely felt need to modernize the teaching of Mathematics, and a concern about the wide gap between university and secondary school mathematics. Modernization was rooted in the need to adapt mathematical preparation to scientific and technological developments in the major Western societies, and it was also a response to special historical and political conditions.

This situation spurred mathematicians to believe that they had the historical mission to involve themselves in pre-university mathematics education by defining the modernization of school mathematics and by building an adequate bridge to university mathematics<sup>2</sup>. The truth is that professional<sup>3</sup> mathematicians<sup>4</sup>—many of them internationally recognized in the field<sup>5</sup>—conducted most national and international conferences,

Beyond the sociological dimension of the reform, there were important ideological, philosophical and even political reasons that exerted important influence in the age of the New Math.

## *The Reform in Latin America*

The concerns about modernization necessarily reached our subcontinent, but the initiative in favor of the reform came from outside. We received the textbooks that the School Mathematics Study Group (SMSG) was producing in the US, but it is likely that the most decisive event was the First Interamerican Conference on Mathematics Education, held in Bogotá, Colombia, in 1961.

This Conference received large financial aid from the US National Science Foundation (NSF), and was attended by respected mathematicians, such as Marshall Stone from the US and Gustave Choquet from France. The participation of representatives from all countries in our hemisphere was sought to implement without delay a strategic plan: preparation or translation of textbooks, curricula changes, teacher training, and so forth, activities that were already going on in Europe and the

US.

During the follow-up conference, held in Lima, in 1966, the syllabus for secondary schools (12-18 years old) was prepared. This syllabus would be instrumental in the reform of all mathematics curricula on the subcontinent. Methods and programs for training teachers were also designed in Lima.

Latin America did not have a closely-knit mathematical or scientific community, and this made it easier for the reform to be accepted<sup>6</sup>. Universities got involved in the process, in different ways and at various paces<sup>7</sup>, and students returning home after graduating in Mathematics in the United States and Europe, reinforced—in general—the new plans<sup>8</sup>. Textbooks, sometimes still in use today, played a very important role in that process<sup>9</sup>.

The Interamerican Committee on Mathematics Education (IACME) was born within this general context<sup>10</sup>. Its first president was Marshall Stone, a very important American mathematician. Luis Santaló, renowned mathematician and educator born in Spain and residing in Argentina, was chosen in 1966 as his representative in everything connected with Latin America. The Committee was in charge of implementing the reform, with representatives from all regions of the hemisphere<sup>11</sup>.

## *IACME and the Reform*

As we shall see, the Interamerican conferences on mathematics education were faithful for many years to the objectives of the reform. However, just as mathematics education kept on changing worldwide, the same thing was happening within IACME. The reform did much to reinforce the ties among mathematicians all over the world, especially between those in Latin America and their counterparts in the US, Canada and Europe. IACME became literally an institutional bridge joining the North and the South of the hemisphere in everything dealing with Mathematics and Mathematics teaching. The reform brought with it a spirit and a mystique among mathematicians, who contributed a great deal in preparing like-minded professionals throughout the entire region and strengthening their academic realm within the universities.

Whether or not the reform programs were based on ideas that are correct, many of the actions that sprang up around them contributed to developing a professionalization of the mathematics teacher: they are specialists in their own right, different from the mathematician and from the general educator.

As time passed by the reform's original objectives disappeared from IACME, just as had happened elsewhere. However, an international organizational framework remained. It is recognized as the most permanent and important organization in the field of mathematics education in Latin American in the last

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thirty years. The Interamerican Conferences on Mathematics Education have continued to take place, more or less regularly, now making a total of nine (see Table 1).

Table 1: List of the Interamerican Conferences on Mathematics Education.

| Place                             | Date           |
|-----------------------------------|----------------|
| Bogotá, Colombia                  | December, 1961 |
| Lima, Perú                        | December, 1966 |
| Bahía Blanca, Argentina           | November, 1972 |
| Caracas, Venezuela                | December 1975  |
| Campinas, Brazil                  | February 1979  |
| Guadalajara, Mexico               | November 1985  |
| Santo Domingo, Dominican Republic | July, 1987     |
| Miami, USA                        | August 1991    |
| Santiago, Chile                   | August 1995    |

Six years passed between the Second Conference and the Third Conference. The objectives that had been so clear in the first two were no longer so strongly present and many of the organizations and institutions that had been involved had lost interest.

In the first two Interamerican Conferences on Mathematics Education, the objective was very broad, but at the same time very precise: to carry out the reform of mathematics teaching at the secondary level. That was the motivating idea and it sought very important ends that were very concrete. In the following conferences, more specific topics were selected—around them there were presentations and discussions—but they did not have the wide impact throughout the region of the first two conferences. By the Third Conference, the President of IACME, Marshall Stone, in his opening address, complained of the difficulties that had occurred in carrying out the meeting and denounced the lack of interest in many organizations. This lack of interest might explain the six-year gap between the Second and the Third Conferences.

During the Third Conference there was still an obvious effort to implement the teaching of New Math in the primary level as well as in those places where it had not yet been tried. However, in that and subsequent conferences it was well noted that the results of the reform were not as planned and that there had been tremendous difficulties. Criticisms over various aspects were felt. For example, in the Third Conference Lore Rasmussen (USA) said:

In practice, the reform could not achieve many of its goals. The concern with the use of a precise language such as the distinction between number and numeral and equivalent and equal were imposed artificially. The insistence of implementing the language of sets, the abuse of certain notations, the mention of the commutative, associative and distributive laws hampered on many occasions the intuitive confidence for mathematics in the teachers as well as in the

students. [Educación Matemática en las Américas III, p. 95.]

In the Fifth Conference, Emilio Lluís (Mexico) also expressed the difficulties that were present in trying to substitute teaching Euclidean Geometry in the usual way with a presentation from the point of view of Linear Algebra and the loss that this represented pedagogically.

In spite of the fact that the objectives of the conferences changed, they have continued to be an excellent discussion forum about the problems of mathematics teaching in these countries and for many years they represented the only such forum in Latin America.

With respect to their functioning, the Third and Fourth Conferences maintained a structure that was similar to the first two. That is, in each case the Committee selected four themes that they considered important for mathematics education in the American countries and, addresses and short communications were presented on those topics, as well as round table discussions. In addition, the majority of the participating delegates presented reports on the state of mathematics teaching in their countries. Finally, based on the reports and the discussions some agreements were reached in the form of recommendations directed to the institutions and organizations that had to do with mathematics teaching.

For the Fifth Conference, the Committee decided on having three keynote addresses given by distinguished mathematicians who selected their own topics. Later, as had been the case in previous conferences, four themes were treated in detail, but this time a panel discussions was used in order to promote greater participation. Additionally a few seminar-workshops were delivered on very specific topics. This conference did not have reports presented by delegates from the countries.

The structure of the Fifth Conference was maintained in the following conferences: general invited keynote addresses with topics chosen by the presenter, four discussion panels on specified topics, and seminar-workshops. However, in each of these the participants presented a large number of oral communications. These oral communications were not actually the equivalent of the reports of the first conferences, but, instead, the presentation of proposals, experiences and specific ideas on various aspects of mathematics and its teaching, especially methodological considerations.

### *Two Stages in the History of IACME*

For practical purposes we can divide the ideas and structure of the conferences into two stages. The first stage corresponds to the first four conferences in which the primary objective was to change the kind of mathematics being taught at the secondary and primary level in the participating countries, especially in Latin America.

In those Conferences the focus was on deciding what type of mathematics programs were more appropriate, what topics should be included or excluded from those programs, how should teachers be prepared in order for there to be some chance of success with the

proposed changes, and so forth. However, psychological and pedagogical aspects related to students, and the actual possibilities of carrying out reform were rarely taken into account. Very few of the communications or addresses in this stage were concerned with analyzing problems related to pedagogy, teaching methods or any topics related to them. The delegates' reports were limited to giving statistics (when they existed) or to a perspective on how the various aspects of change in mathematics teaching were advancing. Some delegates reported difficulties and obstacles encountered in the process.

A second stage would correspond to the next five conferences; with the Third being a transition. Even though the general ideas of promoting reform were not abandoned completely—principally through the keynote addresses—a new concern appeared for dealing with more specific topics, especially those of pedagogical nature. In addition to giving importance to what should be taught there was importance given to how it should be taught. This is clearly reflected in the oral communications, especially in the last three conferences.

Those who participated as delegates in the first conferences accepted a mission: changing the teaching of mathematics in their countries by introducing new curricula, following the guidelines for introducing and developing topics proposed in the conferences. Thus, an important aspect of the conferences in the first stage (something that does not appear in the second stage) was the establishment of a series of recommendations that, although not obligatory, did indeed encourage many of the delegates to do something in their respective countries. In contrast, by way of the addresses and the recommendations, the conferences in the second stage have not had that missionary character and this has resulted in them being less influential. This is quite apart from the rapid development of mathematics education internationally that has given rise to a different context that influenced and continues to influence IACME.

### ***Conference Organizers and Sponsors***

The First Inter-American Conference on Mathematics Education was proposed and organized by the International Commission of Mathematical Instruction (ICMI). A recommendation of the conference was to create the IACME with the responsibility of organizing the forthcoming conferences. All the Conferences have sponsors within the countries in where the conferences are held. International institutions or with other interests have sponsored some of the conferences (e.g. the Rockefeller Foundation, Ford Foundation, U.S. National Science Foundation (NSF), the Organization of American States (OAS), and UNESCO for the First and Second Conferences). Because by the Third Conference many of those organizations had lost interest (possibly because the objectives proposed in the first two had been achieved or were in process), only OAS and UNESCO sponsored the Third and Fourth Conferences. Of these, only UNESCO has remained as a sponsor (all

the conference proceedings—since the Third—have been published by UNESCO). The Ninth Conference awakened a greater interest again, and OAS and NSF reappeared as sponsors.

### ***As a reaction: New trends in the methodology?***

In another order of ideas and from a theoretical point of view, we can say that the new tendencies, in the 90s, that favor an integration of constructivism and socioculturalism in the teaching of mathematics, can be seen as a “reaction” against the ideology of the reform of previous decades. A methodological and theoretical starting point is an understanding that mathematics education should be grounded in a cognitive sociocultural construction where the subject participates actively (and through confronting problem situations) and where the teacher has an active role as the central conductor of a different and special educational experience.

These new realities defined a new situation for the current mathematics education<sup>12</sup>. As was the case in the rest of the world, the reformers and their plans were modified in this direction and the same has happened in the Interamerican Conferences on Mathematics Education<sup>13</sup>.

The major lines of development in mathematics education have had an effect in Latin America. Professionalization has run a certain course and, reciprocally, professionals linked to IACME have precisely developed certain key themes of current research, such as those relative to sociocultural influences in mathematics<sup>14</sup>.

Although reform is an unequal and combined process in the different countries, it is important to understand its most profound significance. The teaching of mathematics is going to be modified substantially in the new era by the impact of new developments in the technology of calculators, computers<sup>15</sup>, telematics, etc. In less than two decades, calculators, microcomputers, CD-ROMs, multimedia, the Internet will be resources available for almost everyone. What will be the mathematics education of the new historic order?

Without any doubt, in the new historical context mathematics education is called to occupy a very important place, given that mathematical preparation at all levels constitutes an essential instrument for scientific and technological development. In consequence the ideas, projects, institutions that are created in an attempt to strengthen those disciplines are going to be very relevant for the progress of the American nations.

### ***The Future of IACME***

The Interamerican Conferences on Mathematics Education have been for more than thirty years an extraordinary medium for strengthening mathematics education throughout the region, not only by sharing experiences and stimulating dreams, but also by establishing links with international communities concerned with mathematics and its teaching. The significant national and international participation that

was achieved in the last Conference, in Santiago, Chile, as well as the high quality of the meeting, are a sample of IACME's expectations and responsibilities in the new historical order. With our eyes on the new millennium, the IACME can, without a doubt, be a first class instrument in Mathematics Education.

The valuable possibilities that the Conferences have opened in knowledge and in the international social world should continue to be vigorous realities that contribute to knowledge and education, and that promote progress and the quality of life in the region.

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## Notes

<sup>1</sup> This paper is based on the book: *The history of the Interamerican Committee on Mathematics Education*, written by A. Ruiz and H. Barrantes (School of Mathematics of the University of Costa Rica). The Spanish and English versions have been published by the Colombian Academy of Exact, Physical, and Natural Sciences. Patrick Scott did the translation to English; Edward Jacobsen and Eduardo Luna made the technical revision. See also, Ruíz (1992).

<sup>2</sup> Moon (1986) points out that "the case studies demonstrate that one interest group appears to have been particularly influential in the early years of reform. The impact of university mathematicians, notably those advocating a "bourbakist" reform of the school curriculum, is demonstrated in each country" (p. 216). Moon is referring to France, Holland, England, Germany, and Denmark.

<sup>3</sup> Some with certain links to government (Moon, 1986, p. 198)

<sup>4</sup> Some of the most important reformers in Europe were Bauersfeld in Germany, Christiansen in Denmark, Freudenthal in Holland, Picard in France, and Matthews in England. Only Matthews did not come from a university.

<sup>5</sup> In the US there was a concerted effort directed by mathematicians. E. G. Begle was named to direct the School Mathematics Study Group (SMSG) supported by the American Mathematical Society, the Mathematics Association of America, and the National Council of Teachers of Mathematics (Moon, 1986, p. 46).

<sup>6</sup> The case of Costa Rica is interesting because the reform appeared in official programs beginning in 1964. This was due to a special situation: The Costa Rican educational system experienced a reform in the early 60s; Dr. Alfaro-Sagot took advantage of the situation and introduced the main aspects of the New Math movement. Alfaro himself wrote the first textbooks with the new focus, although it should be pointed out that he abandoned completely all the intuitive aspects and any relation to physics.

<sup>7</sup> The process of preparing mathematics teachers in Latin America was developed, essentially, in the 70s. Bourbakian paradigms and rationalist philosophies dominated this process. It is necessary to take into account this situation when delineating future plans.

<sup>8</sup> Many of them contributed to create a distance between mathematics and mathematics education, as well as between mathematics and the other sciences.

<sup>9</sup> Of course, on the international level a mathematics textbook industry was generated, provoking an extraordinary socialization to the new mathematics.

<sup>10</sup> See Fehr (1962), p. 184.

<sup>11</sup> The reform influx into Latin America benefited from a particular experience in Chile, Argentina and Uruguay that can be symbolized by the creation of the Consejo Latinoamericano de Matemáticas e Informática (CLAMI). The special relationship of Argentinean intellectuals with Europe facilitated—in particular—the special intervention of the Bourbaki group in Latin America. Dieudonné himself taught a course for several months in Buenos Aires to young mathematicians who came from various parts of South America and who were influential professionals in Latin American mathematics. IACME was not the only route traveled by Bourbaki ideology on its way to Latin America.

<sup>12</sup> Some affirm that the zenith of the reform was the meeting in Lyon, ICME of 1969, and that the beginning of the new era was in Exeter, ICME of 1972.

<sup>13</sup> The process of professionalization of mathematics education in Latin America still has a long road to travel; much in the same way that research still requires significant impulse. This is a key, yet difficult, matter to accomplish given the weakness of the systems of science and technology and of higher education.

<sup>14</sup> But, besides, this double process of professionalization and research in mathematics education can be seen as well apart from the IACME. For example, there have already been eight *Central American and Caribbean Meetings of Teachers and Researchers in Educational Mathematics*; and in August of 1994 there was great success with the *Second Iberoamerican Congress of Mathematics Education* in Blumenau, Brazil.

<sup>15</sup> The use of microcomputers and special calculators in the teaching of mathematics has served as a lifesaver for many groups of ex-reformers and institutes after they lost their financial and institutional backing in the 70s. This needs to be said. But it is not bad. It has helped (or will help) to accelerate the transition towards the new mathematics education. But what is more important is the historical sense of computing and informatics. It is not a matter here to point out common places, but to extract practical conclusions. The development of informatics and of the technology of electronic computing has created a foundation for a substantial cognitive revolution throughout the planet. The new rhythms of processing, communication and ordering of information will substantially modify all of the processes that are linked to culture and education in the next decades. As mathematics educators we do not want to just "suffer it," but to direct it in our field of action. The theme has been included in the conferences of IACME for quite a while; what we wish to emphasize is not just its importance, but also its historical and epistemological sense.