

# The Italian contribution to the International Commission on Mathematical Instruction from its founding to the 1950s

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## Abstract

*In my paper I will illustrate, also referring to unpublished documents, the Italian contribution to the activities of the International Commission on Mathematical Instruction (ICMI) from 1908 to the 1950s when the Commissione Italiana per l'Insegnamento Matematico, was created. I will focus on: the role of Guido Castelnuovo in the earliest period; the ICMI's influence on academic policies and school reforms in Italy; the dissolution of ICMI following World War I and the Italian side of the story; the political role of Salvatore Pincherle in re-establishing international collaboration in 1928; the birth of the Italian Commission for Mathematics Teaching and the role of Guido Ascoli.*

## Introduction

The origins of the Italian Commission for Mathematics Teaching<sup>1</sup> are linked to the founding of the International Commission on the Teaching of Mathematics (French, *Commission Internationale de l'Enseignement Mathématique*; German, *Internationale Mathematische Unterrichtskommission*; Italian, *Commissione internazionale dell'Insegnamento Matematico*), which, from the early 1950s on, was known as the International Commission on Mathematical Instruction (ICMI).<sup>2</sup> Constituted in Rome during the fourth International Congress of Mathematicians (ICM IV, 6-11 April 1908), its first president was Felix Klein, well-known for his important reforms in the teaching of mathematics in Germany. The initial aim of the commission was to promote inquiries and publish general reports on the principal trends in mathematics teaching in various countries. Klein was the driving force and inspiration for the entire first period, and his objectives concerning education were essentially the following: to bridge the gap between secondary and university teaching; to create closer relationships between pure mathematicians and those working on applications; and to emphasize elementary mathematics from an advanced standpoint in teacher training.

Eighteen countries from all over the world joined the new commission, including Italy, which was one of the “major” countries with three delegates:

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<sup>1</sup> As it currently stands, the *Commissione Italiana per l'Insegnamento della Matematica* (CIIM) is a permanent commission of Italian Mathematical Union, independent of ICMI, but as stated in Article I of its Regulations, it carries on with the work of the former Commission whose history is discussed here. The acronym CIIM now used is the same one introduced starting from 1963 to indicate the old.

<sup>2</sup> For simplicity's sake in what follows we will adopt the acronym ICMI used today.

Bjarnadóttir, K., Furinghetti, F., & Schubring, G. (Eds.) (2009). “Dig where you stand”. *Proceedings of the conference “On-going research in the History of Mathematics Education”*.

Guido Castelnuovo (1865-1952), Giovanni Vailati (1863-1909) and Federigo Enriques (1871-1946). The choice of Castelnuovo and Enriques as delegates was pretty much a given: the Italian school of algebraic geometry that Castelnuovo and Enriques were both part of was known and esteemed the world over, and, above all, both were in agreement with Klein's way of conceiving research as well as mathematics teaching. Vailati, who represented secondary school teachers, was also a natural choice, because at that time he was involved in the project to reform Italian secondary schools, and Klein was one of his main points of reference.

Section IV of the 1908 ICM, dedicated to *Philosophic, Historic, and Educational Issues*, was much richer than in previous congresses, and presented topics that would concern ICMI for years to come: the syllabuses for mathematics of various types of schools in different countries; methods for teaching geometry; the relationship between intuition and rigour, etc. The section was carefully prepared by Vailati with the advice of Gino Loria (1862-1954), as shown by two unpublished letters by Castelnuovo, the Secretary general of the congress, and David Eugene Smith,<sup>3</sup> who had been the first to suggest setting up an international Commission to study problems pertaining to mathematics teaching. In his letter to Loria, Smith declared: "It seems to me that a pedagogical section should devote its energies to the larger questions of mathematical education, leaving the small details for discussion by associations of less importance". The presentations regarding the teaching of mathematics were thirteen,<sup>4</sup> many more than what Castelnuovo had expected, and the speakers included mathematicians known internationally for their commitment to education. This can be considered ideally as the starting point of the work of the Italian Commission for Mathematics Teaching. Its history up to the 1950s reflects the successive vicissitudes of ICMI, so it is worthwhile to mention very briefly the principal phases that ICMI went through in its century of activity, phases that were partly determined by external factors, and partly by changing focuses of interest and activities.<sup>5</sup>

During the first phase, justly called the "Klein Era", an important international network of national sub-commissions was established for the preparation of reports on the state of mathematical instruction as well as on thematic issues. Following World War I there was a serious crisis, which finally resulted in the dissolution of the Commission in 1920-1921. ICMI was reconstituted in 1928 in Bologna during ICM VIII, but was not able to produce new ideas and projects, and was limited to carrying out the old agenda, until World War II forced a second

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<sup>3</sup> Cf. G. Castelnuovo to G. Vailati, February 16, 1907, and D. E. Smith to G. Loria, January 12, 1906, *Fondo Vailati*, Library of Philosophy, University of Milan.

<sup>4</sup> Proceedings 1909, III, pp. 371-579. During the Congress seven daily bulletins, which carried news about the congress in real time were published; summaries, sometimes quite detailed, appeared in the major journals for teachers, with ample space given to the presentations of Section IV: cf. for example *Il Bollettino di Matematica*, 1908, pp. 86-127; *Periodico di Matematica*. 1908, pp. 241-272.

<sup>5</sup> See the website (Furinghetti & Giacardi, 2008), where the most significant events in the history of ICMI and the key figures are delineated through documents, images and interviews; see also the article by Bernard Hodgson in this present volume.

arrest of activities. In 1952 in Rome ICMI was rebuilt as a permanent subcommission of IMU, its structure defined, and fruitful collaborations with other international organizations established (UNESCO, CIEAEM, OEEC), which led to a greater internationalism and to a broadening of the lines of research and new approaches to mathematics education. But the real ICMI renaissance began in the late 1960s. This phase was dominated by Hans Freudenthal, a charismatic figure whose broad mathematical knowledge was joined to a profound interest in culture. With his gift for organization and above all, his strongly independent spirit, he gave life to two initiatives that mark turning points in the history of ICMI, projecting it towards the future: the first International Congress on Mathematical Education (1969), which opened the door to a tradition that is still ongoing; and the founding of the new journal *Educational Studies in Mathematics* (1968), dedicated expressly to problems of teaching.

### **The earliest activities of the Italian sub-commission: the role of Castelnuovo**

The first official meetings of the Italian sub-commission of ICMI were held in Padua on 21 and 22 September 1909, on the occasion of the Congress of the *Associazione Matthesis*, an association of Italian mathematics teachers.<sup>6</sup> Enrico D'Ovidio, professor of geometry at the University of Torino and author of a successful geometry textbook for secondary schools, was nominated president, and Castelnuovo (University of Rome) secretary. The members of the commission were chosen from among both university professors with ample experience in education, and secondary school teachers. The three delegates to ICMI were Castelnuovo, Enriques (University of Bologna), and Gaetano Scorza (1876-1939, Istituto tecnico of Palermo), chosen to represent the secondary school teachers in place of Vailati, who had passed away the previous May.<sup>7</sup>

In the course of these first sessions, in keeping with the instructions of ICMI, a plan of activity was defined, assigning various members to report on mathematics teaching in the principal schools in Italy – primary and secondary –, on the mathematical training of engineers, on the preparation of future teachers and finally on the geometry textbooks for secondary schools.

Between 1911 and 1912 eleven reports were published, and the results of the work of the sub-commission were amply covered in the Italian principal journals dedicated to mathematics teaching, the *Bollettino della Matthesis*, *Il Bollettino di*

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<sup>6</sup> Cf. *L'Enseignement Mathématique* (from now on *EM*) 12, 1910, pp. 135-136.

<sup>7</sup> The other components were: S. Pincherle (University of Bologna); F. Severi (University of Padua and president of the *Associazione Matthesis*); C. Somigliana (University of Torino); G. Veronese (University of Padua); A. Conti (Scuola normale Margherita di Savoia, Rome, and director of *Il Bollettino di Matematica*); G. Fazzari (Liceo Umberto I, Palermo and director of the journal *Il Pitagora*); G. Lazzeri (Accademia navale, Livorno and director of *Periodico di Matematica*); U. Scarpis (Liceo Minghetti, Bologna).

*Matematica* and the *Periodico di Matematica*.<sup>8</sup> The particular attention given to the activities of ICMI is due to the fact that the president of the Mathesis Association was Castelnuovo, and the directors of the journals, A. Conti and G. Lazzeri, were members of the Italian sub-commission.

The reports of the Italian sub-commission were presented at the ICMI congresses of Milan (18-21 September 1911)<sup>9</sup> and Cambridge (21-27 August 1912)<sup>10</sup> and they offered a picture of Italian education system and the most lively debates. In particular, regarding the classical-humanistic schools the speakers lamented the fact that school legislation had relegated mathematics to a secondary status, with less than half of the number of hours allotted for Latin and Italian; regarding the technical institutes, they criticised above all the “double soul”, that is, the fact that these schools had, on the one hand, to prepare students for administrative jobs and, on the other, to prepare them for university studies. Further, there was criticism of the teaching method that tended towards exaggerated rigour or rigid purism, while little or nothing was done to orient secondary school teaching towards advanced teaching, nor to coordinate it with that of closely related sciences. Moreover the two dominant positions in the Italian debate on intuition versus rigour in the teaching of mathematics emerged clearly from these reports: that of Peano’s school of mathematical logic and that of the school of algebraic geometry. For example, Alessandro Padoa, who represented Peano’s school, stated that mathematics teaching in high schools has to be exclusively deductive. On the other hand, Scorza, member of the Italian school of algebraic geometry, condemned the “fanatic adorers of logical systems that are

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<sup>8</sup> In particular, from 1911 to 1914, the *Bollettino della Mathesis* published the supplement entitled *Atti della Sottocommissione italiana per l’insegnamento matematico* and from 1909 to 1914 *Il Bollettino di Matematica* dedicated space to the ICMI activities in the section devoted to congresses and sometimes in a special section dedicated expressly to the proceedings of the Italian sub-commission: *Atti della Sottocommissione Italiana della Commissione internazionale per l’insegnamento matematico*.

<sup>9</sup> Cf. Pincherle, S. (1911). Sugli studi per la laurea in Matematica e sulla sezione di matematica delle scuole di Magistero. *Bollettino della “Mathesis”. Supplemento. Atti della Sottocommissione italiana per l’insegnamento matematico*, a. III, pp. 1-14; Somigliana, C. (1911). Intorno all’ordinamento degli studi matematici nel primo biennio universitario in Italia. *Ibidem*, pp. 15-23; Scarpis, U. (1911). L’insegnamento della matematica nelle Scuole classiche. I. I successivi programmi dal 1867 al 1910. *Ibidem*, pp. 25-33; Fazzari, G. (1911). L’insegnamento delle matematiche nelle Scuole classiche. II. Critiche e proposte. *Ibidem*, pp. 35-48; Scorza, G. (1911). L’insegnamento della matematica nelle Scuole e negli Istituti tecnici. *Ibidem*, pp. 49-80. Cf. also *EM* 13, 1911, pp. 457-458; *EM* 14, 1912, pp. 249-253, pp. 416-420.

<sup>10</sup> Cf. Lazzeri, G. (1911a). L’insegnamento della matematica nelle scuole industriali, professionali e commerciali. *Bollettino della “Mathesis”. Supplemento. Atti della sottocommissione italiana per l’insegnamento matematico*, a. III, pp. 81-95 (the report on the industrial schools is signed by C. Ciamberlini); Lazzeri, G. (1911b). L’insegnamento della matematica nella R. Accademia Navale di Livorno e nella R. Accademia Militare di Torino. *Ibidem*, pp. 97-110; Conti, A. (1911a). L’insegnamento della matematica nelle Scuole Normali. *Ibidem*, pp. 111-178; Conti, A. (1911b). L’insegnamento della matematica nelle Scuole infantili ed elementari, *Ibidem*, pp. 179-214; Padoa, A. (1912). Osservazioni e proposte circa l’insegnamento della matematica nelle scuole elementari, medie e di magistero. *Ibidem*, pp. 215-234; Scorza, G. (1912). Sui libri di testo di geometria per le scuole secondarie superiori. *Ibidem*, pp. 235-247.

rigid and precise” (Scorza, 1911, p. 79), and maintained the importance of avoiding being dogmatic and harmonising the requirements of science with those of didactics, achieving a balance between rigour and intuition.

The true driving force behind the Italian sub-commission in this first phase was Castelnuovo. His commitment to education was inspired by a very precise idea of mathematics and manifested itself in various forms.<sup>11</sup> In his activities within the Italian sub-commission and as president of the Mathesis Association, he was able to establish important international contacts and promote an increased exchange of information on new movements for reform in Europe, in particular that proposed by Klein, whose methodological approach he wholeheartedly endorsed. He made the *Bollettino della Mathesis* the vehicle for presenting the work of ICMI and the Italian sub-commission, publishing summaries of the activities, translations of talks and lectures, inquiries and debates. In fact he wrote to Vacca:

Almost unexpectedly, and against my will, I have been elected president of the Mathesis. I accept the nomination only because I think that it might be helpful for the affairs of the Italian Commission for mathematics teaching, for which the Bulletin of the Math[esis] will become the publishing organ. I would like keep the level of the Bulletin high, reducing to a minimum the Byzantine discussions in which secondary teachers too often delight (G. Castelnuovo to G. Vacca, Rome, January 27, 1911, in (Nastasi & Scimone 1995, p. 46, my translation).

During the congress of the Mathesis Association in Padua (20-23 September 1909) just when the Italian sub-commission was getting started, Castelnuovo presented a report on the activities of ICMI, declaring that the Italian sub-commission shouldn't “occupy itself with statistical data alone; it should carry out an investigation in higher areas and deal with pedagogical and psychological questions” (Castelnuovo, 1909, p. 2), such as methods of teaching of mathematics, experimentation of new teaching programmes, teacher training, etc. Further, addressing teachers, Castelnuovo asked them to attempt the introduction in the schools of the fundamental notions of analytic geometry and infinitesimal calculus, as prescribed by Klein and as proposed by Vailati in the context of the project to reform secondary teaching (Castelnuovo, 1909, p. 3).

The first plenary meeting of ICMI took place in Italy in Milan from 18 to 21 September 1911 (*EM* 13, 1911, pp. 437-511). Two topics were proposed for discussion: the rigour in secondary school teaching and the teaching of mathematics to students of physical and natural sciences. Castelnuovo was charged with presenting the general report on the topic of rigour. In order to be able to compare the methods employed in the various countries, in his account he focuses on just one type of school – the high schools with a humanistic orientation – and just one area of mathematics – geometry. Taking a number of school textbooks as examples, Castelnuovo divides teaching methods up into the following kinds: A) the purely logical method (Peano, Hilbert, Halsted, etc.); B) methods based on

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<sup>11</sup> Cf. Giacardi, L. *Guido Castelnuovo*. In (Furinghetti & Giacardi, 2008).

empirical principles and logical development (Sannia-D'Ovidio, Veronese, Enriques-Amaldi, etc.); C) methods consisting in alternating and mixing intuitive and deductive considerations (Borel, etc.); D) the intuitive-experimental method (Perry, etc.). Then he observes that the national reports show that the Latin nations (Italy, France, French Switzerland) favour method B; the Germanic nations (Germany, Austria, German Switzerland) prefer method C. He also illustrated the evolution of the methods in the principal countries, and notes that, while in France, Germany and England there was movement towards methods where more space is given to intuition, in Italy the trend was inverted (*EM 13*, 1911, p. 463). During the discussion that followed Castelnuovo's presentation, a number of interesting comments were made – including those by Veronese and Enriques – that show not only how the debate on rigour vs. intuition was particularly lively in Italy, but also the various subtle differences present within each school of thought. (*EM 13*, 1911, pp. 464-468).

The ICMI congress held in Paris from 1 to 4 April 1914 (*EM 16*, 1914, pp. 165-226 and pp. 245-356) can be considered the first actual international congress on teaching of mathematics. Klein's ill health prevented him from attending, so he invited Castelnuovo to give the opening address in his stead, and they planned it together.<sup>12</sup> In his talk, among other things, Castelnuovo underlined how important it was that the mathematicians working in pure research also concern themselves with the problems related to teaching:

We are sometimes asked if the time that we dedicate to the questions of teaching might not have been put to better use in scientific research. Well, our answer is that it is social duty that forces us to treat these problems (Castelnuovo, 1914, p. 191, my translation).

The themes discussed during the congress reflected the main interests of Klein: the results obtained by the introduction of differential and integral calculus in the final years of high school; the place and role of mathematics in higher technical instruction. The general reports on these two topics were presented respectively by E. Beke and P. Staeckel, who collected and summarized the various national reports.<sup>13</sup> Castelnuovo prepared the report on the situation in Italy, illustrated the new syllabus for the *liceo moderno* that he had just designed,<sup>14</sup> and underlined how the fundamental concepts of infinitesimal calculus were generally introduced in a rigorous way in Italy (*EM 16*, 1914, p. 269 and p. 295). I only mention the thorough and lively discussion that followed the two reports because there were many comments by the members of the Italian group, once again reflecting the two points of view regarding the teaching method. For example, Padoa underlined the need to avoid infinitesimal pseudo-intuition: in fact, according to him, rigour does not exclude appeals to intuition, but does not permit such appeals to be made surreptitiously in the definitions and proofs. He further maintained that

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<sup>12</sup> Cf. G. Castelnuovo to F. Klein, Rome, March 3, 1914, in Niedersächsische Staats-und Universitätsbibliothek, Göttingen, *F. Klein* 51.

<sup>13</sup> For details see Giacardi, L. *Timeline* 1913-1921. In (Furinghetti & Giacardi, 2008).

<sup>14</sup> See the following section.

mathematics courses for engineers are certainly not to be distinguished from those for mathematicians by rigour (because without rigour there is no mathematics), but in the choice of topics treated. On the other hand, Castelnuovo asserted that the teacher must not give the illusion that rigour in theory is sufficient to carry the results over to applications because a wide gulf separates theory and practice. (*EM 16*, 1914, pp. 298-302 and pp. 335-356).

Thus we can see that the role of the Italian sub-commission in the Paris congress was not at all a secondary one, above all thanks to Castelnuovo, who was not only esteemed as a mathematician, but also had a vision of mathematics teaching that was very close to that of Klein, and a strong democratic spirit. This attitude had led him from the very beginning to involve secondary school teachers, as well as mathematicians like Vailati and Padoa, whose point of view differed from his own in many ways, but who shared his profound and sincere interest in problems of education.

### **Influences on academic policies and Italian schools**

The earliest activities of ICMI had an obvious influence on education in Italy, with Castelnuovo as intermediary, supported by a very active group of mathematicians, such as Enriques, Fano, Padoa and Loria, but also significant was the contribution of secondary school teachers. This isn't so surprising; in fact at that time the best secondary school teachers often also held classes at the university, and university professors often began their careers teaching in secondary schools. This fostered dialogue between the two.

First of all, there was a notable increase in the spread of information regarding school reforms in the various member countries of ICMI. In particular, Klein's views on education inspired some modifications of the syllabuses and influenced the debates on teaching methods and the problem of teacher training.

In 1911 the minister for education Luigi Credaro instituted the *liceo moderno*, a new kind of high school where Greek was substituted by a modern language (German or English), scientific subjects were amply developed, and elements of the economic and juridical sciences were added. Castelnuovo designed the syllabus for mathematics,<sup>15</sup> introducing into it the notion of function and the concepts of derivative and integral, and further, placing more emphasis on numerical approximations and applications. The adherence to Klein's ideas is evident.

The entire programme for the third congress of the Mathesis Association, which took place in Genoa on 21-24 October 1912, also strongly reflected the influence of Klein. This is clear in the topic to be debated: "Ordering of the scientific and technical studies that lead to an engineering degree". In his opening talk on "The School in relation to life and to modern science" (Castelnuovo, 1913), Castelnuovo reiterated the basic points of his vision of mathematics teaching:

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<sup>15</sup> Cf. Ginnasio - Liceo Moderno. Orario - Istruzioni - Programmi. *Bollettino Ufficiale del Ministero dell'Istruzione Pubblica*, XL, 45, 30 ottobre 1913, pp. 2791-2795, now in <http://www.subalpinamathesis.unito.it/storiains/uk/liceomod.pdf>. See also Loria, 1914.

avoid excessive specialisation; break down the barriers between the various observational sciences; support theory with experience; don't mistrust approximations; bring theory closer to applications. One of the plenary lectures, that of Vincenzo Reina, professor of Geodesy at the School of Engineering in Rome, was dedicated to "mathematics of precision" and "mathematics of approximation" (Reina, 1913), a topic particularly appreciated by Klein.

The influence of the international contacts favoured by ICMI can be also perceived in the sector of teacher training, a topic that was the object of debate at many of the congresses and meetings of the Mathesis Association.<sup>16</sup> There were different points of view, but the importance of elementary mathematics from an advanced standpoint in the training of future teachers was generally upheld, in keeping with Klein's ideas. It was precisely from this perspective that Enriques published the collection *Questioni riguardanti le matematiche elementari* (1912-1914), and, during the congress of the Mathesis Association in Padua (1909) Roberto Bonola presented the project for an encyclopaedia of elementary mathematics expressly aimed at mathematics teachers and students of the *Scuole di Magistero*.<sup>17</sup> Besides, courses devoted to elementary mathematics from an advanced standpoint started to spread in Italian universities; suffice it to mention those by Segre in Torino, Enriques in Bologna, Castelnuovo in Rome, and Scorza in Naples.<sup>18</sup>

## The period between the two World Wars: The Italian side of the story

### *Fascist dictatorship and the frustration of the Italian sub-commission*

On 20 September 1920 the International Mathematical Union (IMU) was constituted, and for political reasons, the former Central Powers were excluded, and were not allowed to participate at ICM VI held immediately afterwards, in Strasbourg (22-30 September 1920). During the congress the mandate of ICMI was not renewed.<sup>19</sup> The new conditions imposed on official international scientific relations forced international commissions or associations created before the war to either dissolve or reorganize. ICMI was dissolved, but national sub-commissions were, however, permitted to continue with their work. As Klein wrote to Enriques<sup>20</sup> allowing the national network to survive was a positive decision taken by the old Central Committee.

In connection with international events, the Italian Mathematical Union was constituted in 1922, with Salvatore Pincherle, professor at the University of

<sup>16</sup> See *Mathesis' Congresses*, in <http://www.subalpinamathesis.unito.it/storiains/uk/congresses.php>.

<sup>17</sup> The project was finally carried out only in the 1930s, but it is in any case indicative of the spread of Klein's ideas in Italy.

<sup>18</sup> Cf. for example (Giacardi, 2003) and (Gario, 2006); cf. also *Bollettino della Unione Matematica Italiana* (from now on *BUMI*) 1, 1922, p. 35 and 2, 1923, p. 116.

<sup>19</sup> The reasons underlying the crisis in ICMI which led to its dissolution, have recently been made clear: cf. (Schubring 2008, pp. 15-27).

<sup>20</sup> F. Klein to F. Enriques, Göttingen, August 13, 1920 in Niedersächsische Staats-und Universitätsbibliothek, Göttingen, *F. Klein* 51.



Bologna, as its first president. His statement regarding international collaboration in the programme of the Italian Mathematical Union clearly contrasted with that of IMU:

From now on, we can and must firmly hope that, the echoes of the world conflagration having died away, the International Union shall fully live up to its name, gathering, in a not distant future, the cultivators of the exact science from all over the world: this is one of the vows of the *Unione Matematica Italiana* (Pincherle, 1922, p. 1, my translation).

In that same year, following the march on Rome, Benito Mussolini became head of the Italian government and the Fascist dictatorship began. In 1923, in the space of a single year, Giovanni Gentile, minister for education, put into effect a complete and systematic reform of the Italian school system in keeping with a neo-idealist philosophy. Secondary education was divided into two branches: classical-humanistic and technical-scientific. The classical-humanistic one was intended to train the ruling class and was considered overwhelmingly superior to the scientific-technical one. The sciences were strongly penalized. Protests were of no avail: not those of the mathematicians; not those of the Mathesis Association and its president Enriques; not those of the Accademia dei Lincei, which expressed its dissent in a report edited by Castelnuovo.<sup>21</sup>

It was this reform and the fascist dictatorship, even more than World War I, that marked a caesura in the activities of the Italian sub-commission, which saw its efforts annihilated. Invited to collaborate in the design of the syllabuses, Castelnuovo refused and was replaced by the ICMI delegate Scorza, who tried to follow the tenets which up to then had inspired the activities of ICMI and the Italian sub-commission. In the newly instituted scientific lyceum, he maintained the teaching of some elements of differential and integral calculus, but he was constrained by the general vision of the reform, which did not recognise in mathematics and the sciences the educational value that he personally strongly believed in.<sup>22</sup>

### *Salvatore Pincherle and the re-establishment of international collaboration*

In 1928, once again an Italian city – this time Bologna – was the theatre for important events. It was here that ICM VIII took place from 3 to 10 September 1928.<sup>23</sup> The congress was organised by the Italian Mathematical Union, whose president, Pincherle, had been nominated president of the International Mathematical Union four years earlier in Toronto. The mathematicians participating in the work of the congress numbered 836 and came from 36 countries, without any of the previous restrictions due to political reasons. In particular, Pincherle, in the name of scientific internationalism, allowed the

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<sup>21</sup> For further details cf. (Giacardi, 2006a, pp. 608-613).

<sup>22</sup> Cf. Giacardi, L. *Gaetano Scorza*, in (Furinghetti & Giacardi, 2008).

<sup>23</sup> Cf. *EM* 27, 1928, pp. 326-327; *BUMI VII.4*, 1928, pp. 221-228, 266-284; *Il Bollettino di matematica*, 1928, pp. 142-160; (Proceedings 1929-1932).

participation of the Germans, even if they had not joined the International Research Council (IRC), thus violating one of the rules of the IMU. To obtain the support of other countries, Pincherle wrote dozens of letters and succeeded in garnering the support of the United States, England, Denmark, Sweden and Holland. He wrote to Emile Picard, president of the IRC:

The world's state of mind is no longer the same as it was following the time of the war; the reasons that were influential at that time, are no longer shared by many young scientists [...]. The weighty correspondence I have been obliged to carry on for two years has given me the most evident proof of this. Holland, Denmark, Sweden, the most authoritative groups of England and the United States have made it known to me very clearly that a Congress that is not international in the broadest sense of the word, would result in a general abstention on their part. Such is the viewpoint of the large majority of my Italian colleagues as well (Proceedings 1929-1932, I, p. 8, my translation).

Picard remained however, decidedly in opposition, and Gabriel Koenigs, secretary general of the IMU, wanted the regulations to be applied to the letter, excluding the countries who were not members of the IRC. Paradoxically, there was also a group of Germans which tried to boycott the Bologna Congress, but David Hilbert openly opposed them, upholding scientific internationalism (Reid, 1970, p. 188). The General Assembly of the IMU, which took place unofficially because Koenigs refused to convene it (nor had he sent the minutes of the previous Assembly in Toronto), unanimously approved what the president had done, but Pincherle, aware that he had not respected IMU rules, handed in his “absolutely irrevocable” resignation from the role of President (Proceedings 1929-1932, I, p. 83). Nevertheless he had played an important role in re-establishing international scientific collaboration.

### *From the ephemeral rebirth in 1928 to the second forced interruption for World War II*

During the congress in Bologna ICMI was reconstituted, and former members of it were recalled to serve in the new Central Committee. Smith was elected as the President, Castelnuovo and Jacques Hadamard were the two Vice-Presidents (Proceedings 1929-1932, I, p. 113). This rebirth, however, was short-lived because the reinstated working group was incapable of producing new ideas and limited itself to finishing up projects that had already been started.

Between 1929 and 1933 the reports of the various countries on the modifications made in mathematics teaching since 1910, and on the training of mathematics teachers were published in *L'Enseignement Mathématique*.

The Italian reports provide a picture, though somewhat mitigated, on the situation in Italy after the school reform. Enriques' account (Enriques, 1929) of the Gentile Reform appears less critical than might be expected: he limits himself to pointing out the reduction in the number of the hours devoted to mathematics, and the unsolved problem of teacher training. Instead, he gives ample space to the flourishing of new textbooks, remarking in particular two series, one directed by

Roberto Marcolongo and Onorato Niccoletti, the other by Francesco Severi. He also presents his many initiatives aimed at teacher training: in addition to the collection dedicated to elementary mathematics, *Questioni riguardanti le matematiche elementari*, of which the second edition had just been published, he cites the school for specialisation in history of the sciences annexed to the *Istituto Nazionale per la Storia delle Scienze*, which he had created after the reform, and the book series on the history of mathematics, *Per la storia e la filosofia delle matematiche*, which he began in 1925 and which was expressly intended for teacher training. Equally veiled are the criticisms of the Gentile reform on the part of Loria in his general report on the theoretical and practical training of mathematics teachers for secondary schools (Loria, 1933). The national report prepared by the ministerial supervisor Alfredo Perna (Perna, 1933) on teacher training in Italy, appears to be the least ambiguous; in fact, it lists the institutional shortcomings in this area: there were no institutions for professional teacher training; there were no courses on methodology and pedagogy at the universities; there were no scholarships designated for teacher training; life-long learning was not compulsory, training courses for in-service teachers were left up to individuals.

During this period the situation of the Italian sub-commission clearly reflects both the disorientation within ICMI and the political situation in Italy. It did not undertake collective and coordinated activities as it had in the previous period, rather, it was up to individual members to promote initiatives aimed at improving mathematics teaching, which had been undermined by the Gentile Reform. In addition, in 1938 Castelnuovo and Enriques were targeted by the race laws and in 1939 Scorza died. Opposition to the reform had reached its acme in 1925, when after protests by the Mathesis Association and the *Accademia dei Lincei*, the faculties of sciences of Naples, Bologna, Milan, Rome, Genoa, Florence and Pavia were joined by other science associations in expressing their dissent, albeit in different ways.<sup>24</sup> Later, in the face of a lack of interest on the part of the government, there grew first a feeling of frustration, then resignation and adaptation, clearly seen in the meetings of the Mathesis Association. Since there was no possibility of influencing syllabuses and school organisation, instead there flourished debates and projects intended to improve scientific teaching.

In 1936 during ICM X in Oslo, ICMI decided to confer the title of *Honorary Member* on nine mathematicians in recognition of their commitment to education. Three of them were Italian: Castelnuovo (Rome), Enriques (Rome) and Loria (Genoa) (Proceedings 1937, II, p. 289).

World War II once again brought the activities of the international scientific commissions to a halt, including those of IMU and ICMI.

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<sup>24</sup> *Periodico di Matematiche*, 4, 1925, pp. 202-204, and pp. 205-219.

## ICMI as a permanent sub-commission of IMU and the birth of the *Commissione Italiana per l'Insegnamento Matematico*

### *The birth of the Italian Commission for Mathematics Teaching*

At the end of the War a new phase in the history of ICMI began. IMU was reconstituted in 1950 and its First General Assembly took place in the richly decorated Renaissance Villa Farnesina in Rome on March 6-8 1952. During the Assembly the new Executive Committee of IMU was elected with Marshall Stone as president and Enrico Bompiani as secretary. Bompiani was the exiting president of the Italian Mathematical Union and professor of geometry at the University of Rome.

During the Rome Assembly ICMI was transformed into a permanent sub-commission of IMU while maintaining its original aims. The president for the period 1952-1954 was Albert Châtelet, but it was secretary Heinrich Behnke, who would become the next president, who was actually behind the reconstitution, as archival documents attest.<sup>25</sup> On 21 February 1953 Guido Ascoli was designated treasurer of ICMI.<sup>26</sup>

At ICMI's request, each member country nominated a national sub-commission that would cooperate in the activities of the ICMI delegates. The *Sottocommissione italiana per l'Insegnamento della Matematica* was constituted in Bologna on 28 March 1954 on the occasion of the meeting of the Scientific Commission of the Italian Mathematical Union. It was composed of Ascoli (Torino); Vincenzo Amato (Catania); Luigi Amerio (Milan); Pietro Buzano (Torino); Oscar Chisini (Milan), president of the Mathesis Association; Ugo Cassina (Milan); Francesco Cecioni (Pisa); Mario Villa (Bologna); and Guido Zappa (Florence).<sup>27</sup> None of the members of the former commission were still alive: Scorza and Enriques had passed away in 1939 and 1946 respectively; Castelnuovo had died in 1952 and Loria died in January of that very year, just two months before. The new members chosen by the board of the Italian Mathematical Union were all mathematicians active in scientific research, but who also shared an interest in education, as shown by the fact that almost all of them taught courses in "Complementary mathematics" aimed at the education of future teachers. In particular, Chisini had been a friend and collaborator of Enriques, Cassina had been a student of Peano, and Ascoli and Villa were actively involved in teacher training.

<sup>25</sup> See the *ICMI Archives* (cf. <http://www.icmihistory.unito.it/documents/archives5254.pdf>).

<sup>26</sup> Cf. G. Ascoli to E. Bompiani, April 23, 1953 (*ICMI Archives* 1952-54). Following a request from Behnke for an Italian representative in ICMI, Ascoli had been nominated for that role by the Office of the President of the Italian Mathematical Union on 7 January 1953, cf. *BUMI* 3, VIII, 1953, p. 96.

<sup>27</sup> *BUMI* 3, IX, 1954, 216. The commission met for the first time on that very day, and in accordance with the Office of the President of the Italian Mathematical Union, Luigi Campedelli (Florence) was brought on board. On 2 October 1954 (*BUMI* IX, 1954, p. 468) were added Luigi Brusotti (Pavia), the new president of the Mathesis Association, and Dario Graffi (Bologna). On 24 April 1957 (*BUMI* XII, 1957, p. 335) they were joined by Giovanni Dantoni (Catania) and Vittorio Galafassi (Pavia).

There were no secondary school teachers.

The first task that the commission had to face was the preparation of the report on the results of the two enquiries promoted by ICMI on mathematical instruction for students between 16 and 21 years of age and the role of mathematics and the mathematician in contemporary life for ICM XII, which was to take place the following summer in Amsterdam. The first report was assigned to Villa, and the second to Ascoli; both were published in their entirety in *L'Enseignement Mathématique*.<sup>28</sup> Villa's presentation offered a detailed description of the Italian high schools and the first two years of university, highlighting the defects and not sparing criticism of the Gentile Reform. In his report, about which I will say more below, Ascoli illustrated the social, educational and moral role of mathematics.

Following the Amsterdam congress Behnke, the newly elected ICMI president, invited the national sub-commissions to designate their delegates. Ascoli had been nominated as one of the member at-large (*EM* 40, 1951-1954, p. 91), and on 2 October 1954 the Office of the President of the Italian Mathematical Union submitted the selection of Brusotti and Villa as ICMI delegates to the Italian Committee of the IMU for approval: the proposal was accepted.<sup>29</sup> In fact, according to the *Terms of Reference* introduced for governing the activities of ICMI during the IMU General Assembly in The Hague (31 August - 1 September 1954), the entities proposed for this nomination were the individual national committees of IMU, who thus retained control over each sub-commission.<sup>30</sup>

The Italian Commission for Mathematics Teaching officially began to function on 17 April 1955 when the first official meeting was held in Bologna with Ascoli as president and Buzano, as secretary (Verbale, 1955).

### *Guido Ascoli's presidency*

As was often the case at that time, Ascoli (1887–1957) taught in various secondary schools throughout Italy (Spoleto, Cagliari, Caserta, Florence, Parma, Torino) before finally obtaining a chair in analysis at the University of Pisa in 1932. In 1948 he transferred to the University of Torino to hold the chair of Complementary mathematics. Here, in 1950, he re-established the Torino section of the Mathesis Association, breathing new life into it, and created a post-university programme of specialization aimed at new graduates who had to face the competitions for teaching positions in secondary schools.<sup>31</sup> His objectives were: to offer young people a wide choice of complementary subjects, so as to encourage the collaboration between mathematicians and other specialists (Ascoli, 1955, pp. 76-77); to consider questions regarding the foundations, instilling respect not so much for rigour in the details, but above all rigour in the logical ordering of

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<sup>28</sup> Cf. *EM* 2, 1956, pp. 172-216 and Ascoli 1955; cf. also Proceedings 1954-1957, I, pp. 543-544.

<sup>29</sup> Cf. G. Sansone to E. Bompiani, 21 January, 1955 (*ICMI Archives*, 1955-57); *BUMI* 3, IX, 1954, p. 468; *BUMI* 3, X, 1955, p. 121 and p. 131.

<sup>30</sup> See Giacardi, L. *Timeline* 1937-1954. In (Furinghetti & Giacardi, 2008).

<sup>31</sup> For further details see Giacardi, L. *Guido Ascoli*. In (Furinghetti & Giacardi, 2008).

the theories (Ascoli, 1913, p. VI); and to present elementary mathematics from an advanced standpoint:

elementary mathematics is a “ground floor” whose structure can only be appreciated if one goes down into the basement to study its foundation, and then ascends to the upper floors, where it is possible to understand the stylistic unity of the edifice, investigating the functionality of all of its parts: how it was built, why it was built, and what function it is meant to serve (Ascoli, 1956, p. 25, my translation).

Ascoli’s first contribution as a member of ICMI was the report that he presented to the ICM in Amsterdam on the role of mathematics and the mathematician in contemporary life. With Buzano’s help he prepared a questionnaire that adapted the one sent by ICMI<sup>32</sup> to fit the Italian situation, and sent it to engineers, chemists, physicists, actuaries, biologists and mathematicians, gathering the responses in order to prepare his report.<sup>33</sup> Along with the questionnaire Ascoli sent a letter in which he briefly explained the objectives of the enquiry. For example, in a letter to Giulio Natta, who ten years later would receive a Nobel prize for chemistry, he wrote:

[...] we are to indicate which tasks, aside from teaching and disinterested – but not because of this uninteresting – research, can be entrusted to mathematicians today for the benefit of applied sciences, technology, industry; which jobs, in short, a well-organized society might have to offer to those with degrees in mathematics who are well equipped with intelligence, initiative and culture. This is a question of great relevance to us, at a time when valid young people are deserting the studies of mathematics because of the too miserable prospects offered by secondary teaching [...] (G. Ascoli to G. Natta, Torino, January 5, 1953, *Ascoli Family Private Archives*, my translation).

Ascoli’s talk at the Amsterdam congress (Ascoli, 1955) was a presentation of the results that emerged from the questionnaires. He first illustrated some examples of applications of mathematics in science and industry. Next he briefly discussed mathematics teaching in Italy for non-mathematicians (physicists, engineers, chemists, etc.) and then presented the opinion of the non-mathematicians as to a possible collaboration with pure mathematicians. He

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<sup>32</sup> *EM* 2, 1955, pp. 110-111.

<sup>33</sup> This preparatory work is documented in the correspondence held in the *Ascoli Family Private Archives*. These contain the drafts of some of the letters sent by Ascoli and the responses to the questionnaires that were received from R. Bruschi (engineer), G. Bono (engineer, FIAT), G. Gabrielli (aeronautic engineer, Torino), M. Marchisio (engineer, FIAT, patent office), A. Terracini (mathematician, Torino), R. Rigamonti (chemist, Torino), R. Giovannozzi (mechanical engineer, Torino), A. Cavallari Murat (civil engineer, Torino), F. Tricomi (mathematician, Torino), E. Perucca (physicist, Torino), G. Albenga (civil engineer, Torino), C. Codegone (physicist, Torino). Four other responses to the questionnaire have signatures that are illegible. The correspondence shows that Ascoli was also in contact with G. Natta (Milano) for chemistry; R. d’Addario (Rome) and B. de Finetti (Rome) for statistics and actuarial sciences; R. Sartori (Torino) for electrotechnical sciences; and C. Ferrari (Torino) for aerodynamics. However, their responses to the questionnaires cannot be found.

concluded his talk by underlining the educational value of mathematics and the importance of the mathematical “forma mentis” in moral sciences and human relations as well.

From the responses to the questionnaire we can see that the non-mathematicians consider collaboration with mathematicians to be useful only in the case of questions that are particularly difficult, both because industry often requires that its projects be kept secret, and because they believe that such a collaboration can be successful only if the mathematician is also well-versed in the area he is asked to collaborate in. More than anything, the mathematician’s critical outlook and the requirement of rigour lead to diffidence on the part of the non-mathematicians. It is also worthwhile to observe that the majority of the responses indicate that mathematics teaching at the secondary level was generally considered to be adequate, but someone criticized the scarce room given to applications, and reproached teachers “for reducing mathematics to a dry exercise in logic” (*Ascoli Family Private Archives*).

At that time, mathematical instruction in Italy was still profoundly influenced by the Gentile Reform: teaching of humanities was excellent, but it prevailed too much over that of the scientific subjects, which had suffered a consistent and gradual deterioration, partly because of the combined teaching of mathematics and physics in secondary school education.<sup>34</sup>

This topic was widely debated in Italy, and was one of the subjects proposed for reflection by Ascoli during his presidency of the Italian Commission (Verbale, 1955). He himself contributed to discussion, presenting a report on 8 January 1955. At the time of the Gentile Reform, he had supported the combined teaching of mathematics and physics even while “deploring the illogical, illegal and oppressive way that it had been applied” because he had seen it as the “ideal antidote” to the tendency to present knowledge that was fossilised and “to parrot old things or logical trifles”.<sup>35</sup> Now the results of this separation and his personal teaching experiences had led him to change his ideas: “knowledge of geometry is very poor, that of infinitesimal calculus is uncertain, and there is no interest at all for questions about the foundations of mathematics [...]. Since it has been confirmed that knowledge is not made from two lacks of knowledge, we can only go back to the old ways” (Ascoli, 1955, p. 76, my translation). This topic was intimately connected to the problem of teacher training, of great concern to Ascoli, who also expressed his hopes that the “useless” mixed degree in mathematics and physics, created in 1921 by O. M. Corbino to qualify young people to teach scientific subjects, would be abolished.<sup>36</sup>

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<sup>34</sup>A depiction of mathematical instruction in Italy at that time can be found, for example in (Segre, 1954) and (Bompiani 1956).

<sup>35</sup> *BUMI* 3, X, 1955, p. 124 and (Ascoli, 1955, p. 75).

<sup>36</sup> Although the debate in the years that followed was quite lively, the mixed degree in mathematics and physics was finally abolished only in 1961.

Meanwhile, contact with what was happening abroad was maintained by means of participation in international congresses. On 21-23 February 1955 an international congress on the teaching of mathematics took place in France at the *Centre international d'études pédagogiques de Sevrès*:<sup>37</sup> members of ICMI participated, and the Italian delegates were Mario Villa and Emma Castelnuovo, a teacher and one of the daughters of Guido Castelnuovo. She presented a report on the teaching of arithmetic, algebra and geometry in secondary schools.<sup>38</sup> Through lectures and reviews, Emma contributed to making the studies of Piaget on children's intelligence, and the pedagogical and educational research and experimentation of the CIEAEM (Commission Internationale pour l'Etude et l'Amélioration de l'Enseignement des Mathématiques), of which she was a founding member, known throughout Italy. She also presented – in Italy and abroad – the educational experiments that she herself conducted in class with her pupils, underlining the importance of an approach to teaching mathematics that was psychological, intuitive and constructive.<sup>39</sup> Emma was able to give a voice to the secondary school teachers in the field of research in education and she would become an Italian delegate to ICMI starting with the 1975-1978 term (*ICMI Bulletin* 1975, p. 10).

The last meeting of the Italian Commission for Mathematics Teaching over which Ascoli presided before his death took place in Torino on April 24, 1957. Ascoli's talk had the sound of a farewell speech (Verbale, 1957). He regretted that reasons of health had lately prevented him from adequately stimulating and directing the Commission's work. Concerned about its future he invited those present to think of someone to take his place as president, and suggested that the Commission be enlarged by including not only university professors, but secondary school teachers as well, because of their experience in the field. This last suggestion, however, was set aside.

Ascoli passed away a few days later, on 10 May 1957. The teachers would allowed to become part of the Italian Commission for Mathematics Teaching only in 1963, in accordance with by-laws.<sup>40</sup>

## Conclusion

In conclusion we can see that, in parallel with what took place in the history of ICMI, the first period of the Italian commission, from its founding up to World War I, was dominated by the charismatic personality of Castelnuovo, who was the intermediary between ICMI and the world of Italian schools, supported by a group of secondary school teachers and university professors who, in spite of occasional

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<sup>37</sup> The congress was organized by APMEP (Association des Professeurs de Mathématiques de l'Enseignement Public).

<sup>38</sup> *BUMI* 3, X, 1955, p. 128.

<sup>39</sup> See the article by Marta Menghini in this present volume.

<sup>40</sup> Statuto per la Commissione Italiana per l'Insegnamento Matematico approvato dalla C. S. il 15 dicembre 1963. *BUMI*, 3, XIX, 1964, pp. 83-84.



differences in point of view, worked together enthusiastically. In the period between the two World Wars, the activities of Italian sub-commission reflected both the ups and downs of ICMI and the political situation in Italy. It continued to operate only through some of its representatives, in particular Enriques, Scorza and Loria, but the role of the teachers gradually became increasingly less important. After ICMI was reconstituted in 1952, the national sub-commissions were gradually formed.

The Italian Commission for Mathematics Teaching began to function officially in 1955 with Guido Ascoli as its first president. At the basis of his commitment to improving the teaching of mathematics there was a synthesis of the methodological and pedagogical tenets of the two opposite schools of thought, that of mathematical logic (Peano, Vailati, etc.) and that of algebraic geometry (Segre, Castelnuovo, Enriques, Scorza, etc.), which had dominated during the first half of the century. The short mandate of Ascoli, interrupted by his premature death, marked the transition between the old and the new Italian Commission which would acquire a well-defined identity with the approval of the by-laws in 1963. Expertise in the sector of research in education would gradually become more important; further, Ascoli's goal of making the Commission the official interlocutor of the Ministry for Public Instruction regarding problems concerning mathematics teaching would become one of its most significant features.

## References

- Ascoli, G. (1913). *Complementi di Geometria per gli Istituti Tecnici*. Livorno: Giusti.
- Ascoli, G. (1955a). Sulla preparazione degli insegnanti delle scuole secondarie e sull'abbinamento della Matematica e della Fisica. *Bollettino della Unione Matematica Italiana*, 3, 10, 75-77.
- Ascoli, G. (1955b). La funzione della matematica e del matematico nella vita contemporanea. *L'Enseignement mathématique*, s. 2, 1, 179-187.
- Ascoli, G. (1956). Parole pronunziate dal Prof. Guido Ascoli, Presidente della Commissione italiana per l'insegnamento matematico. In *Atti della Società Italiana di scienze fisiche e matematiche "Mathesis" 1955* (pp. 23-26). Bologna: Zanichelli.
- Bompiani, E. (1956). Report on mathematical instruction in Italy. *The Mathematics Student*, 24, 111-145.
- Buzano, P. (1958). La Commissione Italiana per l'Insegnamento Matematico nei suoi primi quattro anni di attività (1955-1958). In *Atti della Società Italiana di scienze fisiche e matematiche "Mathesis" Anno 1958* (pp. 22-24). Bologna: Zanichelli.
- Castelnuovo, G. (1909). Sui lavori della Commissione Internazionale pel Congresso di Cambridge. In *Atti del II Congresso della "Mathesis" Società italiana di matematica, Padova 20-23 Settembre 1909* (Allegato F, pp. 1-4). Padova: Premiata Società Coop. Tipografica.
- Castelnuovo, G. (1913). La scuola nei suoi rapporti colla vita e colla Scienza moderna. In *Atti del III Congresso della Mathesis, Genova, 21-24 ottobre 1912*. (pp. 15-21). Roma: Coop. Tip. Manuzio.
- Castelnuovo, G. (1914). Discours de M. G. Castelnuovo. In *Compte Rendu de la Conférence internationale de l'enseignement mathématique, Paris, 1-4 avril 1914*. *L'Enseignement Mathématique* 16, 188-191.

- Enriques, F. (1929). Italia. Les modifications essentielles de l'enseignement mathématique dans les principaux pays depuis 1910. *L'Enseignement mathématique*, 28, 13-18.
- Furinghetti, F. & Giacardi, L. (2008). (Eds.). *The first century of the International Commission on Mathematical Instruction (1908-2008)*. <http://www.icmihistory.unito.it/>.
- Gario, P. (2006). Quali corsi per il futuro insegnante? I congressi dei professori di matematica. *Bollettino della Unione Matematica Italiana*, s. 8, IX-A, 483-497.
- Giacardi, L. (2003). Educare alla scoperta. Le lezioni di Corrado Segre alla Scuola di Magistero. *Bollettino dell'Unione Matematica Italiana*, s. 8, VI-A, 141-164.
- Giacardi, L. (2006a). From Euclid as Textbook to the Giovanni Gentile Reform (1867-1923). Problems, Methods and Debates in Mathematics Teaching in Italy. *Paedagogica Historica. International Journal of the History of Education*, 17, 587-613.
- Giacardi, L. (Ed.) (2006b). *Da Casati a Gentile. Momenti di storia dell'insegnamento secondario della matematica in Italia*. Pubblicazioni del Centro Studi Enriques, La Spezia: Agorà Edizioni.
- Loria, G. (1914). Les Gymnases-lycées "modernes" en Italie. *Zeitschrift für mathematischen und naturwissenschaftlichen Unterricht aller Schulgattungen*, 45, 188-193.
- Loria, G. (1933). La préparation théorique et pratique des professeurs de mathématiques de l'enseignement secondaire dans les divers pays. *L'Enseignement mathématique*, 32, 5-20.
- Nastasi, P. & Scimone, A. (Eds.) (1995). *Lettere a Giovanni Vacca*, Quaderni PRISTEM 5, Palermo.
- Perna, A. (1933). Preparazione dei candidati all'insegnamento della Matematica in Italia, *L'Enseignement Mathématique* 32, 245-254.
- Pincherle, S. (1922). Programma della "Unione Matematica Italiana. *Bollettino della Unione Matematica Italiana*, Numero specimen, 1-6.
- Proceedings (1909). *Atti del IV Congresso Internazionale dei Matematici, Roma, 6-11 aprile 1908*, 3 vols. (Ed. G. Castelnuovo), Rome: Accademia R. dei Lincei.
- Proceedings (1929-1932). *Atti del Congresso Internazionale dei matematici, Bologna 3-10 Settembre 1928*, 6 vols, Bologna: Zanichelli.
- Proceedings (1937). *Comptes rendus du Congrès International des Mathématiciens, Oslo 1936*, 2 vols. Oslo: Brøgers Boktrykkeri.
- Proceedings (1954-1957). *Proceedings of The International Congress of Mathematicians 1954 Amsterdam September 2 – September 9*, 3 vols., Groningen, Noordhoff - Amsterdam, North-Holland Publishing Co.
- Reid, C. (1970). *Hilbert*, New York: Springer-Verlag.
- Reina, V. (1913). Matematica di precisione e Matematica di approssimazione. In *Atti del III Congresso della Mathe-sis, Genova, 21-24 ottobre 1912* (pp. 28-48). Roma: Coop. Tip. Manuzio.
- Sansone, G. (1974). La Commissione Internazionale Insegnamento Matematico. "C.I.I.M.". Sottocommissione Italiana. *Bollettino della Unione Matematica Italiana*, 4, IX, 24-28.
- Schubring, G. (2008). The Origins and Early History of ICMI. *The International Journal for the History of Mathematics Education*, 3(2), 3-33.
- Segre, B. (1954). The teaching of mathematics in Italian schools. *The Mathematics Teacher*, 47, 162-166.
- Verbale (1955). Verbale della 1ª riunione della Commissione Italiana per l'insegnamento matematico indetta per il 17 aprile in Bologna. *Bollettino della Unione Matematica Italiana*, s. 3, X, 301-302.
- Verbale (1957). Verbale della 3ª riunione della Commissione Italiana per l'Insegnamento Matematico indetta del 24.4.1957 in Torino. *Bollettino della Unione Matematica Italiana*, s. 3, XII, 334-336.