Revista de História da Educação Matemática
HISTEMAT

ISSN: 2447-6447

Submetido: 06/06/2023
Aprovado: 06/06/2023

IDENTITY AND CULTURE IN DIDACTIC CHOICES MADE BY MATHEMATICS TEACHERS OF THE TRIESTE SECTION OF "MATHESIS"FROM 1918 TO 1923[1]

IDENTIDADE E CULTURA NAS ESCOLHAS DIDÁTICAS DOS PROFESSORES DE MATEMÁTICA DA SEÇÃO TRIESTE DA "MATHESIS" DE 1918 A 1923

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ABSTRACT

This study focuses on the work of the "Mathesis" Society, Section of Trieste (Italy), in the period of transition, in the region Venezia Giulia (now belonging to Italy, Slovenia, and Croatia), from the school regulations of the Habsburg Empire to the ones of the Kingdom of Italy (1918-1923). Before 1918, in the two countries the differences in math teaching methods and conceptions concerning education and curricula were considerable. The research, supported by documents of the Trieste Section of "Mathesis" hitherto not yet explored, shows that, in spite of their strong Italian feelings, the mathematics teachers of the Italian language secondary schools in Trieste, trained at the Austrian universities on the teaching methods proposed by Felix Klein, did not accept passively the changes enforced on school curricula, until the Gentile Reform (carried out by the first Fascist government) obliged them to.
Keywords: History of Mathematics Education. Mathematics Education. Secondary School. "Mathesis" Society. Venezia Giulia

RESUMO

Este estudo enfoca o trabalho da Sociedade "Mathesis", Seção de Trieste (Itália), no período de transição, na região Venezia Giulia (hoje pertencente à Itália, Eslovênia e Croácia), a partir dos regulamentos escolares dos Habsburgos Império aos do Reino da Itália (1918-1923). Antes de 1918, nos dois países, as diferenças nos métodos de ensino da matemática e nas concepções sobre educação e currículos eram consideráveis. A pesquisa, amparada por documentos da Seção Trieste de "Mathesis" até então não explorados, mostra que, apesar de seus fortes sentimentos italianos, os professores de matemática das escolas secundárias de língua italiana em Trieste, formados nas universidades austríacas pelos métodos propostos por Felix Klein, não aceitaram passivamente as mudanças impostas nos currículos escolares, até que a Reforma Gentile (realizada pelo primeiro governo fascista) os obrigou.
Palavras chave: História da Educação Matemática. Educação Matemática. Ensino Médio. Sociedade "Mathesis". Venezia Giulia.

[1] First published in: International Journal for the History of Mathematics Education, 2007. 2(2): 39-66.
This research has been approved by the CIRD (Centro Interdipartimentale di Ricerca Didattica) of the University of Trieste and partially supported by the Fondazione CRTrieste.
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INTRODUCTION

As history shows with several examples, mathematics teaching, including both methods and contents choices, is influenced by philosophical ideas and by political opinions. For this reason, a change of the political condition in a geographical area, due to a new establishment or to a deeper revolution such as the transition from one state to another, like that caused by a war, and having influence on the school system can have great consequences on the mathematics teaching itself.

We present here the particular case of the city of Trieste (now situated in north-eastern Italy, on the border with Slovenia) and of the surrounding region Venezia Giulia, to which belonged at that time the city of Gorizia with its territory and the whole peninsula of Istria (now this region belongs to Italy, Slovenia, and Croatia). At the end of the First World War these territories were annexed to the Kingdom of Italy after having been for a long time part of the Habsburg Empire and formed, with some exceptions, the region called Litorale /Küstenland (for a detailed historical description of the political situation of this geographical area before and after the First World War, see Battisti, 1979, pp. 31-41 and Biondi *et al.*, 1996). Consequently, there were naturally many institutional changes: to learn more about the political-administrative, economic, social, ethnic and cultural problems that the Kingdom of Italy faced in dealing with the integration of these formerly Habsburgian territories within the state structure in the immediate post-war years, from November 1918 to October 1922, see especially Ziller (1991). Further, there was the looming problem of adapting the school system to that of the Kingdom of Italy, including regulations and programmes. The differences, as we will show below, were considerable.

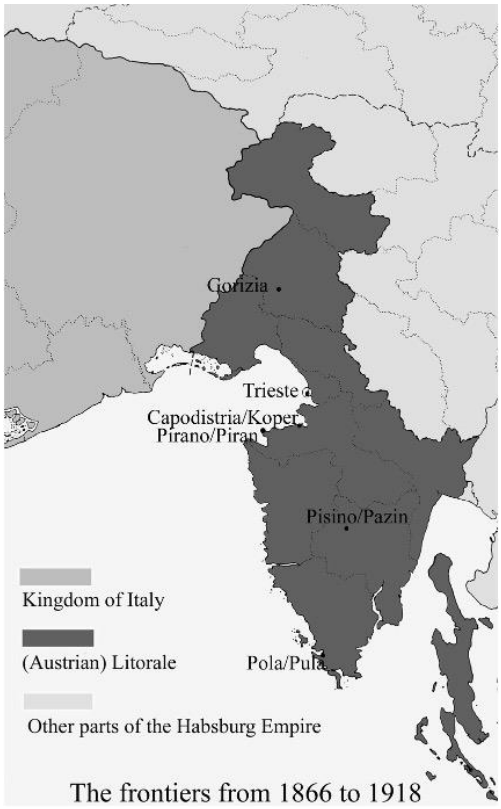

Figure 1 – The Trieste region until the end of World War I

These problems were shared by the region called at that time Venezia Tridentina (now situated in northern Italy and called Trentino-Alto Adige/Südtirol), which was also acquired by the Kingdom of Italy after the First World War. In the present study we refer to that marginally only.

In the following, in fact, we will mainly restrict our attention to the work of a group of mathematics teachers of the secondary schools of Trieste, Italian native speakers, which had a relevant role, from 1918 to 1923, in the process of adapting the mathematics teaching in Venezia Giulia secondary schools to that of the Kingdom of Italy. That situation has aroused a great interest due to both the characteristics of Trieste and the particular moment in the history of math teaching in Italy and Europe.

1. THE CHARACTERISTICS OF TRIESTE

In the considered geographical area, until it was submitted to the Habsburg Empire, beyond the Austrian state schools in German language there were public schools in several languages. Besides the teaching language, they had to follow regulations and programs modelled on the Austrian state schools.

In the year 1911 in the whole Litorale there were 42 public secondary schools. Among them, 37 were in not-German language (26 Italian, 8 Slovenian and 3 Croatian speaking) and 10 were situated in Trieste, 5 in Gorizia, 4 in Pola/Pula, 2 in Pisino/Pazin, 2 in Capodistria/Koper, others in minor cities.

In particular, in Trieste, where immediately before the First Word War there was the majority of the secondary students of the region (in 1911 they were 5,515, more than half of the total amount of 10,422), were active Italian speaking schools of any level, Slovenian speaking schools of primary and middle level (in 1910 was also instituted a private Slovenian secondary school) and German speaking schools of any level. For a detailed description of the secondary instruction in Trieste and in the whole Litorale, see Hofer (1997 and 2001).

The German speaking schools were very popular and were attended also by children of the local middle class, both Italian and Slovenian, as proficiency in the German language was a key to climbing the social ladder, to securing a state administration job and to being admitted into a university (see Dorsi, 1995, pp. 91-92).

In fact, Trieste was a "frontier city" and its population was highly heterogeneous, with Italians, Slavs, Germans, Greeks, Jews, Hungarians, etc. The Italian culture and language prevailed in the city, despite the presence of a large Slovenian ethnic group and the necessity, for certain social classes, to be familiar with the German language and culture, essential for academic studies and certain skilled professions—such as teacher in a secondary school. This explains the openness of Italians, at least those with higher education, to the Central European literature and philosophical thought, as well as medical and scientific culture. A thorough analysis of that situation appears in Ara & Magris (1987[2]), which also states that, for these and other reasons, "the Italian resident of Trieste felt he was a special kind of Italian whose Italian identity was a product of a continuous struggle rather than a pacific fact […]".[4]

[4] "l'italiano di Trieste si sentiva un italiano speciale, la cui italianità era il frutto d'una continua lotta anziché un pacifico dato acquisito […]" (Ara & Magris, 1987[2], p. 17).

2. THE PARTICULAR MOMENT IN THE HISTORY OF MATH TEACHING IN ITALY AND EUROPE

On the other hand, the problem of changing the school programmes in the New Provinces[5] acquired by the Kingdom of Italy after the first World War, which could have appeared to be strictly and purely local, actually affected the contemporary math teaching in all of Italy, as it introduced a reformist current which advocated a less theoretical and more modern way of teaching. A detailed analysis of these reformative trends in that period and of the active role played by the Italian mathematician Guido Castelnuovo in national and international context (also in establishing contacts with the CIEM described in the following) is contained in Furinghetti (2002), whereas the description of the reform plan backed by the Italian mathematician Giovanni Vailati is included in Giacardi (2002), and a large-scope overview of the problems of math teaching in secondary schools of that period in Italy is brought in Giacardi (2006a and 2006b). This current came as part of a larger context that was the movement for renewal that leapt to the fore at the Fourth International Congress of Mathematicians held in Rome on April 6-11, 1908. Many papers that were presented in that congress dealt with math teaching in various countries, with reference also to psycho-pedagogical considerations, and an international commission was established for the study of teaching problems (CIEM/IMUK), presided by German mathematician Felix Klein. A description of school-related papers presented at the Rome Congress is found in Furinghetti (1994), and a wide coverage of the European situation at the time and the Commission's scope and tasks in Schubring (2003). The overall European scene at the end of the 19th century, when the new trends were developing, is described in Schubring (1996), and the Italian scene, with a particular coverage of geometry teaching, also in Menghini (2006).

In the Kingdom of Italy—where during the Unification[6] and in reaction to the long years of living under foreign dominion the mathematicians themselves wished to set math teaching programmes according to strict classicist criteria and rejected the methods of foreign math textbooks (for more about these problems and, specifically, the story of Legendre's geometry

[5] The name "New Provinces" (as opposed to the "Old Provinces") was applied at that time to formerly Austrian territories annexed to the Kingdom of Italy at the end of the First World War, i.e. Venezia Giulia and Venezia Tridentina.

[6] The Unification of Italy into the Kingdom of Italy (proclaimed in 1861) is historically considered to have been completed in 1870 with the capture of Rome.

manual in Italy, see Schubring, 2004)—time was ripe for a school reform, viewed as necessary also in response to the nation's industrial and technical progress.

3. THE FIRST CHANGES IN THE VENEZIA GIULIA SCHOOL SYSTEM[7]

Besides teaching programmes, schools in the Habsburg Empire differed from those in the Kingdom of Italy in multiple aspects, ranging from the administrative rules to the juridical status of teachers. In Venezia Giulia the integration of the two school systems was carried out gradually and only when the Gentile Reform[8] was put into effect during the first Fascist government, in the 1923-24 school year, was the assimilation into the Italian school system completed.[9] It is to point out that a consequence of this reform was the abolition of the Slovenian and Croatian speaking schools.

Figure 2 – The Trieste region after World War I

[7] References here and below mention only documents and rules. For more detailed references regarding consulted archival material, see Zuccheri & Zudini, 2007.
[8] R.D. October 1, 1923, n. 2185, G.U. October 24, 1923.
[9] Bonamore, 1979, pp. 5-6.

Regarding schools in Trieste and its municipal territory, first, in 1918, the Trieste City Council,[10] on opening the city schools (from nursery schools to secondary schools),[11] and then, in 1919, the High Command of the Royal Italian Army, General Secretary for Civil Affairs,[12] introduced the first changes in teaching programmes, especially at secondary schools. The changes did not regard the teaching of mathematics but of literature, history and geography,[13] to instil in schools "the national spirit of teaching and education".[14] Other changes were related to the instruction of religion, which was discontinued in higher school classes and made optional in lower classes, and of German, which could be substituted with the teaching of another language as second (foreign) language in Italian secondary schools, while Italian became the second language in secondary schools of other languages (Slovenian or Croatian).[15]

In 1919 teaching in German—at schools where German had been the main language—was discontinued as well.[16]

The Royal Venezia Giulia Government invited then all the schools to present reports, to be written in collaboration with the teachers, that would contain also a comparison between current local programmes and those of the Kingdom of Italy, in preparation for a reform of secondary school regulations.[17] The Venezia Giulia League of Secondary School Teachers established a committee charged with the task of studying the general problems of adapting the local schools to the current Kingdom school regulations and programmes; with the intent of setting up sub-committees to deal with specific problems of each type of school, it invited secondary school headmasters to join and report on whatever had already been done by their respective teaching staff.[18] A general congress was thus called up for June 9 and 10 in Trieste, inviting all school heads and, for secondary schools, groups of teacher representatives, in order to prepare uniform reports to be presented to the High Command.[19]

> New names were established for secondary institutes. In particular, the *Ginnasio* and the *Ginnasio Reale* became *Ginnasio-Liceo (Classico) and Ginnasio-Liceo Moderno* respectively (*Ginnasio* for the first 5 years and *Liceo* for the last 3) and the S*cuola Reale Superiore* became *Istituto Tecnico* (*Scuola Tecnica* for the first 3 years and *Istituto Tecnico* for the last 4).[20]

[10] Circular no. VI-1243/1-18 of November 30, 1918, by the Trieste City Council.
[11] For an institutional and legislative overview regarding public instruction in Trieste until 1918, see Cova, 1995.
[12] Circular no. 7580 of January 15, 1919, by the High Command of the Royal Italian Army, General Secretary for Civil Affairs.
[13] These regulations applied to the 1918-19 school year (see Annuario della Civica Scuola Reale Superiore all'Acquedotto in Trieste, 1918-1919).
[14] Appendix to Circular no. VI-1243/1-18 of November 30, 1918, cit.
[15] Circular no. 7580 of January 15, 1919, cit.
[16] German speaking state schools, which in Trieste included the Scuole Popolari (primary schools), the Ginnasi, the Ginnasi Reali and the Licei Femminili, operated from 1842 to 1919 (see Dorsi, 1995, pp. 91-92).
[17] Circular no. 071915 of March 7, 1919 by the Royal Government of Venezia Giulia, Office of Civil Affairs, Section VII.
[18] Letter sent by the Presidency of the Venezia Giulia League of Secondary School Teachers.
[19] Letter of May 26, 1919, by the Presidency of the Venezia Giulia League of Secondary School Teachers.
[20] See for example the circular no. VI-1609/2-19 of October 23, 1919, by the Trieste City Council.

Further, in the 1919-20 school year teaching in all schools followed the hours and programmes stipulated in Circular no. 072730 of September 30, 1919, issued by the Venezia Giulia Civil General Commission. In fact, the role of the governing body within the public administration overseeing Venezia Giulia schools was assumed by the Schools Office at the Venezia Giulia Civil General Commission (in 1923 its duties were passed over to the newly formed local Education Superintendence of Venezia Giulia and Zara, pursuant to the Gentile Reform; see Dorsi, 1995, p. 88).[21]

This circular included, with light modifications, an official report by a committee assembled by the governors of Venezia Giulia and of Venezia Tridentina[22] to study secondary school rules and programmes in the respective provinces; its spokesman was Inspector Francesco Piola. The committee recommended that adjusting to the new programmes would be gradual, considering that didactic continuity was important for students in the New Provinces and also the time necessary for teachers to change methods, but also observed that

> While, on the one hand, some elements of the Austrian school system have benefits that might suggest keeping them, on the other we know that reforms are being studied for secondary schools that we have reason to believe would make the differences less evident. That study, however, can benefit from the experience of the new provinces.[23]

And regarding math teaching in the *Ginnasio* and *Ginnasio Reale* (and in other types of schools), the committee, while recommending the gradual application of Italian programmes at the *Ginnasi* of Venezia Tridentina, suggested

> [...] to keep the current programmes in [Venezia] Giulia schools so as to have material for a comparative study in the coming school year, and to take into consideration, in turn, the decisions of the Italian Congress of Mathesis, to convene in Trieste next month.[24]

"Mathesis" – "Italian Society of Mathematics and Physics" – was founded in the Kingdom of Italy, in Turin, in 1895. Its aim was to improve and advance the teaching of mathematics and, more generally, of science teaching. It accepted as members scholars and teachers of mathematics and related disciplines.[25] The foundation of the Trieste Section of

[21] Annuario dello Istituto Tecnico Comunale "Galileo Galilei" di Trieste, 1919-1920.
[22] Its members were Ferruccio Martini, Giuseppe Papaleoni, and Francesco Piola (Il Bollettino di Matematica, op. cit., p. 119).
[23] "Mentre, da un lato, alcune disposizioni austriache hanno pregi che consigliano a mantenerle, dall'altro è noto come siano allo studio riforme per le scuole medie che abbiamo ragione di ritenere renderebbero meno sensibili le differenze. Tale studio, comunque, potrà avvantaggiarsi della esperienza delle nuove province." (Appendix to Circular no. 072730, Group I, Division III, of September 30, 1919, by the Venezia Giulia Civil General Commission, p. 1).
[24] "[...] mantenere i programmi finora vigenti in quelli della [Venezia] Giulia; e ciò per avere materia che possa servire ad uno studio comparativo nel venturo anno scolastico, e per tener conto, a suo tempo, dei voti che saranno emessi dal Congresso italiano della Mathesis, che si riunirà a Trieste nel prossimo mese." (Appendix to Circular no. 072730, cit., p. 4).
[25] To learn more about the history of "Mathesis", see the Web site http://www.mathesisnazionale.it and the periodical Periodico di matematica per l'insegnamento secondario, then Periodico di matematiche: storia - didattica - filosofia, the Society's organ since 1899.

"Mathesis" took place at Federigo Enriques's invitation and in his presence on June 15, 1919.[26] Thus, the Congress of the "Mathesis" Society in Trieste was expected as an important event.

4. THE 1919 "MATHESIS" CONGRESS IN TRIESTE

Hereinafter, following the documents on which we base our study, with the term "New Provinces" we refer mainly to Venezia Giulia.

As explained before, the problem of adjusting school programmes in Venezia Giulia, where school programmes and teaching methods had already followed the new international ideas of the time, required thus dealing with a new demand for global renewal.

With that spirit, the National Congress of "Mathesis" was held in Trieste in October 1919, with a stimulating series of papers on math teaching in Italy's Old and New Provinces, comparing programmes and methods used in various types of schools and paying attention to cognitive and learning aspects. The protagonists of the Trieste Congress were the Italian math teachers from the Trieste Section of "Mathesis". Documents on this Section, especially regarding its origins, are part of the "Fondo Mathesis" (Mathesis Fund) kept at the University of Trieste and catalogued in Zuccheri & Zudini (2007), which hereinafter will be referred to for the more accurate location of cited documents.

4. 1. The inaugural address

The President of the Trieste Section of "Mathesis", Giacomo Furlani,[27] delivered the inaugural address at the Congress of the Society held in Trieste on October 17 to 19, 1919.[28] Presenting himself as the spokesman of math teachers of Italian nationality from the

[26] The great Italian mathematician Federigo Enriques (1871-1946) attended the ceremony of the "Mathesis" Trieste Section's foundation (see Minutes of the 1st Congress of the Section's constitution, June 15, 1919, in Fondo Mathesis). On that occasion, Enriques expressed his desire that the upcoming National Congress of "Mathesis" would be held in that city.

[27] Giacomo Furlani (1883-1969), Trieste-native and a teacher of mathematics and physics at secondary schools in Trieste for almost fifty years, was very active in the cultural, scientific and political life in Trieste. He was published often in journals in Italy and abroad. In 1903 he was arrested in Innsbruck by the Austrian authorities for having participated in an uprising supporting Italian universities (Schiffrer & Furlani, 1964-1965) and in 1916 dismissed from his teaching position due to his pro-Italian ideas.

[28] *Bollettino della "Mathesis", 12* (1-4), pp. 3-4. For more on the 1919 "Mathesis" National Congress in Trieste, see *Bollettino della "Mathesis", op. cit.*, pp. 1-62, as well as *Il Bollettino di Matematica, 16*, (7-9), pp. 109-140.

"redeemed" land, he expressed, on the one hand, his regret for having been cut-off for such a long time from the Italian cultural scene, in particular for having been forced to go study in "foreign universities" and thus forced to learn and then use teaching methods of other European cultures; while on the other, the idea that the reformative tendencies in Italian schools at the time would go more or less in this very direction of adjusting to such methods, and, consequently, his genuine conviction that the experience acquired in this field by the Venezia Giulia teachers would be appreciated and be given credit by the recently regained compatriots.[29]

As stated by the invitation circular sent by the "Mathesis" Board to society members, the National Congress in Trieste was conceived, at the suggestion of the Trieste Section, with the goal of assembling Italian mathematicians and their Trieste colleagues in order to examine together the problems of the school after the annexation.[30]

Federigo Enriques, the president of "Mathesis", in his address which followed that of Furlani, noted that the problems of this shift from one school system to another are the result of differences in programmes and methods, but that they are connected to those raised by several reformative tendencies which had already been followed within CIEM, the International Commission established by the 1908 Congress of Mathematicians in Rome. He considered it a good opportunity to discuss these problems, and recognised the usefulness of certain teaching proposals, but expressed his desire that the artistic and philosophical value of mathematics would not be ignored, reconnecting it to the old tradition of Italic philosophy.[31]

And so the Congress listened to a stimulating series of reports on teaching mathematics in the New and Old Provinces—which focused on comparisons between programmes and methods used in various types of schools and examined cognitive and learning aspects, and which were the subject of lively debates among members.

[29] One must remember that the landing of Italian troops in Trieste on November 3, 1918, was cheered by the jubilant population.
[30] *Il Bollettino di Matematica*, *op. cit.*, p. 109.
[31] *Bollettino della "Mathesis"*, *op. cit.*, p. 4.

5. THE COMPARISON BETWEEN TEACHING METHODS AND CONTENTS IN THE NEW AND OLD PROVINCES AT THE "MATHESIS" CONGRESS

5. 1. The mathematics teaching

In the first report at the "Mathesis" Congress, "Programmi e metodi dell'insegnamento nelle scuole delle terre redente e negli antichi confini d'Italia" ("Teaching Programmes and Methods in Redeemed Territories and within the Old Borders of Italy"), Arrigo Cantoni, a teacher at the Naval School of Trieste, began by observing that in the New Provinces math was taught using the same methods and the same objectives in all three types of secondary schools (for students aged 11 to 18-19) – the *Ginnasio* (*Gymnasium*), the *Ginnasio Reale* (*Realgymnasium*), and the *Scuola Reale* (*Realschule*), which in the Kingdom of Italy corresponded to the *Ginnasio-Liceo (Ginnasio-Liceo Classico),* the *Ginnasio-Liceo Moderno*, and the physics-mathematics section in the *Scuola-Istituto Tecnico*. Regarding math programme followed in these schools, he pointed out that " […] in its line of teaching it offers a great many advantages which none of us would like to give up […]" [32].

He admitted though that the programme had some flaws. For instance, literal calculus, in contrast to the rest of the Kingdom of Italy, was taught too mechanically and the theory of ratios and proportions was treated too formally and with little care for its substance. With detailed descriptions of the subject's arguments and distribution over the various school years and levels, Cantoni pointed out the differences between secondary schools in the New and the Old Provinces, and underlined the great similarities that existed between the former-Austrian *Gymnasium* and *Realgymnasium* and the Italian *Liceo Moderno*.[33]

The main message of that report, though, was the difference between teaching methods, due to deep-set school principles. For example, at schools in the New Provinces greater emphasis was put on exercises and practical application of theoretical subject-matter, considered very important here, unlike in the rest of Italy. In the Austrian junior secondary schools (ages 11 to 13-14), where math was taught 3 hours weekly as compared to 2 hours in Italian schools, they covered both arithmetic and geometry and beginning from the first class students were taught to develop the concept of functionality. Rational arithmetic – which was

[32] "[…] in linea didattica esso offre un grande numero di vantaggi a cui nessuno di noi vorrebbe rinunciare […]" (*Bollettino della "Mathesis", op. cit.*, p. 9).
[33] *Bollettino della "Mathesis", op. cit.*, p. 16. For the history of the Italian *Liceo Moderno* see Giacardi, 2002, 2006a and the more extensive Giacardi, 2006b, which refers also to the relations between the *Liceo Moderno* and education institutions in the New Provinces and to the problems of adopting school programmes in Venezia Giulia.

studied in Italian 'senior' *Ginnasio* and *Liceo* (ages 14 to 18-19) – was substituted in Austrian 'senior' *Gymnasium* by elementary algebra, taught with a continuous resort to examples " […] as one teaches through examples not theory." [34].

There were stark differences in the teaching of geometry. For instance, comparing Austrian 'senior' *Gymnasium* with Italian 'senior' *Ginnasio* and *Liceo*, Cantoni observed that in the Austrian schools little importance was given to the axiomatic method, and individual theorems were presented in the form of problems and, though the material was presented in a logical and consequential way, one could not talk about a truly systematic treatment. Certain theorems were introduced through intuitive proofs, without worrying that this would lead to students not understanding the importance of a rigorous proof. The theorems of geometry where *measure* was applicable were demonstrated more easily with the help of algebra. In general, he concluded, in Venezia Giulia

> […] the […] ideal school is one that does neither follow strictly a single method nor offer a single point of view, but one that tries to combine in its teaching all the methods, be they of geometry or arithmetic, theoretical or practical, but practical and geometrical above all […].[35]

Such methodology aimed to impart to students a lively and interesting view of the material, to make their minds nimble and show the interdisciplinary connections of mathematics with related sciences like physics and geography.

All the observations and convictions expressed by Cantoni demonstrated clear correspondence to the thinking of Felix Klein (whom Cantoni himself quoted in discussing his ideas about the birth and development of mathematical concepts), and not by chance, considering the course of studies that teachers in Venezia Giulia had to follow in Austrian universities. Klein,[36] in fact, stressed the need to adjust the teaching methods and content to contemporary cultural trends and to demonstrate the way mathematics was applied in natural sciences and technology (Klein, 1925[3], p. 227.). He was convinced that in teaching there should not be too-clear distinctions between the various sections of mathematics, actually citing arithmetic and geometry as examples (ibid., p. 228). He also highlighted the possibility of introducing students pretty early to the concept of function, using analytical geometry (ibid., p. 229).

In the following report, "Tendenze riformatrici nell'insegnamento della matematica"

[34] "[…] poichè si insegna per esempi e non per teoria." (*Bollettino della "Mathesis", op. cit.*, p. 13).
[35] "[…] la […] scuola ideale è quella che non segue rigorosamente un solo metodo e non parte da un solo punto di vista, ma quella che tenta di riunire per quanto possibile nel suo insegnamento tutti i metodi sieno essi geometrici o aritmetici, teorici o pratici, ma pratici e geometrici sopra tutto […]" (*Bollettino della "Mathesis", op. cit.*, pp. 16-17).
[36] Klein, 1925[3], *Schlußkapitel*, pp. 226ff. The chapter was taken from the first edition of 1908.

("Reformative Tendencies in the Teaching of Mathematics")[37], Guido Castelnuovo expressed different convictions than Cantoni's regarding the usefulness of teaching analytical geometry in secondary schools (as had been done in the New Provinces) and, in the subsequent discussion, went on to explain that he was concerned that in this way the teaching of geometry would become too concrete and less rigorous.[38]

5.2. The relations between mathematics and physics in teaching

As paradigmatic was also the report presented by Giacomo Furlani, "Rapporti fra la matematica e la fisica nell'insegnamento" ("Relations between Mathematics and Physics in Teaching"), in which he expressed his opinion that a mathematical approach to physics was indispensable, especially in the secondary school. Furlani began with a few guidelines for the *Liceo Moderno*, stating that students should go over the work done by past generations in acquiring scientific knowledge and stressed the importance of intimate connections between mathematics and physics in teaching as well as the fact that such connections had special favour in senior secondary schools in the New Provinces. One should do that, in the first place, to give the student the right idea about both disciplines and their importance and usefulness: the application of mathematics in teaching physics served to better understand and appreciate the importance of mathematics, while physics teaching was made clearer and more rigorous. In second place, it had general educational benefits (conducive to learning the scientific method, for example) but also formative benefits: developing self-esteem and personal enterprise, increasing the individual's problem-solving abilities.

These very principles, Furlani argued, served as basis for teaching at secondary schools in the New Provinces. In them, as in the schools of the Old Provinces, physics was taught in the last two years of study, but the student was being prepared for it already earlier in math lessons; this way, the existing connection between the two disciplines was explicitly and concretely demonstrated right from the beginning, and not only in the last two years of school – as it was in the Old Provinces, though only in the *Liceo Moderno* – when both were taught at the same time. This was possible also due to the greater number of hours dedicated to the teaching of physics at schools in the New Provinces.

[37] *Il Bollettino di Matematica*, *op. cit.*, pp. 117-118. The title of the report was then changed as follows: "Sull'insegnamento medio delle matematiche in Italia dal 1867 ad oggi" ("About the Mathematics Teaching in Secondary Schools in Italy from 1867 till now" (see *Bollettino della "Mathesis"*, *op. cit.*, pp. 17-21).

[38] Guido Castelnuovo (1865-1952), well known for his contribution in algebraic geometry, was involved in the debate on mathematical instruction at all levels and influenced the development of the ministerial curricula for the *Liceo Scientifico* and the *Istituto Tecnico*. See Giacardi (Ed.), 2006.

Not considering the fact that in certain cases the teaching of physics was combined with that of chemistry, the difference between the Old and New Provinces was evident in the total number of hours dedicated in various schools to this discipline: in the Italian *Ginnasio-Liceo Classico* the total was 8 hours, while in the New Provinces 12 hours and a half; in the Italian *Ginnasio-Liceo Moderno*, 10 hours, and in the New Provinces, 16; in the Italian *Scuola* and *Istituto Tecnico*, 19 hours (including those dedicated in the *Scuola Tecnica* to natural history and botany, which was combined with physics lessons), while at science schools in the New Provinces, 21 hours.

Furlani then argued that at the *Liceo Classico* in the New Provinces physics, just like mathematics, was taught nearly the same number of hours as in the *Scuola* and *Istituto Tecnico*, encouraging thus a harmonious development of all the student's intellectual faculties. While recognising the high formative value of studying classical languages, he maintained that the school should not be unilaterally formative and should not neglect the faculties that can be cultivated only through rational scientific studies, so as not to sink into a mere school of rhetoric.

5. 3. The textbooks

Further, Furlani said that other elements to consider in analyzing and judging teaching methods were textbooks used in the various schools: teachers in the New Provinces used the same books as in other Austrian schools, since they perfectly matched the school programmes and were, in his opinion "didactically well made". The reason he gave for his favourable judgment was that the "excessive" use of mathematics, the common flaw in older textbooks, was indeed reduced in the more recent books, omitting "the far too long, and less important, mathematical deductions", or replacing them with "simpler, even if less rigorous, deductions".

He then went on to say, almost as a compensation for his earlier statement, that it would have been difficult, regardless of restrictions that would have been imposed by the Austrian Government, to find among the current Italian textbooks one that would correspond to the programmes in use in the New Provinces or that would not stray too far from it. He went on to say, however, that Italian textbooks, compared to Austrian books, have a number of flaws: first, the traditional textbooks, which were "scientifically excellent", were on the whole "too vast", if not "too detailed and muddled", lacking the kind of simplifications called for in secondary schools. In the Italian textbooks "A teacher can find the material to be taught but not always

the method; the student would not have a clue how to get oriented and benefit from his work"[39].

A similar opinion was voiced in the Congress by Cantoni, referring to geometry textbooks used in the Old Provinces, which he criticised as "too voluminous" and as "written for the teacher rather than for the schoolboy". To Furlani, other Italian textbooks – though "precious" for their rich reporting of research news and results and presentation of modern theories and applications – proved lacking in their "rational development" of arguments, which were introduced as lists of formulae, of laws, of phenomena, of news, too often unconnected, to give the student the impression that science is something dogmatic and fragmented.

Furlani concluded by arguing that the ideal would be to teach mathematics and physics in a reciprocally coordinated way with one dependent on the other in the right measure, considering the students' aptitude.[40]

5. 4. The following discussion

In the discussion that followed Furlani's report, Guido Castelnuovo commented that in the *Ginnasio-Liceo* in the New Provinces the number of hours dedicated to the teaching of scientific subjects was very high, but that increasing the number of hours of scientific subjects in the other Italian schools without increasing the total teaching hours would lead to a reduction of those dedicated to literary subjects, something he could not recommend. He thus declared himself in disagreement with the notion of starting to teach some parts of mathematics earlier in secondary schools, in order to prepare for the teaching of physics, fearing it might disrupt the systematic course of teaching and claiming that the few necessary concepts could be introduced by the teacher of physics himself.

Salvatore Pincherle, on the other hand, declared himself in favour of introducing physics at the *Ginnasio* level, considering that the poor results in physics courses were due not so much to the number of hours or its instruction as to the excessive leniency of the exams.[41]

Furlani responded to Castelnuovo's observations by noting that no damage would be caused by reducing the language-teaching hours, as the teaching of a mother tongue should be complemented by proper exercises during science lessons, granting the student a chance to practice and gain fluency in various fields of thought.

[39] "L'insegnante potrà trovarvi la materia da svolgere, ma non sempre il metodo; l'alunno non saprebbe assolutamente orientarsi ed usare con profitto dell'opera." (*Bollettino della "Mathesis", op. cit.*, p. 29).
[40] These ideas as well followed Klein's direction (e.g., Klein, 1925[3], p. 227).
[41] Salvatore Pincherle (1853-1936), Trieste-born mathematician, famous for his contributions to functional analysis and as founder of the Italian Mathematics Union, was in contact with the "Mathesis" Trieste Section whose meetings he often attended.

Despite the diversity of opinions, an agreement was reached and an agenda was approved almost unanimously. It had been proposed by a committee whose members included Castelnuovo, Cantoni, Conti, Fano, and Furlani. It welcomed innovations in the teaching of mathematics in secondary schools, also nationally, that would take into account, though with different shades, the recommendations brought forward in reports by teachers from Venezia Giulia.

5. 5. The teacher training

The Congress also dealt with the university, especially teacher training programmes. Guido Voghera presented the report "Sulla preparazione degli insegnanti" ("On the Preparation of Teachers"), in which he compared the preparation of secondary school math teachers at universities of the Habsburg Empire to that in the Kingdom of Italy.[42]

The differences in the academic programmes were stark. In Austrian universities exams could be taken only after having completed all four years of study; they were final, concise exams of two, completely independent, types: one for earning a degree, as a Doctor of Philosophy (which required the candidate to demonstrate an ability to conduct scientific work autonomously), and the other for getting a secondary school instructor certificate, which granted the title of *Professor*.

During debate sessions, following report presentations, other differences regarding teachers were brought to light, among them the fact that, contrary to the situation in the Old Provinces, in the New Provinces secondary school teachers had a single role, which allowed teachers to accompany the student from the end of elementary school to the final class of secondary school.

6. THE CONGRESS AGENDA

The Congress concluded with a declaration stating that the disparity in teaching practices created serious difficulties for a possible adaptation (even only partial) of Italian programmes to former-Austrian ones, as had already been made evident by the impossibility of

[42] Guido Voghera (1884-1959), Trieste-native, father of writer-essayist Giorgio Voghera (1908-1999) and a man of many interests, in almost all branches of mathematics and physics but also in other sciences such as theoretical chemistry, genetics, economics, philosophy, psychology and psychoanalysis. For more on Guido Voghera, see Voghera, 1967, and on the Voghera family in general, Fontana & Vinci (Eds.), 1990.

adopting the same textbooks due to the disparate criteria and teaching programmes. Hence, there was a need to work together in close collaboration to tackle this question. A first step toward resolving the problems of schools in the New Provinces and, more in general, toward reforming math teaching, had been taken in the Congress sessions; now there was a need to go on along the indicated road. With this goal, the following agenda was approved unanimously:

> The Congress:
>
> Noting that mathematics programmes at secondary schools in the redeemed provinces are in some parts more extensive than those at schools of the same level in the Kingdom old provinces; and that, by general agreement of many teachers, teaching according to these programmes produces fully satisfying results;
>
> Votes:
>
> That the Ministry will not push for the unification of mathematics programmes in said schools prior to having heard the opinions of representatives of teachers from the new provinces;
>
> That it will in the meantime check, by means of inspections, the advantages of the current programmes at schools in the new provinces;
>
> And, realising that said programmes appear to be worth keeping, will seek the abovementioned unification in a future general revision of the Kingdom school programmes.[43]

Also approved, following Enriques's proposal, was a motion to hold conferences of secondary school teachers on the differences of math teaching methods and programmes in the New and the Old Provinces.

7. THE ROLE OF THE TRIESTE SECTION OF "MATHESIS" IN THE QUESTION OF ADAPTING SCHOOL PROGRAMMES IN VENEZIA GIULIA

The question of the differences between math teaching methods and programmes in Venezia Giulia and those in the rest of Italy was also an important issue for the Trieste Section of "Mathesis" from its foundation.

[43] "Il Congresso:
Rilevando che i programmi di Matematica nelle scuole medie delle provincie redente sono in alcune parti più ampi di quelli delle scuole di pari grado delle vecchie provincie del Regno; e che, per concorde dichiarazione di parecchi professori, l'insegnamento relativo dà risultati pienamente soddisfacenti;
Fa voto:
che il Ministero non abbia a provvedere all'unificazione dei programmi di Matematica delle scuole suddette prima di aver sentito il parere di una rappresentanza degli insegnanti delle nuove provincie;
voglia frattanto controllare, a mezzo di ispezioni, i vantaggi dei programmi attualmente in vigore nelle scuole delle nuove provincie medesime;
e, tenendo conto di quanto in tali programmi apparisse meritevole di esser conservato, provveda eventualmente all'unificazione di cui sopra, in occasione di una prossima revisione generale dei programmi delle Scuole medie del Regno." (*Bollettino della "Mathesis", op. cit.,* pp. 55-56).

7. 1. The study mission to Rome and Bologna

Following the Congress agenda, the Trieste Section of "Mathesis" proposed already in December 1919 to send committees from Venezia Giulia to several cities in the rest of Italy to study first hand, by sitting in lessons and participating in conversations and conferences, the different teaching methods and programmes. Upon their return from their study missions, committee members were to present a report to the authorities and to the Central Section of "Mathesis" with their findings and proposals.[44]

The committee was set up (comprising Arrigo Cantoni, Giacomo Furlani, Adolfo Verson, teachers in Trieste, and Guido Nadalini, a teacher in Gorizia) and sent on its mission to study math teaching in Rome and Bologna. Their report (dated June 12, 1920) offered an extensive analysis of the programmes followed in the Old Provinces, with a detailed comparison of the differences found both among various types of schools within the Old Provinces and between the Old and New Provinces.[45] Accompanying the study of differences in school programmes there was the study of differences in teaching methods. It was the subject of lectures and conferences held by the participants in the study both in Trieste and in Rome.

What emerged from the report as the "spirit" of teaching in the Old Provinces –with considerable consequences from a didactic and formative point of view – was a greater propensity to scientific rigour, to theory, to abstraction and to synthesis, while in the New Provinces teaching was viewed as practical and experimental, marked by a more extensive use of exercises and applications so as to help the student learn by intuition and make him understand the scope and importance of the theories developed for the general progress of math and modern science " […] For us didactic care is important, for them scientific care." [46].

Neither tendency was free of risks if taken to the extreme: on the one hand, in the Old Provinces, the mental immaturity of a student, lacking an ability or preparation to follow and grasp abstractions, was likely to lead him to repeat and reproduce what he had learned without actually comprehending its meaning, turning teaching, devoid of any educational quality, into nothing but empty verbalism; on the other hand, in the New Provinces, the excessive attention paid to exercises and problem solving, at the expense of theories and proof rigour, was likely to limit students to the study of applications of formulae and theorems, to pure calculus, to a mere useless mechanism. In particular, among the aspects that struck the committee was the

[44] Minutes of the General Congress of December 22, 1919, in *Fondo Mathesis*.
[45] Cantoni *et al.*, 1920, in *Bollettino della "Mathesis", 12* (9-12), pp. 165-173.
[46] "[…] Da noi predomina la preoccupazione didattica, dall'altra parte la preoccupazione scientifica." (Cantoni *et al.*, 1920, p. 167).

fact that students at schools in the Old Provinces would often know by heart all the theorems yet would not know how to apply them, and instruction would ignore constructions with geometrical instruments and related problems. The ideal way to teach, according to the committee, would have been a proper balance between theory and application, accompanying calculus with deductive reasoning and following problem solving with a full discussion.

According to the committee, with the exception of Verson,[47] that could be made possible through a gradual closing of the gap between the two school systems, through the pursuit of synergy by teachers in the Old and the New Provinces, over an appropriate period of time and with due caution, in order to achieve the "right" interpenetration, keeping the good points from both sets of methods, aiming for their unification and a future general revision of the Kingdom secondary school programmes. The committee concluded its report with a wish that similar study trips in the New Provinces would be undertaken by secondary school teachers from the Old Provinces. Such visits did not take place, though, if we exclude those made by ministerial school inspectors; there was only the occasional correspondence between institutes and institutions of the Old and New Province.

7.2. The constitution of the "committee for programme reform" and the "congresses for examining textbooks"

The Trieste Section of "Mathesis" was always aware, then, of the need for a school programme reform, participating actively with proposals and recommendations in the debate over plans that were presented over time, also by appointing a special "Committee for Programme Reform". Another problem the Trieste Section was keen on solving was the choice of textbooks to be adopted: there was an immediately recognised difficulty to find among all the mathematics and physics textbooks used in Italian schools any that could fit the methods and programmes in the New Provinces, thus offering an opportunity to compile new textbooks to fulfil that need. The Trieste Section thus embarked on a new intensive project of reviewing school textbooks, both within its Board and in specially convened "Congresses for Examining Textbooks" (a total of three, held from February to April of 1920), ending in the General Congress of June 12, 1920, with the approval of a recommended list of textbooks to be adopted by the various types of secondary schools.

Recommended for the teaching of arithmetic in junior classes was the textbook that had

[47] According to Verson programmes in the Old Provinces could be adopted in their entirety by the New Provinces to their advantage (see Verson, 1921).

been used until then, Jacob-Marussig's *Aritmetica* (Arithmetic), volumes I and II.[48] Suggested as a second choice was Pincherle's book *Aritmetica pratica con un'appendice sul calcolo letterale, ad uso delle scuole secondarie inferiori* (Practical Arithmetic, with an appendix on literal calculus, for junior secondary schools). The book suggested for geometry in junior classes was Baroni-Fontebasso's *Geometria per il ginnasio inferiore e per le scuole complementari* (Geometry for junior *ginnasio* and *scuole complementari*). Senior classes at the *Liceo* and *Istituto Tecnico* were advised to adopt Amaldi and Enriques's book *Nozioni di matematica ad uso dei Licei moderni* (Mathematical Concepts for the *Licei Moderni*), volumes I and II.[49]

7. 3. The recommendations for school programmes for Ginnasio-Liceo Classico and for the Scuola and Istituto Tecnico

The following month (July 1920), the Trieste Section of "Mathesis" proposed to ask the authorities to not require the introduction of new school programmes already in the 1920-21 school year and to thus give time to study the problems and present appropriate solutions.[50] In fact, according to 1920-21 school yearbooks, teaching programmes and hours were still the same as those which had been established by the Civil General Commission for the preceding year, with just a few variations which had not affected the teaching of mathematics and physics, only increased the weekly hour total in several classes.[51]

The Trieste Section felt "a moral obligation" to present its own recommendations for school programmes in Venezia Giulia and for the direction math instruction should take. It charged a number of members with the task of studying programmes for the *Ginnasio-Liceo Classico* and for the *Scuola* and *Istituto tecnico*.[52] The results were subjected to extensive and lively discussions during Section meetings, also in the presence of Central Inspector Piola.[53] The resulting programmes were sent to the authorities and to the "Mathesis" President's Office in Bologna.[54] As reported in the minutes of later meetings, those proposals were held in high

[48] Renato Marussig, a member of the "Mathesis" Trieste Section, translated into Italian Josef Jacob's book, written originally in German. Jacob wrote teaching guides and, particularly, a book on junior secondary school math teaching methods (Jacob, 1913), with a preface by Ernst Mach. "Jacob's Method" was the subject of an article by Voghera published in *Periodico di matematiche* (Voghera, 1922).
[49] List of textbooks recommended by the "Mathesis" Trieste Section, in *Fondo Mathesis*.
[50] Minutes of a meeting of the Board and of the Programmes Committee of July 8, 1920, in *Fondo Mathesis.*
[51] Circular no. 341/10557, Office III, of October 19, 1920, by the Venezia Giulia Civil General Commission.
[52] Minutes of a meeting of the Board and of the Programmes Committee of November 11, 1920, in *Fondo Mathesis.*
[53] Minutes of the March 18, 1921, meeting, in *Fondo Mathesis*, published in *Periodico di matematiche: storia – didattica – filosofia, S. IV, Vol. I*, 1921, pp. 296-297.
[54] Letters sent by the "Mathesis" Trieste Section President's Office, in *Fondo Mathesis.*

regard and were approved with only "minor changes".[55]

Math programmes as prepared by the Trieste Section of "Mathesis" for the *Ginnasio-Liceo Classico* and *Moderno*—the same programmes for both types of school—were quite similar to those which had been in effect until then in the Venezia Giulia, though they included some elements from the Kingdom school programmes. The number of weekly hours was 3 for all classes, hours in which arithmetic, algebra, geometry and trigonometry would be taught. Besides some shifts in the order of instruction, as compared to the preceding programmes (for example, stereometry was to be taught in the first year of the *Liceo* instead of the fifth year of the *Ginnasio*; trigonometry was pushed from the former 6th year in the *Ginnasio* to 2nd year in the *Liceo*; analytical geometry which had been introduced in the former 7th year of the *Ginnasio* was now switched to the 3rd year of the *Liceo*), greater weight was given to several theoretical aspects both in arithmetic (divisibility, for example) and geometry (congruence criteria were now introduced in the 2nd year of the *Ginnasio*, for example, whereas before teacher had used constructions rather than proofs of congruence), becoming even more so in the three years of the *Liceo*. Still, the proposal urged teachers more than once to go through numerous exercises.[56]

In the 1920-21 school year, even without having received a directive from the Civil General Commission, the Ginnasio-Liceo "Francesco Petrarca" of Trieste—where several members of the Trieste Section of "Mathesis" worked as teachers, including Renato Marussig—already introduced changes in its school programme, probably on an experimental basis, in line with the "Mathesis" recommendations, adopting the textbooks proposed by the Society.[57]

Indeed, as made evident by various yearbooks, the *Ginnasi-Licei* and the *Istituti Tecnici* of Trieste adopted in the 1921-22 and 1922-23 school years, following directives of the Special Office for the New Provinces at the Ministry of Instruction,[58] the programmes and hours proposed for secondary schools by a special committee and delivered to the respective schoolmasters.[59] Unfortunately, due to budget problems,[60] starting from the 1921-22 school year all yearbooks were printed in an abbreviated format and no longer included detailed teaching programmes (and in a few cases not even the school textbooks would be listed). Based on information brought in the "Mathesis" minutes regarding the approval of its proposed math

[55] Minutes of the December 12, 1921, Board meeting, in *Fondo Mathesis,* and minutes of the Ordinary General Congress of January 18, 1922, in *Fondo Mathesis,* published in *Periodico di matematiche: storia – didattica – filosofia, S. IV*, *Vol. II*, 1922, pp. 297-304. Furlani was also invited to join the Council of the League of Secondary School Teachers to help define the programmes.
[56] Mathematics programmes for the *Ginnasi-Licei Classici* and *Moderni*, in *Fondo Mathesis*.
[57] *Annuario del Ginnasio Liceo Comunale "Francesco Petrarca" di Triest*e, 1920-1921, pp. 10ff and p. 32.
[58] The directives were communicated by the Civil General Commission in a letter of September 16, 1921, III, n. 341/11263.
[59] Circular no. 341/7573, of June 30, 1921, by the Venezia Giulia Civil General Commission.
[60] Circular no. 346/5582, Office III, of June 2, 1922, by the Venezia Giulia Civil General Commission.

teaching programmes for the *Liceo Classico* and *Moderno* and for the *Istituto Tecnico*, there is no reason to believe that great changes were introduced in the teaching of mathematics at the *Ginnasio-Liceo*, nor at the *Istituto Tecnico*, in Venezia Giulia. This conclusion is further supported by the fact that in November of 1922, that is in the course of the 1922-23 school year, the Venezia Giulia Civil General Commission issued a confidential circular addressed to all secondary school headmasters in the region and discussing again the problem of unification of the grading system, examinations and programmes.[61] In that circular the Head of the Regional Schools Office introduced the future school reform led by Minister Giovanni Gentile (which would take effect in the 1923-24 school year), inviting the recipients to handle this piece of news with due discretion and stating that the Ministry of Public Instruction, after having encountered resistance to an immediate enforcement of transitory rules in the New Provinces prior to the introduction of the programmes then in effect at secondary schools in the Kingdom Old Provinces, had declared that there had been no objection, however, to "an adoption of said programmes at schools in the old and new provinces starting in the 1923-24 school year".[62]

7. 4. The work regarding other institutes

Regarding other institutes, in Venezia Giulia there were the *Licei Femminili* (*Licei* for girls) which did not exist in the Old Provinces.[63] Initially, in 1920, a committee was set up in Rome with headmasters and teachers from the *Licei Femminili* (Giacomo Furlani among them) and a teaching programme that differed only slightly from the current programme at those schools was then approved. Among the minor changes in the new programme was, for example, the abolition of trigonometry studies.[64] But then the Gentile Reform transformed the *Liceo* for girls into a three-year secondary school, which led in some cases to a conversion into a primary teachers' training school and in others to school closures (See De Rosa, 2004, pp. 93ff.).

In the case of naval institutes, the authorities and the Trieste Section of "Mathesis" found themselves right from the beginning on opposite positions. In fact math and physics teaching programmes and hours in these institutes were changed right away by the authorities so they would match the other Italian naval institutes, and members of the Trieste Section, protesting that the reforms had been enforced without first listening to the opinion of a teachers'

[61] Circular no. 3418/11593, Office III, of November 7, 1922, by the Venezia Giulia Civil General Commission.
[62] Circular no. 3418/11593, *cit.*, p. 1.
[63] For more on the history of the *Liceo Femminile* in Trieste, see De Rosa, 1995, and De Rosa, 2004; for general information on girls' education under the Austrian administration, see De Rosa, 1991.
[64] Minutes of a meeting of the Board and of the Programmes Committee of November 11, 1920, in *Fondo Mathesis*.

representative and thus ignoring the advice of the 1919 National "Mathesis" Congress and whatever had been done in other secondary schools, expressed their disappointment about the radical cuts in the number of hours, which in their opinion had left a disproportionate amount of time to teach the required subjects and had not left enough time for exercises.[65] The Central Office for the New Provinces, headquartered in Rome, did not sustain the protests coming from the Trieste Section of "Mathesis", but promised it would communicate these observations to the Ministry of the Navy so they could be taken into consideration for a future general revision of school programmes.[66]

7. 5. The participation in the debate on the education of future teachers

The Trieste Section of "Mathesis" dealt also with the reform of academic curriculum in university courses for future math and physics secondary school teachers. Such was the case with astronomy and geodesy, courses which due to new ministerial regulations, put into effect in 1922 in faculties of science, were no longer required courses. Considering these two disciplines important for the cultural education of future teachers, the "Mathesis" members approved an agenda calling for making at least one of the two a required course for physics and mathematics students and for offering optional courses of practical exercises to help the young acquire the ability to use measuring instruments and learn the technique and practice of numerical calculus, deemed absolutely indispensable for secondary school teachers of mathematics and physics.[67]

CONCLUSIONS

As shown above, the Italian math teachers in the Trieste Section of "Mathesis" in the pre-Fascist years demonstrated an independent spirit when it came to changing school rules and in particular teaching methods and programmes of their discipline from those of the Habsburg Empire to those of the Kingdom of Italy; this, despite the fact that most were committed

[65] Minutes of an Ordinary General Congress on January 18, 1922, in *Fondo Mathesis.*
[66] Letter of May 20, 1922, by the Venezia Giulia Civil General Commission to the President of the Trieste Section of "Mathesis", in *Fondo Mathesis*.
[67] Minutes of an Ordinary Annual Congress of December 21, 1922, in *Fondo Mathesis*.

"Irredentisti"[68] and together with the whole group of Italian language teachers had been subjected to repression at the hand of the Austrian government, especially during the First World War—as reported in introductions to secondary school yearbooks published in Trieste at the end of the 1918-19 school year. These reports indeed describe the way many of these teachers, who had been suspected of being pro-Italian, had been arrested and sent to the front and how in Trieste in 1915 several institutes had been joined together so that teachers who had been declared undesirable due to their ideas could be fired.

Encouraged to propose their ideas for the gradual transition to the programmes of the Old Provinces, while awaiting a reform that was supposed to take into consideration their experience—but did not really—the Trieste "Mathesis" teachers did not mix political ideologies in their decisions but were shown to be true "school men",[69] intent on pursuing goals that were connected to teaching and learning in their courses guided by their didactic and pedagogical convictions developed during their academic studies in Austrian universities and experiments during actual teaching.

Regarding math teaching methods at secondary schools in Venezia Giulia, or at least in Trieste, it would be wrong to assume that changes were as abrupt as was the enforcement of the Gentile Reform. At the Liceo "Petrarca" in Trieste, for instance, where Renato Marussig taught from 1912 to 1930,[70] Josef Jacob's arithmetic book, translated into Italian by Marussig himself, remained as a textbook until the 1932-33 school year.[71]

One can reasonably assume that math teaching methods were thus changed gradually, mainly due to the inflow of Italian teachers who moved from the Kingdom Old Provinces to Venezia Giulia and to the generational changes in the teaching staff. A telling detail is, for example, the fact that at almost all elementary schools in Trieste, at least until the 1960s, students were taught to perform subtractions with an algorithm used in Habsburgian schools.[72]

[68] The "Irredentismo" was a political movement that sought immediately after the Unity of Italy the "redemption", or incorporation into Italy, of neighboring regions that were still under Habsburgian rule, that is Venezia Tridentina and Venezia Giulia. The term "Irredentista" (pl. "Irredentisti") refers to members of this movement or sympathizers.
[69] The "Irredentista" Giacomo Furlani, at the time the schoolmaster at the Liceo Femminile "G. Carducci" in Trieste was deeply disturbed, as a "school man", by the numerous episodes of violence perpetrated in his institute in the years 1922-1923 by Fascist students (see De Rosa, 2004, pp. 91ff).
[70] *Annuario del Liceo Ginnasio "F. Petrarca", Numero speciale del Cinquantenario*, p. 21.
[71] Trieste State Archives, *Liceo ginnasio "Francesco Petrarca" di Trieste*, reg. n. 1 (minutes of teaching staff meetings), pp. 108, 150-151.
[72] For a description of this algorithm and for bibliographic references, see Fiori & Zuccheri, 2005.

ACKNOWLEDGEMENTS

We wish to thank the Chief Editor Gert Schubring and the Referees for their useful suggestions and comments on an earlier version of this paper.

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