Gazeta Matematică:
A Historical Perspective on Its Role in Romanian Mathematics Education

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ABSTRACT This study examines Gazeta Matematică's (GM) influence on mathematics education in Romania from 1895-1945. Analyzing 13 articles from GM's archives, this research explores discussions on mathematics methodology and didactic issues and highlights Ion Ionescu's contributions. Findings reveal tensions between idealized rigorous pedagogy and practical classroom challenges. The study highlights GM's dual role as a mirror reflecting the complexities of mathematics education in a modernizing Romania and as a catalyst for educational reform. It demonstrates GM's significance in fostering mathematical discourse and provides insights into evolving priorities and attitudes toward mathematics instruction during a period of significant social and political transformation.

KEYWORDS: *Mathematics education history, Romanian education reform, Gazeta Matematică, educational periodicals, mathematical pedagogy*

Introduction

The transformative epoch spanning from the 1848 revolution through World War II proved instrumental in shaping contemporary Romania. This half-century witnessed an unprecedented acceleration in the evolution of Romania's public sphere. This can be seen particularly in its geographic and political configurations through the unification of the Danubian Principalities in 1859, the achievement of independence from Ottoman suzerainty in 1877, and the subsequent territorial consolidation of the Romanian state. This period of profound transformation culminated in the establishment of the Kingdom of Romania in 1881, marking a decisive shift in both the country's geopolitical positioning and its internal administrative structures. The territorial configuration continued to evolve dramatically, with Romania reaching its maximum extent after World War I through the acquisition of Transylvania, Bukovina, and Bessarabia (1918-1920), only to face significant losses in 1940 to Hungary, the USSR, and Bulgaria, before settling into its modern borders by 1945 (Hitchins, 2007).

Within this context of rapid transformation, the educational system experienced considerable volatility. During this period of institutional flux, the periodical *Gazeta Matematică* (GM) emerged as a pivotal journal in Romanian mathematics education, simultaneously articulating foundational theoretical perspectives while fostering the development of mathematical pedagogy throughout the nation.

The publications of *Gazeta Matematică* impacted mathematics education despite social and political changes. The aim of this study is two-fold. The first aim of the study is to understand what was written regarding mathematics methodology and didactic issues. The second aim of the study is to provide insight on how Ion Ionescu, a prominent author, potentially influenced broader societal attitudes and perceptions toward mathematics. A central insight emerging from this study is that this journal served as a crucial channel through

which international ideas were disseminated, ultimately enhancing the discourse on national methodologies for teaching mathematics.

This study follows methods used in Furinghetti (2003) and Karp & Schubring (2014). It analyzes GM within its historical context and examines the interplay between the journal and the broader socio-political landscape shaping mathematics education in Romania. The articles were retrieved from *Gazeta Matematică - Electronica Edition* created by the Romanian Society of Mathematical Sciences, in collaboration with SOFTWIN company and the SIGMA Publishing House. This software holds the entire collection of *Gazeta Matematică* series B from 1895 to 2010, encompassing over 55,000 mathematical problems and articles. In 2010, an initiative was launched to digitize the publication's available physical copies, and a dedicated team of over 20 mathematicians undertook the meticulous task of categorizing the Gazette's contents into distinct mathematical fields, thereby creating a comprehensive and easily navigable digital archive of this extensive collection.

The electronic database revealed 31 publications in the journal under the category 'mathematics methodology and didactic issues' between 1895 and 1945. This pedagogically oriented category, rather than the pure mathematics category, was particularly relevant to this research, as it was the only one focused on teaching methods and educational approaches. Out of the 31 items, only 13 articles were available through the electronic database. The researcher was unable to locate the physical copies of the articles not included in the digital repository. The following study is based on the 13 articles that were available to the researcher at the time of this writing. The articles, originally in Romanian, were carefully reviewed and translated by the researcher for this study.

Historical Background

The decades encompassing 1895-1945 experienced many social, political, and ideological shifts reverberating across Romanian society. Major events, from World War I and II to the rise of communist and fascist movements, fundamentally reshaped the nation's economic, cultural, and educational landscapes. However, the extent to which these turbulent shifts impacted the realm of mathematics education merits deeper investigation. Andonie (1965) highlights the importance and impact of *Gazeta Matematică* (GM) in his three-book volume of the history of mathematics in Romania. The journal

Gazeta Matematică, published continuously throughout this period, offers a unique window into the priorities, pedagogical approaches, and human perspectives that shaped how mathematics was taught and perceived in Romania during one of its most volatile eras.

Politically, Romania began this period (1895-1945), as a constitutional monarchy under King Carol I. However, public dissatisfaction with the corrupt and autocratic rule of the monarchy eventually led to the outbreak of the Romanian Peasants' Revolt in 1907, one of the earliest modern revolutions in Europe. Although the revolt was violently suppressed, it revealed deep societal divides and the strength of the peasant movement. After Carol I's death in 1914, his nephew Ferdinand ascended to the throne. Ferdinand made the pivotal decision to enter World War I on the side of the Allied Powers in 1916, seeking to acquire territory from the Austro-Hungarian Empire. However, this resulted in much of Romania being occupied by 1917, before eventually being liberated with help from Russian forces (Drace-Francis, 2006; Hitchins, 2014).

In the aftermath of the war, the territories of Bessarabia, Bukovina, and Transylvania were united with the Kingdom of Romania through the 1918 Great Union. This doubled Romania's territory and population. However, integrating the new territories and their ethnic minorities proved challenging. The interwar period also saw the long-awaited transition from monarchy to democracy. Though this transition was marred by political instability, antisemitism, and the rise of fascist movements like the Iron Guard. In 1938, King Carol II initiated a personal dictatorship, governing by decree until being forced into exile in 1940 by the military and territorial losses to Hungary and the Soviet Union (Hitchins, 2014).

Socially, Romania experienced the stirrings of modernization during this period, although it lagged behind Western European nations. The peasantry remained the dominant social class, comprising over 80% of the population and living in extreme poverty. Land reforms in 1921 and 1923 aimed to uplift the peasantry by breaking up large estates but were only modestly successful. Industrialization gathered pace, with the growth of the oil industry, manufacturing, and infrastructure. Railroads connecting urban centers fueled the expansion of the urban middle and working classes. However, progress was hindered by political instability, underdevelopment, and most of the economic benefits accruing to foreign business interests rather than Romanian interest (Drace-Francis, 2006).

Mathematics School Education in Romanian 1895-1945

Within this context of rapid transformation, the educational system experienced considerable volatility. Different regions inherited diverse educational traditions. In Transylvania, the Austro-Hungarian administration established a robust educational framework that prioritized technical training and embraced multilingual instruction in Hungarian, German, and Romanian. The Old Kingdom (Wallachia and Moldavia) adopted a distinctly French-inspired approach, emphasizing classical studies, literature, and philosophy in line with Western European traditions. Meanwhile, Bessarabia's schools operated under the Russian imperial model, which restricted Romanian-language education and primarily used Russian as the language of instruction (Andonie, 1965; Bachman,1991). Mathematics education in elementary and secondary schools went through several reforms and changes, reflecting the broader educational and political developments in Romania during 1885-1945 (Andonie, 1965).

In the late 19th century, the education system in Romania was heavily influenced by the French model. Mathematics education at the elementary level focused primarily on basic arithmetic operations, weights and measures, and some practical geometry concepts. At the secondary level, which included lower secondary (gimnaziu) and upper secondary (liceu), the mathematics curriculum included algebra, geometry (plane and solid), trigonometry, and elements of calculus. The teaching methods were largely traditional, emphasizing theoretical knowledge, memorization, and exercises (Andonie, 1965).

In the early 20th century, there were efforts to modernize the mathematics curriculum and teaching methods. The 1904 education reform introduced some changes, such as incorporating more practical applications and problem-solving skills in mathematics education. After World War I and the unification of Romanian territories in 1918, further reforms were implemented to standardize the education system across the country. The 1925 reform emphasized the importance of practical mathematics and introduced new textbooks and teaching guidelines (Andonie, 1965; Szakács, 2018).

It is interesting to note that Romania entered the twentieth century with extremely low literacy rates of around 20-30%, which limited student accessibility to mathematics. The 1896 Haret reforms introduced compulsory elementary education and established teacher training programs. In 1904, secondary education opportunities for girls were improved, although poor families still prioritized their sons' schooling. The 1920s and 1930s saw great progress in improving literacy and school enrollment, with the literate population tripling by 1930. Investments were made in new school construction and teacher training. However, a shortage of qualified teachers, inadequate funding, and rural/urban divides persisted. By the end of this period, literacy rates still lagged at around 60-70% (Hitchins, 2014; Hoivik, 1974; Drace-Francis, 2006).

However, the quality of mathematics education varied significantly between urban and rural areas, as well as between different regions of the country. Rural schools often faced challenges such as a lack of qualified teachers, inadequate resources, and large class sizes.

Throughout 1895-1945, geometry and arithmetic remained the core components of mathematics education at the elementary level, while algebra, geometry, trigonometry, and elements of calculus were taught at the secondary level. The emphasis was on developing theoretical knowledge and problem-solving skills, although there were efforts to incorporate more practical applications and modernize teaching methods (Szakács, 2018).

It is important to note that the availability of educational resources, teacher training, and overall educational quality varied significantly depending on the specific region, urban or rural setting, and socioeconomic factors.

Gazeta Matematică

Gazeta Matematică was founded in 1895 by engineers who were passionate about elevating mathematics instruction, and it remains in publication today. During the construction of the Anghel Saligny Bridge, a few of the engineers who were schooled abroad were astonished at the lack of mathematical rigor among other Romanian engineers and were galvanized into creating *Gazeta Matematică*. During its initial 50-year span, the journal established itself as an influential voice shaping discourses around mathematics within Romania's educational sphere. The journal included problems, articles, solutions, biographies, and announcements on competitions (Andonie, 1965).

Analysis of Content in Articles

The following narrative synthesizes the core discussions within the 13 selected articles in *Gazeta Matematică*, offering a succinct yet comprehensive summary of their contents. Among the 13 articles, there are five editorial

articles, three articles written by the committee, and five articles by Ion Ionescu, who was a prominent Romanian mathematics educator and editor of the journal.

In the early 20th century, there was a growing recognition among Romanian mathematics educators of the need to reform the teaching of geometry and arithmetic in secondary schools. Romania became a member of the International Congress of Mathematicians (ICM) in 1911, with Romanian mathematicians actively participating in the congresses, contributing to the development of mathematics, and representing Romania on the global stage. The ICM, which was established in 1893, aims to promote and coordinate the international cooperation of mathematicians. Romania's involvement in ICM reflects its growing interest and involvement in the international mathematical community during the early 20th century (Andonie, 1965.

Prominent figures like G. Țițeica, a prominent mathematics educator, advocated adopting the rigorous, axiomatic approach to geometry promoted by the Italian mathematician, Veronese. This involved grounding geometric instruction in precise definitions, postulates, and logical deductions, while still utilizing intuition and models (Țițeica,1903). Țițeica provided an in-depth analysis of Veronese's approach in articles published in 1903. He outlined how Veronese redefined foundational geometric concepts like equality and parallelism.

Another issue GM addressed was the lack of standardized mathematical terminology across Romania. An effort was made in 1903 by a commission to establish consistent vocabulary for concepts like equations, geometric objects, and operations.

Concurrently in England, committees were formed to rethink the conventional reliance on Euclid's Elements for geometry education (Ionescu, 1903; 1913). Ionescu (1903) reported on their recommended modifications in GM. The English reform approach displayed some alignment with Veronese's axiomatization by separating constructions from deductive theory. Despite these reform efforts aimed at injecting more logical rigor, assessments in the following decades revealed alarming deficiencies in students' arithmetic and trigonometry knowledge, both in secondary schools and for those attempting to enter technical universities. Ionescu (1903) repeatedly criticized the "indulgence" and "guilty leniency" of mathematics teachers who passed unqualified students lacking foundational knowledge (Ionescu, 1913). The searing critiques illustrated how idealized visions for revamped mathematics pedagogy were running up against harsh classroom realities.

In 1945, the educator Simionescu gave a speech titled *Mathematics and Secondary Education* at a conference outlining his perspectives of mathematics education in Romania. He began by detailing the various branches of mathematics taught at the time, including arithmetic, geometry, algebra, trigonometry, analytical geometry, mechanics, and astronomy. Simionescu stated that the main purpose of teaching mathematics was for intellectual training and spiritual development of students, following the vision of the renowned educator, Spiru Haret, the founding father of mathematics education in Romania. However, he lamented that the Romanian school system had not always fulfilled this purpose. He praised the achievements of the early 1900s led by Spiru Haret. While Romanian compulsory education fluctuated between 7 to 10 years in the early 20th century, Simionescu criticized the reduction of required school years in compulsory education because it led to a concerning degradation of the curriculum. Notably marked by the removal of advanced topics such as higher algebra and analytical geometry (Simionescu,1945). Simionescu cited examples of students being unfamiliar with basic geometric constructions as evidence of this decline. Simionescu identified several key factors hindering effective math instruction in Romania: large class sizes, student indiscipline, poorly trained teachers due to inadequate salaries, and an inexplicable indulgence from teachers who passed underperforming students (Simionescu, 1945). He chastised the lack of official recognition and rewards for excellent educators.

Simionescu credited private initiatives like the *Gazeta Matematică* journal and student mathematics clubs for fostering interest and higher achievement in the subject. He advocated expanding the curriculum to include more advanced math concepts like calculus and geometric transformations. Ultimately, Simionescu stressed the need for collaboration between university faculty and secondary teachers to continuously uplift mathematics education standards. He expressed optimism that prioritizing quality mathematics education would propel Romania's cultural renaissance and economic development as a modern nation.

In summary, influential authors like G. Țițeica advocated for adopting rigorous, axiomatized approaches to geometry inspired by figures like Veronese, but the realities of implementation presented significant obstacles. Recurring critiques from educators like Ion Ionescu and Simionescu highlighted alarming deficiencies in student knowledge, pointing to issues like unqualified students being promoted due to "indulgent" grading, large class

sizes, and inadequate teacher training. A key tension emerged between the idealistic vision of rigorous, logic-based mathematics teaching and the practical realities of classroom instruction. To improve mathematics education standards, Țițeica (1903), Ionescu (1913), and Simionescu (1945) called for an ongoing collaboration between university professors and secondary school teachers.

Ion Ionescu

Of the 13 articles examined, five bore the signature of Ion Ionescu, showcasing his prolific contribution and profound influence within the field. Ion Ionescu (1870-1946) was a pioneering figure in the field of mathematics in Romania. Born in Bucharest, he displayed an early aptitude and passion for mathematics during his school years. After completing his studies in engineering, Ionescu embarked on a lifelong career dedicated to teaching mathematics and nurturing young minds (Andonie, 1965).

In 1895, at the age of 25, Ionescu founded the *Gazeta Matematică* journal, which would become his legacy. This monthly publication was designed to cater to students and mathematicians alike, offering a unique platform for exploring mathematical problems and solutions. Ionescu served as the editor-in-chief of *Gazeta Matematică* for 51 years, until his passing in 1946 (Andonie, 1965).

Under Ionescu's stewardship, *Gazeta Matematică* flourished, attracting contributors from across Romania and beyond. The journal's pages were filled with intricate problems, solutions, and thought-provoking articles that challenged readers to think critically and to develop their problem solving abilities. Ionescu himself was a prolific contributor, authoring a great number of articles, problems and solutions. According to Andonie (1965), Ionescu contributed over 210 publications. Beyond his editorial duties, Ionescu was a gifted teacher. He taught mathematics at the Polytechnical school in Bucharest, inspiring generations of students with his passion for the subject. As this study highlights, Ionescu had an unwavering commitment to academic rigor. He believed that Romania economics would grow only if the mathematical curriculum and teaching in elementary and secondary schools remained rigorous. He claimed that teachers who expected bribes would be detrimental to Romanian society (Andonie,1965).

Ionescu's impact extended far beyond the confines of the classroom or the pages of *Gazeta Matematică*. He

96. Ion Ionescu în 1938. Semnătura sa:
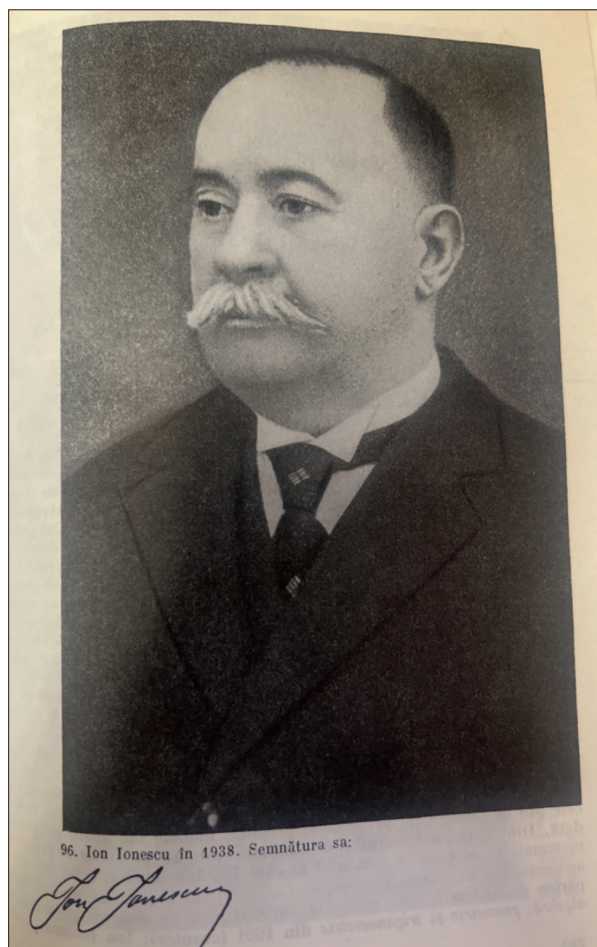
played a pivotal role in promoting the teaching of mathematics in Romania, fostering both practical understanding and intellectual curiosity in mathematics. Moreover, Ionescu's contributions transcended national borders. *Gazeta Matematică* gained international recognition, with contributors and readers from around the world participating in the intellectual discourse it fostered. Ionescu also participated in committees in London (Andonie,1965).

In recognition of his achievements, Ionescu received numerous accolades and honors. He was elected a member of the Romanian Academy, and his name became synonymous with excellence in mathematics education (Andonie, 1965). Even after his passing, his legacy lived on through the continued publication of *Gazeta Matematică* and the enduring appreciation for his contributions.

Conclusion

These thirteen articles published in *Gazeta Matematică* were devoted to critiquing and describing the mathematical education landscape of that time. The articles give insights into the evolving priorities, pedagogical approaches, and underlying attitudes toward mathematics instruction. GM served as a platform for debating educational reforms, standardizing mathematical terminology, and addressing the challenges of implementing new teaching methods.

It must be noted that during the period of political instability from 1915 to 1944, *Gazeta Matematică* (GM) saw a decline in publishing articles containing opinions and suggestions on mathematics pedagogy. Instead, the journal maintained its focus on mathematical problem sets and solutions. This shift reflected the broader climate of academic repression, where many scholars faced imprisonment for expressing views contrary to the existing political power. Nevertheless, the very existence of GM and the consistency of monthly publications was seen as a championed endeavor to the public. Ionescu's tireless dedication as editor over five decades, had the goal of shaping discourses and inspiring students through its pages. Despite the challenges of the time, GM remained a beacon for mathematical education and enthusiasm in Romania. This underscores the journal's significance in fostering mathematical discourse and its enduring impact on Romanian mathematics education.

Ultimately, *Gazeta Matematică* served as both a messenger documenting the complex realities of mathematics education in a nation grappling with modernization, and as a catalyst fueling aspirations for a revitalized curriculum that could propel Romania's cultural and socioeconomic development. The journal's historical significance extends beyond its immediate temporal context. Analysis of *Gazeta Matematică*'s role from 1895-1945 demonstrates its fundamental contribution to Romanian mathematical education during a period of substantial socio-political transformation. *Gazeta Matematică* established and maintained high academic standards while successfully bridging traditional and modern teaching methods. This approach led to the development of comprehensive curriculum models that would shape Romanian mathematics education for generations to come. The cultural and social impact of *Gazeta Matematică* extended far beyond mathematics education. The journal played a significant role in Romania's national identity formation, effectively responding to the increased demand for technical education during a period of rapid social change. It successfully balanced Romanian intellectual traditions with Western European educational models, contributing to a broader national cultural revival. During a time of urbanization and industrialization, the journal adapted its content and approach to support the growing needs of middle-class education. The journal's success has also brought international recognition to Romanian mathematical achievements, enabled the export of educational methodologies, and facilitated valuable cross-cultural educational exchange.

In the modern era, *Gazeta Matematică* has successfully transformed to meet contemporary challenges. The journal's digitization represents a significant evolution, enabling the preservation of its rich historical content while enhancing accessibility. This digital transformation has facilitated integration with online learning platforms and provided global access to Romania's mathematical heritage, extending its influence beyond national borders.

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