

Introduction

The subject of this book is mathematics education in Russia. There has been no shortage of writing on Russian (Soviet) education in general and its mathematics component in particular. Interest in this subject reached its high point in the years of the Cold War, when a period of intense scrutiny and even imitation of the Soviet school system followed in the wake of the Sputnik launch. With the advent of Gorbachev's reforms in the mid-1980s, as the country became more open, hundreds of highly qualified mathematicians poured out of Russia into the West. The prominent French mathematician Pierre Cartier remarked in jest that they had accomplished what Stalin could not do with all his army: they conquered the world (Senechal, 1998). Understandably, the educational system that had trained these mathematicians attracted particular interest, albeit sometimes a narrow one, directed toward special institutions for the mathematically talented students (a fully deserved interest, in our opinion).

As far as we know, no attempt, however, has been made, pre-Gorbachev or since, to give a systematic description and analysis of the origin and development of mathematics education in Russia. This two-volume work is an attempt to provide this description.

Volume 1 *History and World Significance* is followed by Volume 2 *Programs and Practices*. The division indicates at either instance, the dominant theme of the analysis; however, the first volume cannot avoid discussion of programs and practices, just as the second must also include a great deal of history. This entanglement is among the challenges awaiting anyone who would attempt an analysis of mathematics education in Russia. Its practice cannot be understood distinctly from its history, nor can its history be considered without an understanding of the practice.

Writing about impressions of Russia recorded by foreign travelers in the 19th century, the great culture historian Yuri Lotman observes that these texts require deciphering. Offering perfectly accurate representations of time and place, they nevertheless exhibit an ignorance of a *code* that could give meaning and significance to their observations — a code rooted in an understanding of a complex and polysemic foreign culture (Lotman, 1992). The task set before the editors of this collection first of all has been to help the reader in accessing the historical and cultural codes underlying the facts in hand.

The history of the development of mathematics education is inseparable from the history of the country itself. Major efforts to bring Russia into communion with European mathematical culture were made in the time of Peter the Great (1672–1725). In the words of the poet Pushkin, the Czar had “opened a window into Europe.” The contemporary cultural historian Boris Uspensky notes ironically that Peter also had raised the very wall in which this window were hacked out by bolstering serfdom, ramping up state oppression, and generally lowering literacy levels (Uspensky, 2004).

The vast country peopled with many nations for centuries had remained illiterate, even as it put forth magnificent cultural contributions exemplified by the works of Dostoevsky and Tolstoy, Mussorgsky and Chaikovsky, and Lobachevsky and Chebyshev. The revolutions of 1917 that finally handed power to the Bolsheviks appeared at first to have brought land to the peasants and rights to the formerly oppressed nations; but in the Soviet empire that rose upon the ruins of its predecessor, both rights and land were promptly expropriated. Education in general, and mathematics education specifically, had become available to an incomparably greater portion of the population, however.

Thoughts about contradictions within the social structure compelled Lev Tolstoy, along with hundreds of others among “the educated classes,” to consider the possibilities of teaching mathematics to the children of peasants. Likewise, the aspiration to overcome these contradictions became the chief impetus for the students themselves. The same or similar issues and contradictions continue to fuel debate to this very day and keep present scholars from passing an unbiased

judgment on the past. Old contradictions are not always resolved. Tensions of a century past are felt today as keenly as ever.

Debates over the history of mathematics education continue, and the editors of these volumes had no intention of sidestepping the issue: the reader will find in these volumes a variety of opinions and interpretations of the past as well as of the present. The authors represented here are Russian mathematics educators, who had both studied the history of the development of mathematics education and played an active role in its practice, as well as mathematics educators from other countries, closely involved in the study of the research and the practice of Russian mathematics education.

The volume opens with Tatiana Polyakova's brief history of the development of mathematics education in Russia prior to 1917. The following chapter (Alexander Karp) discusses the formation of the Soviet system of mathematics education in the first half of the 20th century. Alexander Abramov continues the thread with a discussion of the history of the so-called "Kolmogorov reform" of the 1960s–1980s. Mark Bashmakov offers an analysis of the recent past of Russian mathematics education and submits his vision of the key challenges facing the system today. The chapter written by Alexey Sossinsky addresses a purely Russian phenomenon — the extensive involvement of research mathematicians in the school mathematics education. Mark Saul and Dmitri Fomin focus on a particular manifestation of this involvement, mathematics competitions, tracing their history, and illustrating it with diverse examples of problems typically offered to participants. Jean Schmittau discusses the program of mathematics teaching in elementary schools, devised by the prominent psychologist Vasily Davydov that has gained great popularity abroad. Natalya Stefanova talks about the history and the practice of pre-service mathematics teacher education. The reader will also find in this chapter useful information on the organization of mathematics training in Russian middle and high schools today. The next chapter partitioned into three sections, written by Antoni Pardała, Katalin Fried, and Orlando Alonso, examines the influence of Russian (Soviet) mathematics education in three countries of the former so-called socialist block (i.e., countries falling within the sphere of influence of the

USSR). The countries selected are Poland, Hungary, and Cuba. Finally, Jeremy Kilpatrick writes about the influence of Soviet psychological studies in the USA and about the history of their publication in English.

The second volume offers a detailed discussion of the practice of mathematics education in Russia, focusing separately on the distinct disciplines (i.e., algebra, geometry, calculus, and finite mathematics), the specifics of the curricula in schools for mathematically talented students, schools with reduced mathematics components, and elementary schools, as well as on mathematics-related extracurricular activities. Special attention will be given to lesson planning in Russian schools and the main trends in research in mathematics education.

Finally, we note that several of the chapters included in this volume were originally written in Russian and subsequently translated into English. The editors wish to thank Ilya Bernstein and Sergey Levchin and also Heidi Reich for help in preparing the manuscript for publication.

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