Back to the Future: the Conservative Reform of Mathematics Education in the Soviet Union during the 1930s-1940s

Alexander KARP
Teachers College, Columbia University, USA

Probably the high point in the reputation of the Russian (Soviet) education system in mathematics and the natural sciences came during the period of the Sputnik, when American and Western European politicians and scientists flocked to the Soviet Union in order to learn how high school education was organized there—in the belief that it was high school education that explained the USSR's technological successes (see, for example, Benton, 1958). Today, the names and dates of birth of the leading Russian engineers who were in one way or another connected with the Sputnik project and with Soviet rocket technology in general can be easily found in Wikipedia:

Name	Date of Birth	Age in 1931
Korolev	1907	24
Barmin	1909	22
Gluschko	1908	23
Kozlov	1919	12
Kuznetsov	1913	18
Lidorenko	1919	12
Piliugin	1908	23
Riazanskii	1909	22
Tikhonravov	1900	31

The year 1931 is singled out in this table because it marked the beginning of a grand restructuring of Soviet high school education. Between 1931 and 1936, the Central Committee of the Communist Party published a series of resolutions: *On Elementary and High Schools* (1931), *On the Educational Program and Regulations in Elementary and High Schools* (1932), *On the Structure of Elementary and High Schools in the USSR* (1934), *On the Organization of Educational Work and Internal Regulations in Elementary, Middle, and High Schools* (1935), *On Pedological Perversions in the People's Commissariats of Education* (1936). These publications radically transformed the Soviet school system. Without in the least questioning the usefulness of studying the Soviet school system of the 1950s, it should be noted that most of the creators of the Sputnik attended schools of a completely different character, and that therefore the Sputnik can in no way be taken as a proof of the effectiveness of the educational system created by the Central Committee's resolutions.

Thus, the transformations which took place in Soviet education were sometimes simply ignored abroad. In Soviet history of education they were considered unequivocally beneficial (Korolev, 1958; Korolev et al., 1961; Konstantinov et al., 1982), and even today some authors (Koliagin, 2001) consider the 1940s and 1950s—when the transformations were completed—a kind of golden age in Soviet mathematics education. Comparing the Moscow State University entrance exams from 1928 and 1953, we do

indeed find that the latter are considerably more demanding (see appendix). On the other hand, it is not difficult to find parallels between contemporary pedagogy and tendencies that were decisively rejected in the USSR during the 1930s, prompting an inclination to idealize the 1920s. There is a need for impartial studies that characterize the transformations which took place during the 1930s and 1940s without either applauding or criticizing them, but seek simply to determine what these transformations consisted in.[1] This is the aim of the present article, which relies mainly on materials from St. Petersburg archives and the pedagogical publications of the 1920s-1940s.

Post-Revolutionary Schools

The period between the Revolution and the Central Committee's resolutions in the 1930s was relatively brief, lasting from the end of 1917 until 1931. The destruction of the pre-Revolutionary school system—with its schools of "routines and rote memorization"—and the establishment of a new "school of labor" (Blonsky, 1918) were seen at the time as the most important objectives in education. Attitudes toward organization and methodology also went through a corresponding transformation. Korolev (1958) notes that the People's Commissariat of Education (Ministry of Education), wishing to turn away from former bureaucratic practices that had "suffocated Russian education," initially rejected the idea of centrally-issued teaching plans and curricula altogether, restricting its own input only to general guidelines (p. 223). Moreover, even changes that were implemented systematically did not take hold all at once. Therefore, in studying mathematics education during this period, one must take into account the fact that it was not uniform across the country.

Although there is no space here to analyze the variations that existed at the time, it is clear that unprecedented emphasis was put on the general educational and applied significance of mathematics education. Sample school programs from the Northern Region, for example, read as follows:

> The course in mathematics is structured and conducted according to its basic-minimum program not so much in the interests of future mathematicians or future engineers, chemists, statisticians, and so on, as with the aim of filling in those missing components of the liberal education system which only mathematics can provide (Materials on Education Reform, 1919, p. 5).

School programs from 1920 stated that the main significance of mathematics consisted in the fact that it "provides methods that, in their application to reality, have no substitutes," while "the significance of mathematics as an abstract science, for exercising the minds of young people, is negligible" (quoted in Korolev, 1958, p. 258). Consequently, it was seen as desirable as far as possible, "when covering mathematics, to present it relation to the productive processes of the working collective" (Vol'berg, 1918, p. 14). The systematic course in mathematics was not quite suited for this purpose and the so-called complex method—in which certain topics were studied "complexly," from the perspective of different school subjects—turned out to be more appropriate.

The well-known Russian writer Veniamin Kaverin described this system as follows:

> I remember how we covered the duck. We covered the duck in three classes at once: geography, science, and Russian language. In science class, the duck was studied as a duck: what kind of wings it has, what kind of feet, how it swims, and so on. In geography class, the same duck was studied as a resident of the planet: we had to show on the map where it lives and where it does not live. In Russian class, Serafima Petrovna [the teacher] taught us to write "d-u-c-k." (pp. 70-71)

We do not know how the subject "duck" was covered in mathematics class, but we do know how the topic "horse" was covered (Gratsiansky, 1926). Students solved problems of the following type: "One horse needs four horseshoes. How many horseshoes are needed for 23 horses?" To be sure, one could find more natural connections as well, for example, educators developed the subject "post office," which seemed to have come straight out of the pages of contemporary textbooks (Ponomareva, 1926). Also fashionable was the so-called Dalton Plan, which devoted an enormous amount of time to independent work (Sigov, 1925). In general, many innovative ideas that were popular among Russian and international reformers of mathematics education were put into practice on a massive scale.

The programs in mathematics during this time were far from modest: they included the concept of the limit and other topics in analysis, the solution of various types of equations, and a quite intensive course in geometry (Krogius and Popov, 1928). However, these programs were presented to teachers as recommendations rather than requirements: the methodological guidelines in Krogius and Popov's book from 1928 mention different approaches and refer to different publications, the final choice and selection among which is largely left up to the teacher. In general, it bears repeating that the propaganda about new methods did not always achieve its desired goal in practice. Korolev et al. (1961) claims that in practice the complex method was not widely used in the higher grades (p. 176). However, a report put out by the Leningrad city school board in 1931-32—after the first of the Central Committee's resolutions—describes a related pedagogical methodology, "the project approach," and states that "in the spring of 1931, all Leningrad schools followed the project system, and the Educational-Pedagogical State Publishing House (Uchpedgiz) issued textbooks based on the same principle." But this may have been an exaggeration made in order set up the boast that immediately followed: "already by the end of 1931, we find in all Leningrad schools a decisive rejection of the project approach and a struggle against this approach, which derives from the commercial practices of the petit bourgeoisie and severs practice from revolutionary theory" (Report, 1932, p. 62).

On the Fundamental Changes

The assertive style of the report quoted above was typical of the campaign that begun after the publication of the Central Committee's 1931 resolution, which stated that "school education does not provide students with an adequate body of general knowledge and does not satisfactorily solve the problem of preparing educated people with a sound grasp of scientific basics for colleges and institutions of higher learning" (People's Education, p. 157). Consequently, the earlier theorizing was declared to have been a left-

wing deviation from the party line and intensive reforms in teaching began. These changes did not take place overnight: a number of crucial steps were taken during the 1930s, but the 1940s saw numerous changes as well. The transformation as a whole was a rather lengthy and complicated process that can necessarily be only sketched in its general outlines in this article.

Centralization. The programs issued by the People's Commissariat of Education became virtually absolutely mandatory. As early as 1932, on-site reports began by relating how the programs were being implemented in the schools, although they also noted certain deviations, supposedly caused by the programs' difficulty (Report, 1932, p. 3). The instructional letters distributed by the People's Commissariat of Education (Berezanskaya, 1933) sharply criticized teachers who switched the order of various topics in the curriculum, omitted something from the program, or added something to it. Textbooks that were stable and identical for the whole country were introduced. Subsequently, the centralization increased more and more—for example, in the 1940s, graduation exams in mathematics became standardized, with the Ministry of Education distributing identical tests for all the schools in the country (Karp, 2007a).

Programs. New sections that had appeared in mathematics curricula during the years following the Revolution disappeared rather quickly. The elements of higher mathematics vanished, and teachers began to talk less and less about functions. Analyzing the programs of the 1937-38 school year, Sakharov (1938) writes: "With a single stroke of the pen, the elementary course in geometry for the fifth grade—which more than one generation of mathematicians has struggled to defend—has been eliminated" (p. 78). By contrast, traditional gymnasium subjects—problems involving the Newton binomial, etc.—began receiving greater attention, even though these subjects were regarded as outdated at the time (Report, 1945). The Leningrad city school board report for 1932 complains about the fact that algebra and geometry are still not sufficiently separated from one another, resulting in an unsystematic approach**,** but this shortcoming was overcome in subsequent years. It should be noted that the standard textbooks introduced in all the schools in the country were revised versions of textbooks that dated from before the Revolution (Karp, 2002).

Working with teachers. Demands on teachers, and above all on their knowledge of the subject, were sharply raised. The chairman of the Leningrad city school board remarked at a teachers' conference that good teachers "attain a high level of discipline, a high level of order in the classroom, and a high level of achievement by comparison with the other classes... because they have, first and foremost, a good command of their subject" (Transcript, 1935, p. 82). At an inspectors' conference, the Leningrad city school board representative aggressively inquired: "How many teachers do you have who are illiterate in Russian language and mathematics?" And he was clearly displeased when it turned out that only teachers who lacked an adequate background in Russian language had been included in the answer to his question, while those with a poor knowledge of mathematics had been left out (Transcript, 1935, p. 6).

At a certain stage in these developments, even instructors of methodology were informed that their position was secondary to that of instructors specializing in various subjects. As the Leningrad city school board representative told mathematics teacher educators at a conference:

> Face the facts. What do you teach the teacher? You yourselves have stated that you teach him methodological techniques. But is this enough? No, it is not enough. Since the teacher does not know his subject, he must acquire command of his subject. Otherwise, his teaching will be mere scholasticism, mere going-through-the-motions, which the Soviet government has no need for. (Transcript, 1934, p. 28)

Consequently, educators began to talk about the need to broaden the teacher's education. They even went so far as to urge that every time a teacher missed a teachers' seminar, his absence should be reported to the director of the school, and that teachers with too many absences should get fired from their jobs (Transcript, 1934, p. 25). Calls for greater involvement of instructors specializing in particular subjects in the work of the school were also heard:

> Those who worked in St. Petersburg will remember that not only university instructors were invited to work in schools, but professors as well, and there were many individuals who were instructors at a gymnasium, professors, and qualified methodologists as well. And it appeared that these professors gave us decent classes from the point of view of their subject. (p. 27)

Not everything always went well with professors, however. A report from the Leningrad City Institute of Teachers' Continuing Education for 1938-39 stated that "as a rule, research mathematicians have extremely poor knowledge of high schools, working conditions in high schools, and high school teachers. All of these facts rendered the staffing of the mathematics' department extremely difficult" (Annual Report, 1939, p. 3). But teachers did have to attend continuing education courses and seminars. Somewhat coyly, the head of the trade union section in one school complained at a meeting that no one had any time for community work because "too much emphasis has been put on the academic side of things—people spend all their time in the teaching lab with these lessons in order to improve their knowledge... some are raising their qualifications, others are going to classes, and so on" (Transcript, 1935, p. 42).

Methodology. Such continuing education classes devoted considerable attention to teaching methodology. One might say that, over time, virtually normative requirements developed for how classes ought to be conducted. By 1949, educators could write straightforwardly: "Every teacher of mathematics is required to construct a lesson in a pedagogically correct fashion" (Report, 1949, p. 3). The same report noted that "the following plan is typical of most lessons: (a) homework review; (b) presentation of new content; (c) content reinforcement; (d) homework for the next lesson" (p. 11).

But the correct construction of a lesson was seen to consist not so much in following this form, as in intensive teaching, which could be achieved by various means, and which ensured heightened attention from the students. Speaking at a party meeting, a mathematics teacher from one school formulated this requirement with a bureaucratic flair: "In order to liquidate failure, it is necessary... that measures be taken to keep the students in a special state of tension, to ask questions more often" (Minutes, 1949, p. 28). The Leningrad city school board chairman put it better:

> What do we want when we demand from the teacher a lively, active approach, vividness, examples, and so on, and so forth? We want all of these measures to secure a lively interest on the part of the child in the subject being taught. (Transcript, 1935, p. 84)

In any event, more important than such theoretical propositions were actual exemplary lessons that were identified and promoted as models to be followed. The Leningrad city school board reports for 1932-33 contain praise for individual teachers. One teacher "possesses the ability to alternate between... independent work by students on small assignments and general active discussion of the results of the work by the class as a whole under the skillful guidance of the teacher" (p. 85). Another teacher knows how to involve the entire class in collective active work under conditions of exemplary discipline. A third teacher uses vivid illustrative models in solving stereometric problems, while his students themselves create their own models. A fourth teacher has her students construct proofs on their own, with her guidance, and this is followed by "precise and accurate execution of sketches and notations in notebooks" (p. 86).

Verification and monitoring. A key aspect of this emerging educational system were its stringent requirements and pervasive monitoring. The teacher had to monitor the students constantly, the principal had to monitor the teacher, the inspector had to monitor both the teacher and the principal, etc. A problem of paramount importance for the schools was to prevent students from falling behind or failing: students who failed mathematics numbered in the thousands in Leningrad; for example, in the first quarter of the 1935-36 school year, in all 7 grades mathematics classes in the city of Leningrad, only 83% of the students passed (Report, 1936, p. 2), and subsequently in the 1930s and 1940s the percentage of failing students remained consistently high. Teachers had to work constantly with failing students, but they were not allowed to give in to "rotten liberal tendencies" and inflate their grades. The elimination of "rotten liberal tendencies" was seen as a worthy objective and a significant achievement. As the Krasnogvardeysky district school board report for 1946 put it: "The central achievement in the teaching of mathematics this year consists in increased precision and rigidity in the requirements, and the elimination of liberalism in grading" (p. 16).

There was no liberalism, too, with respect to teachers. The surviving documents indicate, for example, that L., a mathematics teacher who had started working at her school on January 19, 1937, was being investigated by a special team of inspectors already by the second month of her employment there, and that a certain Comrade Pryanishnikova had visited her classes and had "found a series of shortcomings: the lesson was organized incorrectly, the discipline was poor, the notebooks were not being checked adequately." Then L.'s classes were observed by "the vice principal for the fifth and sixth grades, who also noted the defects in her work... and indicated the measures that must be taken in order to eliminate them." Then the principal requested the notebooks from L.'s classes for re-checking and discovered that they had not been checked for almost one month, and that her students' tests had been written not in special notebooks but on separate sheets of papers, etc. (An Examination of Complaints, 1937, p. 177). All of this led to the teacher getting fired, although her dismissal was subsequently appealed and overturned, since she was able to show that she was working on improving herself and, in particular, that she was going to the municipal methodological office for consultations, and that in improperly handling her students' notebooks she had acted not

on her own initiative, but on the advice of the same Comrade Pryanishnikova, who had recommended that instead of using separate notebooks in the classroom and at home, students use simply notebooks No. 1 and No. 2.

A good principal or vice principal had to observe hundreds of classes. For example, in one Leningrad school in 1946, "from October 24 to November 4, the principal visited two seventh grade classes in Russian language and mathematics every day, in order to check up on the teachers' work in correcting the shortcomings in the students' knowledge as a result of omissions in their education during the fifth and sixth grades" (Note, 1946, p. 3), while the vice principal visited 228 classes during the first semester. Even so, both the principal and the vice principal were criticized for shortcomings in their own work, namely, the fact that they "are unable to keep detailed notes about the classes that they observe and their recommendations, and often fail to make sure that their recommendations are being followed. Brief, incomplete notes lose their value" (p. 4).

City school board inspectors were also monitored and not permitted to shirk their responsibilities. A note about the state of verification procedures (Annual Report of the Leningrad City School Board, 1946) stated:

> There are repeated instances in which city school board inspectors, even when they have been alerted by school principals, do not adequately monitor the work of teachers who produce unsatisfactory results, and fail to draw any conclusions from their observations. Thus, when Comrade Vasilyev, a city school board inspector, visited School No. 74 after talking to its principal, he did not observe a single class and wrote in teacher Rappoport's work review notebook: "Measures must be taken to eliminate shortcomings in the teaching of mathematics and to raise student achievement in this subject".... Meanwhile, when Degtyarev, a city school board consultant, observed this teacher's classes, he left no remarks at all concerning this issue in the school and limited himself to a personal conservation with the principal." (pp. 63-64)

Ideology. Soviet society was permeated with ideology. For the schools of the 1920s, whose task was to create the "new man," the promotion of Communist ideology was evidently the most important objective. The Central Committee resolutions that restructured Soviet education were seen as calls for a return to ordinary education in different subjects in place of propaganda. In a short story written in 1934 by two famous humorists (Il'f, Petrov, 1985), an old Bolshevik reads the Central Committee's resolution and discovers that his own son knows nothing about any school subject (including mathematics: the boy does not know how to tell if a number is divisible by three), but spends all his time going over ideologically correct literature. The father shouts that the son must study, and that he will have time to go over ideological literature later at the Communist academy. The Central Committee resolutions themselves indicated that education was the most important objective and called for a reduction in the students' ideological workload, which could hinder their studies. In practice, ideology did not disappear from the schools and even mathematics teachers were given the task of cultivating Soviet patriotism and other social views among their students. Nonetheless, in mathematics classes this task had to be fulfilled in such a way as not to interfere with the

primary objective—teaching the students mathematics. Perhaps this constituted the main difference between school-level mathematics and other subjects (Karp, 2007b).

An increase in the number of students. Perhaps the most important change consisted in the fact that, due to an increased need for people with a higher education, serious school-level mathematics education was made available to a much greater number of people than ever before. The following table indicates the annual growth in the number of students in the higher grades in Leningrad (Leningrad City School Board Report, 1938, p. 5):

School Year	Grade 7	8	9	10
35-36	22,997	10,993	6,211	2,500
36-37	26,984	14,328	7,342	4,533
37-38	34,074	19,411	11,360	6,461

Prior to the Revolution, the fundamental theoretical gymnasium course in mathematics was available only to a very small number of students. Now such a course was accessible to millions.

Discussion and Conclusion

To conclude that the Sputnik reflected the virtues of the schools of the 1920s would be no less naive, of course, than to conclude that it proved the virtues of the schools of the 1950s. Yet it was in fact the case that, while the West was busy discussing the fact that Johnny cannot—and does not want to—become acquainted with serious mathematics, and moreover has no apparent need for serious mathematics, Ivan was studying this kind of mathematics, complete with proofs and complicated lines of reasoning. And it was precisely in the 1930s that serious mathematics first became available to Soviet schoolchildren on a massive scale. Why exactly this change took place—and just how beneficial were the administrative and various other curricular transformations that accompanied it—is a separate question.

These changes in Soviet education took place within the context of the cultural politics of the time. In literature, for example, it was precisely at this time that proletarian writers' associations came to be seen as excessively left-wing—deviations from the "general line" of the Communist Party—and replaced by a consolidated Writers' Union, which was nominally much more tolerant toward traditional literature. In reality, the level of tolerance dropped even below what it had been in the 1920s, which were characterized by the great Russian poet Anna Akhmatova as "vegetarian" by comparison with the more carnivorous years that followed. Traditionalism and conservatism both in education and in literature turned out to be far more fitting under the new conditions than the spirit of revolutionary reform (whatever its virtues or defects were). But solving problems on geometric construction which were rooted in traditional Euclidian geometry was and remains an engagement with genuine mathematics; by contrast, the new socialist Tolstoys of the 1930s usually had little to do with real literature.

Mathematics turned out to be necessary for a totalitarian state occupied not with the creation of a new, revolutionary man, but with the preparation of qualified military engineers on a massive scale. It was this objective that led the authorities to offer a

serious school-level course in mathematics on a massive scale. Certain restrictions started being introduced rather quickly, for example, during the 1940s education in the higher grades ceased to be free (see Konstantinov et al., 1982); but a full return to the previous way of doing things was not planned and indeed was hardly feasible. In addition, by the time of revolution, the course in mathematics—though then offered to a relatively small circle of students—had largely taken shape as a coherent whole; and later the unique position of mathematics—which remained comparatively free of ideology—was quite favorable to its preservation and development.

It is noteworthy that the mathematics of cumbersome transformations turned out to resonate with the new Stalin's era, while the curricular innovations of the 1920s came to be seen as useless. This was probably due mainly to the fact that education began following a pre-Revolutionary model, but it is impossible to avoid the impression that students who carefully and diligently completed assignments that were long and complicated, but entirely routine—and who solved problems by following rules and instructions that they had been given by their teachers—were well matched with the spirit of the new system of education.

Experiments in restructuring programs that had been cut short during the 1930s were subsequently revived in the USSR and Russia: the elementary course in geometry returned once more, as did various elements of higher mathematics, while Newton's binomial and problems with cumbersome transformations ended up disappearing from school-level education. "Rotten liberalism," by contrast, ended up gaining the upper hand: already by the beginning of the 1970s, only 1.3% of students in Leningrad were being left back—almost ten times fewer than in the 1950s, and most importantly, this statistic was published for internal use only, i.e. as classified information (Correspondence, 1972). Grade falsification and grade inflation—"percentage-mania," as it later came to be called—became widespread phenomena. Under conditions of general state terrorism, a system founded on total, minute-by-minute control could still retain a certain degree of effectiveness. But the resources for such control started running out even before Stalin's death. And even much earlier than that, verification and control often amounted merely to discovering deviations from instructions, no matter how insignificant they were, thus promoting the mindless following of established patterns and routines.

On the other hand, the existence of high standards for students and high standards for teachers led to the creation of a certain methodological tradition and above all to a tradition of the intense, densely-packed lesson—a lesson that was challenging and substantive from the mathematical point of view, and varied and effective from the pedagogical perspective. Moreover, the widespread study of serious mathematics could not but give rise in society to a tradition of respect for such study and this was undoubtedly one of the signal achievements of Russian mathematics education.

An analysis of the indirect consequences of the reforms of the 1930s and 1940s would inevitably lead us to a discussion of the present day, which lies outside the scope of the present article. Let us merely note that the traditions of Russian mathematics education remain widely discussed by contemporary authors (see http://www.mccme.ru/edu/ for example), and therefore what happened over seventy years ago remains relevant today. The collection of data and the study of materials that have survived from that time must continue.

Appendix

Moscow State Univesity entrance exam from 1928

1. Find the volume of a regular, four-faced pyramid, given a dihedral angle α at its vertex and the area of a face.
2. Factor $x^8 - 4y^8$.
3. Write down six numbers between 7 and 35 that form an arithmetic progression with those two numbers. (Gurvits et al, 1929, p. 78)

Moscow State Univesity entrance exam from 1953

1. Two factories received orders for the same number of cars. The first factory started operating 20 days earlier than the second one, and finished 5 days earlier. By the time that both of the factories together had completed one third of the combined total of their orders, the first factory had manufactured 4 times as many cars as the second factory. All together, the first factory operated x days, manufacturing m cars per day, while the second factory operated y days, manufacturing n cars per day. Find all values of x, y, m, n and all relations $\frac{x}{y}$ and $\frac{m}{n}$, that can be determined from the conditions of the problem.
2. What values of x satisfy the inequality $\frac{1}{x} < \frac{1}{x-1} - \frac{1}{2}$?
3. How many six-digit numbers are there that have three even digits and three odd digits? (Modenov, 1954, 77)

References

Benton, W. (1958). *This is the challenge*. New York: Associated College Presses.

Berezanskaya (1933). *Matematika v sredney shkole. Instruktivno-metodicheskoe pis'mo Narkomprosa RSFSR*. OGIZ, Uchpedgiz.

Blonsky, P.(1919). *Trudovaya schkola* [School of Labor]. Moscow.

Dokladnaya zapiska i analizy Instituta usovershenstvovaniya uchiteley o sostoyanii prepodavaniya biologii, matematiki, russkogo yazyka i geografii. [Report and analyses of the Teacher Continuing Education Institute on the state of instruction in biology, mathematics, Russian language, and geography] (1945). TSGA IPD, f. 25, op.11, d.310.

Dokladnaya zapiska LenGorono ob itogakh uchebno-vospitatel'noy raboty za 1937/38 uchebnyi god v shkolakh Leningrada [Leningrad city school board report on the outcomes of teaching and instruction for the 1937-38 school year in Leningrad schools] (1938). TSGA, f, 5039, op. 3, d, 201.

Dokladnye zapiski i otchety o sostoyanii prepodavaniya v shkolakh [Reports and briefs on the state of teaching in schools] (1939). TSGA, f. 5039, op. 3, d. 154.

Ewing, E.T. (2002). *The teachers of Stalinism*. New York: Peter Lang

Godovoy otchet Gorodskogo otdela narodnogo obrazovaniya, spravki inspektorov o sostoyanii uchebno-vospitatel'noy raboty shkol i znanii uchaschikhsya g. Leningrada,

1945-46 uchebnyi god [Annual report of the Leningrad city school board and inspectors' reports on the state of teaching and instruction in schools and Leningrad students' proficiency for the 1945-46 school year] (1946). TSGA IPD, f. 25, op. 11, d. 343.

Godovoy otchet o rabote fakul'teta za 1938/39 uchebnyi god [Annual report on the work of the department for the 1938-39 school year] (1939). TSGA, f. 4966, op. 1, d. 10.

Gratsianskii, I.I. (1926). Metodika matematiki i kompleksnaya systema. [The methodology of mathematics and the complex system.] In I. I. Gratsianskii (Ed) *Matematika v shkole*. Moscow-Leningrad: Gosudarstvennoe izdatel'stvo, 8-15.

Gurvits,Yu, Znamenskii, M., Fridenberg, V. (1929). Analiz priema v vuzy osen'iu 1928 goda. [Analysis of college admissions in the fall of 1928.] *Fizika, khimiya, matematika, tekhnika v trudovoy shkole*, # 5, 76-85.

Holmes, L. (1991). The Kremlin and the Schoolhouse. Bloomington and Indianapolis: Indiana University Press.

Il'f, I., Petrov, E. (1985). Razgovory za chainym stolom [Conversations around the Tea Table]. In *Rasskazy, fel'etony, stat'i*. Moscow: Izdatel'stvo "Pravda", 32-36.

Karp, A. (2002). *Klassik real'nogo obrazovaniya* [Classic of Genuine Education]. St. Petersburg: SMIO-Press.

Karp, A. (2007a) Exams in Algebra in Russia: Toward a History of High Stakes Testing. *International Journal for the History of Mathematics Education*, 2(1), 39-57.

Karp, A. (2007b). The Cold War in the Soviet School: A Case Study of Mathematics. *European Education*, vol. 38, #4, 23-43.

Kaverin, V.A. (1950). *Dva kapitana*. [Two captains.] Moscow: Gosudarstvennoe izdatel'stvo khudozhestvennoy literatury.

Koliagin, Iu. M. (2001) *Russian Schools and Mathematics Education*. [Russkaya shkola i matematicheskoe obrasovanie]. M: Prosveschenie.

Konstantinov N.A., Medynskii, E.N., Shabaeva, M.F. (1982). *Istoriya pedagogiki*. [The history of pedagogy]. Moscow: Prosveschenie

Korolev, F.F. (1958). *Ocherki po istorii sovetskoy shkoly i pedagogiki. 1917-1920.* [Sketches in the History of Soviet Schools and Pedagogy. 1917-1920]. Moscow: Izdatel'stvo Akademii pedagogicheskikh nauk RSFSR.

Korolev, F.F., Korneichik, T.D.; Ravkin, Z.I. (1961). *Ocherki po istorii sovetskoy shkoly i pedagogiki. 1921-1931*. [Sketches in the History of Soviet Schools and Pedagogy. 1921-1931]. Moscow: Izdatel'stvo Akademii pedagogicheskikh nauk RSFSR.

Krogius, V.A., Popov, N.S. (1928). *Sputnik prepodavatelya matematiki*. [The mathematics teacher's companion.] Moscow-Leningrad: Gosudarstvennoe izdatel'stvo.

Materialy po reforme schkoly. Primernye programmy po matematike [Materials on school reforms. Model programs in mathematics] (1919). Izdanie otdela podgotovki uchiteley Komissariata narodnogo prosvescheniya Soiuza kommun Severnoy oblasti.

Modenov, P.S. (1954). *Sbornik zadach po matematike*. [Problem book in mathematics.] Moscow: Sovetskaya nauka.

Narodnoe obrazovanie v SSSR. Sbornik dokumentov. 1917-1973. [People's education in the USSR. Collection of documents.] (1974). Moscow: Pedagogika

Otchet Krasnogvardeyskogo rayionnogo otdela narodnogo obrazovaniya o rebote shkol rayiona za 1945-46 [Krasnogvardeysky district school board report on the work of the schools in the district for 1945-46] (1946). TSGA IPD, f. 25, op. 11, d. 399.

Otchet LenGorono o rabote shkol za 1931-32 gg. [Leningrad city school board report on the work of schools in 1931-32] (part 2). (1932), TSGA, f. 5039, op. 3, d. 2.

Otchety o sostoyanii prepodavaniya i kachestve znanii uchaschikhsya shkol Leningrada po matematike i arifmetike. [Reports on the state of instruction and Leningrad student proficiency levels in mathematics and arithmetic] (1949). TSGA, f. 4966, op. 1, d. 340.

Otchety rayionnykh otdelov narodnogo obrazovaniya za I polugodie 1932-33 uchebnogo goda. [District school board reports for the first semester of 1932-33] (1933). TSGA, f. 5039, op. 3, d. 3.

Perepiska s Ministerstvom prosvescheniya RSFSR o postanovke uchebno-vospitatel'noy raboty v shkolakh Leningrada [Correspondence with the Ministry of Education of the RSFSR concerning instruction and teaching in Leningrad schools] (1972). TSGA, f. 5039, op. 9, d. 8

Ponomareva, A.I. (1926). Opyt razrabotki kompleksnoy temy "narodnaya svyaz' (pochta) [Developing the complex subject of "communications" (post office)]. In I. I. Gratsianskii (Ed). *Matematika v shkole*. Moscow-Leningrad: Gosudarstvennoe izdatel'stvo, 25-40.

Protokoly partsobranii shkoly # 189 [Minutes of party meetings at School No. 189] (1949), TSGA IPD, f. 4414, op. 1, d. 8,

Razbor zhalob i zayavlenii uchiteley g. Leningrada. [An examination of complaints and grievances by Leningrad teachers] (1937). TSGA, f. 5039, op. 3, d. 194.

Sakharov (1938). Novye programmy po matematike za 1937/1938 uchebnyi god. [New programs in mathematics during the 1937-38 school year.] *Matematika v shkole*, # 1, 77-82.

Sigov, I.A. (1925). Dal'ton-plan v shkolakh vtoroy stupeni. [The Dalton Plan in secondary schools.] In I.A. Sigov, I.S.Simonov (Eds.) *Voprosy prepodavaniya matematiki.* Leningrad: Brokgauz-Efron, 54-67.

Spravka o proverke sostoyaniya kontrolya za rabotoy uchitelya v shkolakh ## 21 i 38 Vasileostrovskogo raiona [Note on the monitoring of teachers in Schools Nos. 22 and 38 in the Vasileostrovsky District] (1946). TSGA, f. 25, op. 11, d. 381.

Stenogramma soveschaniya s inspektorami Volodarskogo i Petrogradskogo raionov o prorabotke materialov Dekabr'skogo plenuma TSK VKP (b) i postanovleniya SNK i TSK VKP(b) ot 3 sentyabrya o shkole. [Transcript of a meeting with Volodarsky and Petrogradsky District inspectors containing a discussion of the materials of the December plentary meeting of the Central Committee of the Communist Party and the Central Committee resolutions of September 3 concerning schools] (1935). TSGA, f. 5039, op. 3, d. 95.

Stenogramma disputa po voprosam metodicheskogo rukovodstva shkolami [Transcript of a debate on methodological guidelines for schools] (1934). TSGA, f. 5039, op. 3, d. 38.

Vol'berg, O. (1918). Matematika v trudovoy shkole [Mathematics in the school of labor]. *Matematika v shkole,* 1(1-2), 9-18.

[1] The limited size of this article prevents us from undertaking a detailed analysis of the existing literature on Soviet pedagogy of the 1930s-1940s. However, mention must be made of books by Holmes (1991) and Ewing (2002) that are relevant to the present discussion. It is worth noting that, by contrast with these authors, we are much more concerned with the concrete details of how specific topic (mathematics) was taught. In our view, this approach opens up additional possibilities.