

Moscow City, Russian Federation

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Introduction

Overview of Education System

Under the current Law on Education passed in 2012,¹ education policy in the Russian Federation is developed at the national level and implemented at regional and local levels under the oversight of the national authorities.

The public education system in the Russian Federation consists of general education, vocational education, further education, and vocational training, providing the right to education throughout life (lifelong learning). General education comprises the following levels: preprimary education, primary general education, basic general education or lower secondary education, and secondary general education or upper secondary education. Federal State Educational Standards set requirements for learning outcomes at each level.^{2,3}

As a specialized authority of the capital city, the Moscow Department of Education and Science carries out state administration and education policy suitable for the regional socioeconomic characteristics of the City of Moscow. It ensures that the education system functions for the benefit of its residents, the constitutional right to education is realized, and public services are organized and provided at all levels of education.⁴

In Moscow, general education is provided by major multiprofile education complexes that include preprimary, primary, basic, and secondary educational institutions as well as additional education institutions, special corrective institutions, and other institutions.

The education system in the City of Moscow provides students with many opportunities to become acquainted with various professions, which helps graduates make sound professional choices. In accordance with the priority direction “Development of the profile instruction system in the conditions of integration of general and additional education,” preprofessional educational programs are implemented in academic, medical, engineering, and Information Technology (IT) classes (Grades 10 to 11) in 50 percent of Moscow schools. These programs provide in-depth study of mathematics and science. After graduation, students participate in a preprofessional exam. Universities that implement preprofessional education projects take the results of this exam into account.⁵

To prepare students for admission to the preprofessional class, preprofile instruction is carried out in Grades 7 to 9. Students study some subjects, including mathematics and science (physics,

chemistry, biology, etc.), at an advanced level. They also take elective courses and participate in additional education programs.

Work is organized with close cooperation between schools and universities, which facilitates students' success studying school subjects and special elective courses in preparation for the preprofessional exam. Consultations and master classes conducted by university teachers in Moscow schools, as well as cooperation with enterprises, focus graduates' training on specialized subjects.

A modern high-tech education environment has been created in Moscow for the development of preprofessional education. Moscow schools have access to research centers, scientific laboratories, children's technology parks, and IT polygons.

Use and Impact of TIMSS

Moscow took part in TIMSS as a separate region for the first time in 2019.

The Mathematics Curriculum in Primary and Lower Secondary Grades

The mathematics curriculum is unified throughout the Russian Federation. This information is provided in the [chapter about the Russian Federation](#).

The Science Curriculum in Primary and Lower Secondary Grades

The science curriculum is unified throughout the Russian Federation. This information is provided in the [chapter about the Russian Federation](#).

Professional Development Requirements and Programs

In Moscow, much attention is paid to the professional development of teachers. Under the current Law of Education, teachers have the right to professional training programs in education and pedagogy at least once every three years.

Since September 2013, education organizations have provided funding to train teaching staff in the City of Moscow. Thanks to targeted subsidies issued by the Department of Education and Science, Moscow schools have the right to choose education programs for professional development of their teachers independently. This process has improved the efficiency of educational organizations' expenditures in this area.

Moscow's education system has a regional register of additional professional programs that enable mathematics and science teachers to improve their professional skills purposefully. Teachers may use scientific resources from the teaching staff of the leading federal universities in Moscow and participate in training at high-tech enterprises, thereby improving their practical skills and qualifications in fundamental science and scientific knowledge. The principals of education organizations can quickly manage the professional development of their teachers and strengthen their educational organizations. Such approaches to improving teachers' skills ensure the development of professionalism among teaching staff with high-level communication,

research, and information skills. The professional development system for mathematics and science teachers in Moscow includes both express and long-term courses.

In addition, the following professional development events are held in Moscow:

- Olympiads for teachers on IT and meta-subject skills, including a meta-subject Olympiad and an Information and Communications Technology (ICT) Olympiad.
- Training for teachers in the format of the Unified State Examination (USE), which students take at the end of upper secondary school.
- Training courses for teacher teams from various schools in functional literacy, creative thinking, new teaching technologies, and new directions in assessment. Moscow has shifted its focus to support not just individual outstanding teachers, but teacher teams.

Monitoring Student Progress in Mathematics and Science

Monitoring of student progress in mathematics and science is implemented at the federal and regional levels, as well as at the school level.

Students take national examinations in Grades 9 and 11, but national examinations are not conducted in primary schools. To be awarded the basic and secondary school certificates, students must pass two compulsory national external examinations in Mathematics and Russian: the Basic State Exam (BSE) for basic school and the USE for secondary school. For the BSE, examination papers are developed centrally, and results are marked and graded at the regional level. For the USE, examination papers are developed centrally, and results are marked at the regional level and scaled centrally at the federal level. To earn a basic school certificate, students must also pass two additional examinations in subjects they select according to their future education plans. Passing the USEs enables graduates to enter the universities.

The National Studies of Education Quality (NSEQ) program consists of separate projects for studying the quality of education in specific academic subjects at specific levels of education within the overall program. Each project involves diagnostic work on a subject or some practical tasks, student questionnaires, and contextual information about the learning process. NSEQ is aimed at identifying participants' subject and meta-subject skills, as well as the formation of universal education skills to assess the quality of education at the national level and the development of the unified education space in the Russian Federation. It also promotes the standardization of evaluation procedures in education.

Development of the regional system of general education quality evaluation is a priority area for advancing metropolitan education. The regional system of education quality evaluation serves to:

- Provide information about trends in academic achievements to various stakeholders, including parents.
- Identify influences on the quality of education and ensuring informed management decisions.

- Enable the state-public evaluation of education quality.

The Moscow regional system of educational achievements assessment provides:

- Coverage of all levels of education (primary, basic, and secondary education).
- Measurement of school subject and meta-subject results.
- Development of assessment instruments in accordance with the Federal State Educational Standards of general education, taking into account international approaches to assessing the quality of education.

The Moscow regional independent assessment of education achievements is based on the following principles:

- Independence of assessment procedures, reliability, and validity of obtained results due to scrupulous compliance with all procedural requirements for the development of assessment tools and administration of tests—for instance, obligatory presence of an independent observer.
- Uniform standards of education results (including compulsory components determined by federal authorities and at a regional level) specifying the content and structure of regional assessment tools.
- Providing assessments in which education institutions participate on both compulsory and voluntary bases.

The Moscow system of independent assessment includes:

- Mandatory subject diagnostics in mathematics and science and integrated diagnostics on the assessment of meta-subject skills (mathematics literacy, science literacy).
- Diagnostics by choice of schools: both subject and meta-subject.

The within school system for assessing the quality of education is being created to monitor the results of the implementation of Federal State Educational Standards in each school. The development and implementation of the model is carried out by the school administration.

Special Initiatives in Mathematics and Science Education

In Moscow, much attention is paid to identifying and supporting talented students. Subject Olympiads are an instrument for identifying and developing student talent. Along with the All-Russian School Olympiad, the Moscow School Olympiad is held annually in Moscow. Since 2012, all schools in Moscow have held school-level Olympiads, including Olympiads in mathematics and science, so that every student in Moscow has a chance to participate in the All-Russian Olympiad.

Student talent development in Moscow is carried out in close cooperation with city structures subordinate to the Moscow Departments of Education and Science, Culture, and Sports.

The Mathematical Vertical Project has been implemented in Moscow schools since 2018. The goal of the project is to motivate students to study mathematics, science, and engineering; to develop the availability of advanced mathematics education as a basis for career development among graduates of Moscow schools; and to improve the quality of training for future applicants

to Moscow universities seeking to study science and engineering professions. As part of the project, more than half of Moscow schools have opened math classes. The instruction is based on an innovative program developed to provide multipurpose preprofessional training for students in Grades 7 to 9 in mathematics and related fields. After graduation, students will be able to continue their studies in specialized, preprofessional classes (Grades 10 to 11), and then study in leading Moscow universities in specialties that are in demand in the city. Within the framework of the project, students study a modern course of mathematics, attend clubs, and take electives in mathematics, science, and IT subjects. Instruction is conducted using specially developed teaching books of the Moscow Electronic School—a unique internet platform that automates most of the organizational, methodological, and pedagogical tasks of modern Moscow schools. Teachers who have been selected and specially trained work in these classes. Professional methodological support for schools is provided by the project’s resource centers—leading universities and the best schools in the city.

Saturdays of the Moscow Schoolchild is an education project for students and parents. Project participants have the opportunity to attend various master classes, seminars, and lectures by teachers of leading universities in the country, as well as in museums, parks, exhibitions, military units, TV studios, art venues, and other project locations.

The Kurchatov Center for Continuous Convergent (Interdisciplinary) Education (the Kurchatov Project) combines the efforts of teachers of education organizations; resources of network institutions of the Department of Education and Science of the City of Moscow; and specialists from the Kurchatov Institute, a national research center. Participation in the Kurchatov Project is a unique opportunity to organize the education process based on modern convergent laboratories equipped with high-tech training equipment. Participants in the Kurchatov Project are general education organizations, organizations of additional education, and the Kurchatov Institute. The goals of the project are to develop convergent thinking among students and to achieve effective intersubject interaction. The project enables students to form a complete picture of the world based on intersubject educational programs. It also provides an opportunity for students to work on projects and research using high-tech educational equipment. Participation in the project enables graduates to enter the leading technical and science universities.

Moscow is actively working to improve the quality of education in schools with poor learning outcomes. Schools Without Educational Deadlocks is a project organized and funded by the Department of Education and Science of the City of Moscow. It involves schools that have received a low rating in their contribution to the quality education of Moscow’s students. The objectives of the project are to improve the quality of education, motivate teaching teams to achieve high education results, and increase the level of professional development of school staff. These goals are achieved by monitoring student performance in the form of corrective diagnostics for students with low learning outcomes, and developing and implementing effective mechanisms for providing schools with methodological assistance (special training courses for teachers and administration, round tables and seminars on improving the quality of education, etc.). During

the implementation of the project, the dynamics of the learning outcomes, the quality of teaching, and the management of an education organization are analyzed using specially developed indicators.

In accordance with the regional system for assessing the quality of education, mandatory diagnostics are carried out regularly in Moscow schools for students with low BSE and USE results. The dynamics of regional diagnostics are also monitored, and individual support is provided to schools for students with low and high results.

References

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