Azerbaijan

Shirin Mammadov
Imran Ibishov
Royal Mahmudov
Institute of Education of the Republic of Azerbaijan

Introduction

Overview of Education System

The education system in Azerbaijan is governed by a variety of legal documents, including the nation's constitution; the 2009 Education Law; various decrees, orders, and decisions related to education; regulations from the Ministry of Science and Education; other relevant legal texts; and international agreements.[1] The Constitution of the Republic of Azerbaijan ensures the right to education for all citizens, with the government providing free compulsory education at the primary and secondary levels. Education is seen as crucial for the development of both society and the state, holding strategic importance and high priority. It is grounded in democratic, secular, national, and international principles.

The Azerbaijani Ministry of Science and Education, as the central executive authority, implements and regulates the government's education policy and manages the education processes. It works in collaboration with central and local government bodies, local administrations, international and nongovernmental organizations, and various individuals and legal entities. The Ministry is responsible for the following:

- implementing a single education policy throughout the country
- developing the education system in predetermined directions
- providing state control over the quality of education, regardless of legal status and property type
- organizing mental health services and social or pedagogical care
- studying and disseminating advanced pedagogical practice and achievements in pedagogical and psychological sciences
- identifying and training talented students
- promoting innovative teaching methods and efficient management tools for school principals and education staff
- strengthening educational materials, facilities, and services

Mandatory general secondary education in Azerbaijan lasts for 9 years, as outlined in the Education Law. The country has both public schools, which are owned by the state and nonprofit, and private schools, which generate income through tuition fees.

Exhibit 1 presents the levels of education in Azerbaijan.

Exhibit 1: Levels of Education in Azerbaijani Schools[2]

Level of Education		Description
Preprimary		Preprimary education is for children from birth to age 6 and is not compulsory. It is provided in nurseries (children below age 3), kindergartens (children ages 3 to 5 or 6), and schools (children ages 5 to 6).
Primary		This compulsory level of education begins at age 6 and covers the first 4 years (Grades 1 to 4).[3]
General secondary	Lower secondary	This level is also compulsory and covers students ages 10 to 15 (Grades 5 to 9). At the end of Grade 9, students take final assessments to receive a document that is considered a basis for continuing to the next level of education. After completing this level, students may choose to continue with vocational education.
	Upper secondary	This level includes students up to the age of 17 (Grades 10 and 11) and is not compulsory. After completion of this stage, students have to pass the final state attestation and then receive the Certificate of General Secondary Education.
Primary vocational		Students who have completed lower secondary education can enroll in 6-month, 1-year, and 2-year primary vocational education programs that lead to a certificate. The duration of the program is 2 years for Grade 11 graduates and 3 years for Grade 9 graduates.
Secondary vocational		Admission to this level requires passing the examination administered by the State Examination Center. Those who are admitted to secondary vocational education institutions on the basis of general secondary education (Grade 9) also get a full secondary education. A document on secondary vocational education gives the right of admission to institutions of higher education and is treated as a sub-bachelor's diploma.
Higher education	Baccalaureate	Graduates of the baccalaureate level who have completed higher education receive a bachelor's degree. The duration of the programs leading to the bachelor's degree is normally 4 years.
	Magistrate	The duration of a full-time master's degree program is 2 years.
	Doctorate	The duration of the programs leading to the doctor of philosophy or doctor of science degrees (introduced by the 2009 Education Law) is 3 to 4 years.

Use and Impact of TIMSS

Azerbaijan took part in the TIMSS assessment in both 2011 and again in 2019 but did not participate in the 2015 cycle. Although Azerbaijan's curriculum underwent significant changes in 2008, results from the 2011 TIMSS assessment did not reflect the curriculum changes at

that time since the students participating in TIMSS 2011 were not yet taught with the updated curriculum. However, following participation in the 2019 cycle, Azerbaijan began a curriculum revision process. Results from the TIMSS 2019 cycle had a notable effect on the revision process, particularly in the core subjects of mathematics and science, starting in 2020.

The Mathematics Curriculum in Primary and Lower Secondary Grades

The mathematics curriculum is a comprehensive framework delineating the primary objectives of mathematics instruction in mainstream educational institutions, encompassing all endeavors aimed at attaining overarching education goals. It is intricately tailored to address the diverse needs and opportunities of individual students and serves as a guiding document for educators, school administrators, textbook authors, parents, and the broader community. Serving as the cornerstone for the development of instructional materials and pedagogical methodologies, the curriculum informs the creation of manuals, educational aids, and teaching materials, while also guiding the selection of training methods and facilitating teacher development initiatives.

Aligned with outcome-driven content standards, the mathematics curriculum advocates for regular evaluation of student performance to ensure adherence to established benchmarks. While prioritizing the acceleration of student progress as a primary objective, it underscores the imperative of equipping students with essential life skills.

In formulating content standards, particular emphasis is placed on maintaining equilibrium among key learning outcomes, including computational proficiency, cognitive understanding, and problem-solving acumen. The current education paradigm fosters fundamental learning outcomes through the cohesive integration of content and activity streams, facilitating the delineation of essential knowledge and skill acquisition pathways for students.

Fourth-Grade Mathematics Curriculum

At the end of Grade 4, a student should be able to do the following:[4]

- demonstrate understanding and structure of numbers, as well as the interactions between numbers; recognize simple fractions; and give explanations
- demonstrate and use understanding for the meaning, properties, and interactions of arithmetic operations
- demonstrate estimation skills when performing arithmetic operations on numbers and problems
- use mathematical expressions and give explanations
- compare numerical expressions and solve simple equations
- express simple functional dependencies and provide comments
- solve simple problems related to direction and distance concepts and provide interpretations on a schematic basis

- know some of the properties of simple geometric figures and use them to solve problems
- compare the same quantities and interpret the result of the comparison
- measure quantities using measurement units and tools, as well as evaluate the result
- select and apply the appropriate method for data analysis
- provide predictions based on collected information, and understand and implement a simple assumption concept

The mathematics curriculum is organized by topic, with each topic including standards and substandards of what students should be able to do (see Exhibit 2).

Exhibit 2: Mathematics Curriculum Topics, Standards, and Substandards

Topic	Standard	Substandard
Numbers and operations	1.1. Demonstrate understanding of numbers, the structure of numbers, and the relationships between numbers, and recognize simple fractions	1.1.1. Read and write numbers in 1,000,000s 1.1.2. Determine the value of the digit while writing numbers based on the concepts of place and place value 1.1.3. Write the result of the compared numbers up to 1,000,000 with the help of the symbols >, <, and = 1.1.4. Indicate the numbers to 1,000,000 as the sum of place values 1.1.5. Describe numbers to 1,000,000 in different equivalent forms 1.1.6. Model simple fractions 1.1.7. Compare fractions of the same denominator 1.1.8. Describe the parts of quantity with the help of fractions
	1.2. Demonstrate comprehension of arithmetic properties and the relationship between them	1.2.1. Use arithmetic properties during calculations 1.2.2. Demonstrate knowledge of algorithms in multiplication and division of one-digit, two-digit, and three-digit numbers in the written form 1.2.3. Perform division with remainders
	1.3. Demonstrate estimation skills while performing arithmetic operations	1.3.1. Conduct verbal and written calculations on multidigit numbers 1.3.2. Use interactions between operations to verify the results of calculations 1.3.3. Find a number according to the fraction and a fraction according to a number 1.3.4. Solve simple and complex four-dimensional problems 1.3.5. Round numbers to 1,000,000 to a required place 1.3.6. Determine the approximate results of arithmetic operations

Topic	Standard	Substandard
Algebra and functions	2.1. Use mathematical expressions in calculations	2.1.1. Use the order of operations in calculating mathematical expressions 2.1.2. Identify the symbols that ensure the accuracy of the interactions 2.1.3. Use different numbers, variables, and symbols; write various number sentences with the help of arithmetic operations
	2.2. Compare number sentences and solve simple equations	2.2.1. Write the result of compared number sentences by using the symbols >, <, and = 2.2.2. Solve simple equations 2.2.3. Use equations in mathematical modeling of a problem 2.2.4. Use inequalities in comparison of quantities
	2.3. Express simple functional dependencies mathematically	2.3.1. Explain how one dependent variable influences the other 2.3.2. Coordinate simple functional dependencies with real-life issues 2.3.3. Explain the functional dependencies between different quantities (price, amount, value, speed, time, distance, labor productivity, duration of work, scope of work) 2.3.4. Express the dependencies between quantities in the form of a formula with variables
Geometry	3.1. Solve simple questions about direction and distance concepts based on drawings	3.1.1. Explain own impressions about the movement of items and figures 3.1.2. Define the opening forms of a cube, rectangular prism, cylinder, sphere, and cone 3.1.3. Describe the appearance of items and figures from different aspects
	3.2. Demonstrate knowledge of the properties of simple geometric figures	3.2.1. Demonstrate understanding of the perimeter and surface area of a polygon 3.2.2. Classify simple geometric figures 3.2.3. Use geometric shapes to model the solution of problems

Eighth-Grade Mathematics Curriculum

At the end of Grade 8, a student should be able to do the following:

- read, write, compare, and list irrational numbers; apply the properties of actions on clusters
- apply the properties of the square root of positive real numbers; simplify numerical expressions of the square root
- apply properties of ratios, proportions, and formulas of interest to solve various problems

- estimate square roots and compare the results with the value obtained by applying computational techniques
- construct and solve quadratic equations according to a real-life situation, solve simple problems of linear inequality, solve variations of linear inequalities
- construct the medians of a given triangle; construct a straight perpendicular line to a given straight line; apply the Pythagorean theorem; evaluate the trigonometric functions of some angles; calculate the area of a triangle, parallelogram, rhombus, and trapezoid
- apply the rotation of figures, construct a figure that is congruent with the given figure regarding symmetry and rotation
- find the coordinates of the midpoint of a line segment by the coordinates of the edge points, write the equation of a straight line given two points
- recognize and use international measuring units such as barrel, shaft, and Fahrenheit
- systematize the collected data according to their specificity and find quantities that characterize the limits of change in numerical data
- find the probability of the output of two independent and dependent events and apply the multiplication rule for the calculation of probabilities

The Science Curriculum in Primary and Lower Secondary Grades

Fourth-Grade Science Curriculum

The science curriculum for primary grades (Grades 1 to 4) comprises four content areas,[5] each of which has several learning outcomes that describe what students should be able to do (see Exhibit 3).

Exhibit 3: Science Curriculum Content Areas and Learning Outcomes for Primary Grades

Content Area	Learning Outcomes
Nature and Us	• see themselves as a part of nature • understand the importance of learning about nature • use the knowledge and skills acquired in contact with nature • explain the structure of the human body and the functioning of its main organs simply • develop and present simple projects to improve the environmental condition of the area • provide a simple geographic description of the area and the nature of Azerbaijan

Exhibit 3: Science Curriculum Content Areas and Learning Outcomes for Primary Grades (Continued)

Content Area	Learning Outcomes
Individual and Society	• describe a person as a social being • know that people are formed in different communities and tolerate these differences • link the cost-effective approach to used resources with family resources and the state budget • understand the benefits of working together and create a team with friends to solve certain issues • demonstrate basic knowledge about the country, its attributes, and its structural forms • know one's rights, use them, and respect the rights of others
Morality	• follow interpersonal communication etiquette consciously and express a critical attitude toward unethical behavior • demonstrate moral qualities through actions and behavior in the family, school, and community • know the scientific and religious worldviews about the origin of the world • understand the spiritual values that religions promote and distinguish them from superstition
Health and Safety	• take responsibility for some health-related issues and protection • recognize harmful habits that conflict with a healthy lifestyle • walk freely in the streets by using street signs • recognize the factors that threaten the security of life and follow the safety rules in daily life • use individual and collective protection tools in emergencies

At the end of Grade 4, students should be able to do the following:

- demonstrate awareness of their rights and respect for the rights and freedoms of other people; show sensitivity to the people surrounding them; express their personal opinion on these issues
- explain the most important safety regulations for the protection of human life and health
- demonstrate honesty, justice, humanism, and compassion; explain their views on these moral issues
- use economic knowledge in everyday life
- observe and comment on natural phenomena with a sensitive and caring attitude toward nature and ecology
- interpret events in society according to their age

Eighth-Grade Science Curriculum

The eighth-grade science curriculum includes physics, biology, and chemistry. At the end of Grade 8 physics, students should be able to do the following:[6]

- explain the nature and regularities of thermal and electromagnetic (electrical) phenomena; create and solve simple problems
- solve issues concerning the application of physical quantities characterizing the electric field
- differentiate substances by their physical properties; create and solve simple problems
- differentiate the aggregate states of a substance due to the structure, movement, and interaction of molecules
- build and solve the problems of electrical interactions in nature-related systems
- conduct experiments on thermal and electrical phenomena, measure physical quantities, and perform calculations
- explain the working principle of thermal techniques and assess the role of physical science in their creation

At the end of Grade 8 biology, students should be able to do the following:[7]

- interpret the areas of science that study human beings and the formation levels of their organisms
- conduct experiments to study the structure of living things
- compile a family tree
- interpret the biological processes taking place in the human body and perform relevant mathematical calculations
- differentiate physiological concepts inherent in living things
- explain the rules of health protection and provide first aid against diseases and injuries
- explain the influence of environmental factors on the human body
- prepare a presentation on the protection of the environment and its cleanness

The chemistry curriculum includes the following content areas:

- Substance and Material World
- Chemical Events
- Experiment and Modeling
- Chemistry and Life

At the end of Grade 8 chemistry, students should be able to do the following:[8]

- interpret the structure of substances and processes occurring in electrolyte solutions; solve problems
- explain the correctness of reactions related to major inorganic compounds and make calculations

- conduct observations and experiments on major inorganic compounds and develop models of their molecules
- explain the role of processes in solvents and electrolyte solutions in life and provide information on sources that pollute the environment
- prepare abstracts on the basic laws of chemistry and prominent scientists in the field of atomic structure

Teacher Professional Development Requirements and Programs

There are no mandatory professional development requirements or programs for teachers. Instead, in instances where there's a recognized need for professional advancement, schools facilitate the attendance of teachers in relevant professional development workshops or courses.

Ongoing Professional Development Programs

Professional development programs for teachers include the following:

- training on the content of the Azerbaijani language and mathematics subjects, and the application and methodology of textbooks for teachers at the primary education level
- in-service training on the organization of teaching based on new textbooks on the subjects of the Azerbaijani language and mathematics in the Azerbaijani sector of the primary education level
- in-service training on the organization of teaching based on simplified Azerbaijani language and mathematics textbooks for first-grade students with intellectual disabilities
- in-service training on the organization of teaching based on the *Nature* textbook for Grade 5 in the Azerbaijan and Russian sectors
- methodology of teaching *Nature*
- methodology of teaching the *Mathematics* textbook used in the primary grades and in-service development training on "Organization of education based on the *Mathematics* textbook" (Grade 5)
- in-service training on "Organization of teaching based on mathematics textbooks" at the primary education level, "Organization of education based on the textbook *Life Knowledge*" (Grades 1 and 2), "Organization of teaching based on the textbook *Nature*," "Organization of education based on the textbook *Geography*" (Grades 5 and 7), "Organization of education based on the textbook *Physics*" (Grade 7), "Organization of teaching based on the textbook *Biology*" (Grade 7), and "Organization of teaching based on the textbook *Chemistry*" (Grade 7)

Monitoring Student Progress in Mathematics and Science

Teachers administer quizzes following each topic covered in class and conduct comprehensive assessments at the culmination of each semester. Students' proficiency in mathematics is assessed during Grades 4 and 9, as well as during university entrance examinations. Similarly, science comprehension among students is evaluated during university entrance exams, contingent upon their chosen academic track.

Special Initiatives in Mathematics and Science Education

Special schools and projects that promote and focus on mathematics and science in Azerbaijan include the following:

- STEAM (science, technology, engineering, art, and mathematics) Project in 400 schools and 25 STEAM centers[9]
- mathematics, physics, and informatics lyceum in Baku and its regional branches
- chemistry-biology lyceum in Baku and its regional branches
- a center for special talented students that mostly focuses on mathematics and science classes

Suggested Reading

Aliyeva, E. (2016). AN OVERVIEW OF THE NATIONAL CURRICULUM DEVELOPMENT PROCESS FOR AZERBAIJAN. *The Online Journal of New Horizons in Education*, *6*(1), 13–26.

References

[1] Cabinet of Ministers. (2010). *State standards and programs (curricula) of general education levels*. http://edu.gov.az/upload/file/tehsil-pillesinin-dovlet-strandartlari-ve-proqramlari.pdf

[2] Ministry of Education, Republic of Azerbaijan. (2009). *Education Law of the Republic of Azerbaijan*. https://natlex.ilo.org/dyn/natlex2/natlex2/files/download/83429/AZE83429.pdf

[3] Cabinet of Ministers. (2010). *State standards and programs (curricula) of general education levels*. http://edu.gov.az/upload/file/tehsil-pillesinin-dovlet-strandartlari-ve-proqramlari.pdf

[4] Ministry of Education, Republic of Azerbaijan. (2012). *Education program (curricular) for mathematics science subject for general and upper secondary education levels (1–11 grades)*. Retrieved from https://en.calameo.com/read/0047665997a26f4993f23

[5] Institute of Education and Ministry of Education. (2012). *Education program (curricular) for life science subject for general education levels (1–9 grades)*. Retrieved from https://en.calameo.com/read/004766599adac0f57e654

[6] Ministry of Education, Republic of Azerbaijan. (2010). *Education program (curricular) for physics subject for general and upper secondary levels (6–11 grades)*. Retrieved from http://www.anl.az/down/meqale/az_muellimi/2010/iyun/125408.htm

7   Ministry of Education, Republic of Azerbaijan. (n.d.). *Education program (curricular) for biology subject for general education levels (6–9 grades)*. Retrieved from http://www.biologiya.org/?page_id=305

8   Ministry of Education, Republic of Azerbaijan. (n.d.). *Education program (curricular) for chemistry subject for general and upper secondary levels (7–11 grades)*. Retrieved from https://metodiktovsiyye.blogspot.com/2015/09/kimyaumumi-tlim-nticlri.html

9   Ministry of Education, Republic of Azerbaijan. (n.d.). *STEAM (science, technology, engineering, art, and math)*. Retrieved from http://steam.edu.az/