Islamic Republic of Iran

Masoud Kabiri
Research Institute for Education

Introduction

Overview of Education System

Education in the Islamic Republic of Iran is formally committed to providing all school-aged children a means toward achieving the Ideal Islamic Life (Hayate Tayyebah) at the individual, family, social, and global level. The *Fundamental Reform Document of Education*, the country's strategic document supporting this commitment, was introduced in 2011 and has identified a road map at the national level to achieve this aim.[1] Furthermore, education has a prominent place in the nation's constitution, and 11 articles in the constitution correspond to education issues such as free education and Farsi as the official and instructional language.[2]

The school system in Iran is highly centralized. The Ministry of Education is responsible for all tasks including setting the structure of the education system, recruiting public school teachers, financing schools, regulating the timetable, implementing examinations, and regulating unified education policies. Education departments in provinces and education districts are responsible for administering and implementing curricula under the supervision of the Ministry of Education. The development of curricula, identification of learning goals, and preparation and distribution of textbooks for each grade and subject are defined centrally by the Organization for Educational Research and Planning. However, responsibility for higher education lies with the Ministry of Science, Research, and Technology.

Preschool education serves children up to age 6 and is provided at preschool centers. Preschool education is not mandatory; however, early childhood programs are accessible for children in most areas to attend kindergarten for at least 1 year before starting school. Preschools are typically run by community groups or private sectors. With the establishment of the National Organization for Child Education in 2021, the government has attempted to develop preschool centers in order to facilitate the enrollment of children.

Students have a constitutional right to attend school, and the government provides free education for all students in primary and secondary public schools. Schooling is compulsory starting at age 6 with attendance in primary school and concludes at the end of lower secondary school. Although upper secondary school is not compulsory, a large majority of students are enrolled.

The education system is divided into two levels of primary and secondary education. Primary education comprises two consecutive periods: the first period (Grades 1 to 3) and the second

period (Grades 4 to 6). Secondary education is organized into lower and upper secondary education. Lower secondary education includes Grades 7 to 9, while upper secondary education (Grades 10 to 12) offers three tracks: (1) academic for students who want to continue their education at the university and that includes four programs (natural science, mathematics and physics, literature and humanities, and Islamic sciences); (2) technical and vocational; and (3) knowledge-skill (*Kar-Danesh*) for students who are preparing to enter the labor market. Typically, at the primary level, one teacher teaches all subjects, whereas secondary teachers are specialists in a subject. Moreover, special needs education, which is managed by the Organization of Exceptional Education, is prepared for students who need specific care due to physical or mental disabilities.

There are both public and private schools at all education levels. Public schools are fully supported by the government. Private schools are funded by parents, have hiring authority, and may have additional contents and programs, but they have to maintain their commitment to a formal education approach. Approximately 11.6% of students attend private schools.[3]

Use and Impact of TIMSS

Iran has participated in all cycles of TIMSS in Grades 4 and 8 since the first administration in 1995. Continuous participation in TIMSS has yielded evidence-based data and has provided a longitudinal and cross-country analysis of achievement and other important context variables. In the absence of systematic monitoring of the national education system, TIMSS has become an important part in evaluating the quality of education in Iran. Additionally, TIMSS has been highlighted as a significant source of information for policymakers to improve the education system. More specifically, TIMSS has played an important role in decisions affecting the development and updating of curricula.

International assessments attract a lot of media, political, and public attention. In order to provide accurate information, the National Study Center publishes a report after each TIMSS cycle to present the main findings. Moreover, released items in mathematics and science are published for teachers and researchers to become familiar with the purpose and design of assessment questions. Several papers based on TIMSS data have also been published in national journals, along with numerous master's and doctoral dissertations and theses.

The Mathematics Curriculum in Primary and Lower Secondary Grades

Mathematics is a required subject at the primary and lower secondary level in Iran's education system. The mathematics department at the Organization for Educational Research and Planning introduced the mathematics curriculum in 2011.

According to the National Core Curriculum, mathematics as a learning field is organized around the interaction of content domains and mathematical processes. The content domains are Number and Operations, Algebra, Geometry, and Data and Probability. In addition, students

are expected to be familiar with and master mathematical processes such as problem-solving and applying its strategies; modeling (real-life situations and phenomena); reasoning, critical thinking, and logical reasoning (generalizing, predicting, making and testing hypotheses, explaining answers, clustering, comparing, and applying patterns); visual thinking and creative thinking (spatial reasoning, solving nonroutine problems, and presenting problems in real and fictional stories); connecting between mathematical themes and contents; mathematical discourse (cultural and interactive); decision-making; and estimating.[4] Emphasis is placed on the use of technologies in mathematics (e.g., calculators, computers, and software).

Instruction time for mathematics is allocated to five 45-minute sessions per week for Grades 1 to 4 and four 45-minute sessions per week for Grades 5 and 6. At the lower secondary level, three 50-minute sessions per week are devoted to mathematics instruction.[5]

Exhibit 1 shows what students learn in each mathematics content area by the end of Grade 4.[6]

Exhibit 1: Mathematics Topics in the Fourth-Grade Curriculum

Domain	Content Area	Topic
Number and Operations	whole numbers	• whole numbers and their representations (up to nine digits)
	rational numbers	• fractions and their representations • unit, proper fractions, and fractions equal to unit • mixed numbers • decimal representation of numbers and its relationship with fractions (up to one decimal place) • reading and writing decimal numbers (up to one decimal place)
	operations	• adding and subtracting (whole numbers up to nine digits) and fractions (with equal denominators or one is a multiple of the other) in cases when the result is less than or equal to the unit • multiplying and dividing (whole numbers up to nine digits), and multiplying fractions by whole numbers
Algebra	pattern	• numerical and geometric patterns • immediate and near generalization in patterns
	relationship	• equal to, greater than, and less than • divisibility based on the concept of division and without using divisibility rules • whole numbers and fractions comparison (with equal denominators and when one is a multiple of the other)

Exhibit 1: Mathematics Topics in the Fourth-Grade Curriculum (Continued)

Domain	Content Area	Topic
Geometry	lines and two-dimensional shapes	• point, straight line, line segment, half-line, and angle • polygons, circles, and their components • perimeter of geometric shapes (triangle, square, rectangle, and regular polygons) • area of geometric shapes (square, rectangle, parallelogram, triangle, and trapezoid) • matching (intuitive superposition) • types of angle (acute, obtuse, right) • orthogonal and parallel lines • altitude of polygons
	three-dimensional shapes	• three-dimensional geometric shapes and their involute (rectangle cube, cube, cylinder, and cone)
	geometric transformations	• axial reflection and symmetrical shapes
	analytical geometry	• number line
Data and Probability	data analysis	• statistics data, collecting, recording, and presenting data
	probability	• random and certain events • experimental probability and expressing the probability of events

Exhibit 2 shows what students learn in each mathematics content area by the end of Grade 8.

Exhibit 2: Mathematics Topics in the Eighth-Grade Curriculum

Domain	Content Area	Topic
Number and Operations	whole numbers	• whole numbers and their representations • prime and compound numbers
	integer numbers	• integer numbers
	rational numbers	• rational numbers and their representations
	operation	• adding and subtracting whole, integer, and rational numbers • multiplying and dividing whole, integer, and rational numbers • whole powers of rational numbers and the root of non-negative rational numbers (second degree)

Exhibit 2: Mathematics Topics in the Eighth-Grade Curriculum (Continued)

Domain	Content Area	Topic
Number and Operations	operation	• divisibility rules • multiplier and counter of natural numbers • the largest common numerator and the smallest common multiple of two natural numbers
Algebra	pattern	• numerical and geometric patterns • immediate, near, and far generalizations in patterns
	relationship	• comparison of rational numbers • proportion and lack of fit • algebraic expressions and their simplification • finding the numerical value of the algebraic expression based on different values of the variables • equations of the first degree • factorizing algebraic expressions without using algebraic identity
Geometry	lines and two-dimensional shapes	• point, straight line, line segment, half-line, and angle • polygons and circles (components and features) • the perimeter and area of two-dimensional geometric shapes • the congruent modes of triangles • types of angles (acute, obtuse, right, complementary, supplementary, and coterminal angles) • orthogonal and parallel lines • internal and external angles of polygons • altitude, bisector, median, and perpendicular • properties of bisectors and perpendiculars • circumferential and central angles • tangent lines on the circle and its features • Pythagorean relation
	three-dimensional shapes	• three-dimensional geometric shapes and their widths (rectangle cube, cube, cylinder, and cone) • area and volume of three-dimensional shapes (cylindrical and prismatic shapes)

Exhibit 2: Mathematics Topics in the Eighth-Grade Curriculum (Continued)

Domain	Content Area	Topic
Geometry	geometric transformations	• axial reflection • rotational reflection • rotation • transmission
	analytical geometry	• the length of a line segment in one-dimensional space • Cartesian coordinates and vector coordinates • transfer in coordinate system
Data and Probability	data analysis	• statistics data, collecting, recording, and presenting data • average
	probability	• random and certain events • the probability of chance phenomena

The Science Curriculum in Primary and Lower Secondary Grades

Science is a subject that is taught in Iranian schools starting in Grade 1. Until the upper secondary level, science is an integrated subject. At the upper secondary level, science is divided into separate disciplines. The science department at the Organization for Educational Research and Planning introduced an updated science curriculum in 2010.

The National Core Curriculum considers science as the field of studying life cycles; earth science; changes of matters and energy; the important applications of science in real life; and the history of science, especially in Iran and Islam. Scientific development is not only achieved through transmission of knowledge and facts, but also includes a set of scientific methods and process skills (observation, data collection, measurement, interpretation of findings, making hypotheses and modeling, prediction, design of an investigation, and communication), as well as higher-order thinking skills.[7]

Instruction time for science is allocated to three 45- to 50-minute sessions per week for Grades 1 to 5 and two 50-minute sessions per week for Grade 6. At the lower secondary level, three 50-minute sessions per week are devoted to science instruction.[8]

Exhibit 3 presents an overview of science topics covered in the fourth-grade curriculum.[9]

Exhibit 3: Science Topics in the Fourth-Grade Curriculum

Domain	Content Area	Topic
Biology	human health: maintaining health and safety	• needs for children's growth • social health
	major body structures and their functions in humans, animals, and plants	• main parts of digestive, respiratory, circulatory, and excretory systems in the human body and their functions • main parts of some cells • characteristics of living organisms and their basic needs
	plant and animal characteristics and their behaviors	• animals; making nests; caring for offspring • main parts of a plant • seed components; seeds and fruit; methods of dispersal; planting • pollination with insects
	relationships in ecosystems	• roles of plants and animals in human life, simple food chains and food networks, animal habitats, relationship between predator and prey
	human role in environmental protection	• river and air contamination by humans • providing drinking water, conserving water, sorting waste, recycling plant products (paper), maintaining habitats
	life cycles of common plants and animals	• flowering plants; butterflies; frogs; sea turtles
	classification of living things and some of their important characteristics	• important characteristics of five vertebrate groups, some invertebrate groups, and the main groups of plants
Physical Science	energy sources and effects	• sources of energy and their uses • light sources; familiar physical phenomena • types of energy, uses and the conversion of energy
	forces and motion	• familiar forces; levers affecting balance; force and the effect of force on the movement of objects; Earth's gravity; moving and stationary objects; wheels and their applications
	matter	• matter; volume and mass; structure of matter; types of mixture, solutions, and solvents
	heat	• temperature changes; the effect of color on absorbing sunlight; applications of heat and heating appliances; sources of heat; changes and the effect of heat on states of matter; constructing and using a thermometer

Exhibit 3: Science Topics in the Fourth-Grade Curriculum (Continued)

Domain	Content Area	Topic
Physical Science	light and reflection	• the role of light in vision, sources and applications of light, refraction, types of mirrors, and images formed by mirrors and their applications
	electricity	• electric currents, series and parallel circuits, and insulators and conductors
	magnets	• shapes, interactions, and applications of magnets; electromagnets; magnetic poles; and navigation using a compass
Earth Science	Earth's structure, physical characteristics, and resources	• Earth's surface; fresh water; air • Earth's resources; using resources responsibly
	Earth's processes and cycles	• movement of water on Earth's surface; change of state of water; changes in weather conditions; precipitation
	Earth in the solar system	• solar system; different times of the month • Earth's rotation on its axis and its relationship to the Sun

Exhibit 4 presents an overview of science topics covered in the eighth-grade curriculum.

Exhibit 4: Science Topics in the Eighth-Grade Curriculum

Domain	Content Area	Topic
Biology	characteristics, classification, and life processes of organisms	• major organs in the human body and their components; role of organs and organ systems in sustaining life • biological actions in response to external and internal changes
	cells and their functions	• living things; cell structures and functions • processes of photosynthesis and cellular respiration
	life cycles, reproduction, and heredity	• how humans and plants grow and develop • asexual and sexual reproduction • inheritance of traits to organisms passing on genetic material to their offspring
	human health	• common diseases, methods of infection or transmission, prevention, the body's resistance and healing capabilities • diet, exercise, and lifestyle in maintaining health and preventing illness; dietary sources and role of nutrients in a healthy diet

Exhibit 4: Science Topics in the Eighth-Grade Curriculum (Continued)

Domain	Content Area	Topic
Physics	measuring in science and its tools	• measurement, precision in measurement, and density
	force effects, work, and energy	• force acting on an object that causes a change in the object's shape, size, movement, speed, or weight • relationship between force and work • function of simple machines
	energy transformations, heat, and temperature	• simple energy transformations; concept of conservation of total energy • heating to the transfer of energy, heat transfer methods • temperature changes
	light and its properties	• basic properties of light • reflection and refraction of light
	electricity and magnetism	• electric charges; electrical conductors or insulators; relationship between current and voltage in a circuit • properties of permanent magnets and electromagnets; uses of permanent magnets and electromagnets, electric motor, and electric generator
Chemistry	chemistry	• the classification of matter; the particulate structure of matter; solutions; acids and bases; chemical changes and reactions; conservation of mass; endothermic and exothermic reactions; physical changes
Earth Science	Earth's structure and physical features	• structure and physical characteristics of Earth's crust, mantle, and core; characteristics and uses of rocks, minerals, and soils; formation of soils • physical state, movement, composition, and relative distribution of water on Earth • Earth's atmosphere; changes in atmospheric conditions
	Earth's processes, cycles, and history	• physical processes; formation of fossils and fossil fuels • processes in Earth's water cycle; water flow in the circulation and renewal of fresh water on Earth's surface • seasonal climates; temperature, pressure, precipitation, and wind speed and direction

Exhibit 4: Science Topics in the Eighth-Grade Curriculum (Continued)

Domain	Content Area	Topic
Earth Science	Earth's resources, their use and conservation	• Earth's resources and energy sources; methods of conservation • land resources; fresh water; water conservation
	Earth in the solar system and the universe	• phenomena on Earth, including day and night, year, seasons in the northern and southern hemispheres; tides, phases of the Moon, eclipses; and appearance of the Sun, the Moon, planets, and constellations in terms of the relative movement, distance, and size of Earth, the Moon, and other bodies in and outside of the solar system • physical features of Earth; gravity in the solar system

Teacher Professional Development Requirements and Programs

The main route to becoming a teacher is receiving an undergraduate degree from Farhangian University (a teacher training university) that focuses on theoretical courses as well as the practicum period in the classroom. However, due to a shortage of teachers in recent years, holders of a relevant degree from other universities can become teachers by passing a competitive examination under Farhangian University's supervision.

The organizational body responsible for regulating, funding, and monitoring teacher professional development is the Centre for Human Resource Planning and Administrative Affairs at the Ministry of Education. There are also private institutions for in-service training on the basis of accreditation granted by the Ministry of Education.

Teachers are required to participate in at least 40 hours of free professional development annually. Attending professional development courses counts for career promotion and indirectly leads to a salary increase. There are no specific professional development requirements or national priorities for mathematics and science teachers beyond the general requirement for all teachers.

The aims of in-service training are not only keeping teachers up to date in the subjects they teach, but also supporting teachers to develop and strengthen their teaching capabilities and to develop personal competencies. Courses cover school subjects, pedagogical topics, and more general areas, such as the *Fundamental Reform Document of Education*. To this end, teachers have a variety of opportunities for professional development, including workshops, conferences, etc.

Monitoring Student Progress in Mathematics and Science

Before students start primary school, a school readiness assessment is conducted to screen and diagnose students with special needs. At the primary level, with the exception of a final summative exam at the end of sixth grade, there are no examinations for students. Grade promotion is done automatically, and students are not required to pass examinations to advance to the next level. However, the teacher can decide whether students' retention depends on academic progress. Teachers are responsible for collecting, judging, and interpreting information about students' performance in their classrooms. Accordingly, the focus of assessment lies on formative aspects, including assessing performance, observing in-class activities, reviewing homework, administering teacher-made tests, and portfolios. Formative assessments allow teachers to gain a deeper understanding of individual student progress levels and provide meaningful and immediate feedback. Additionally, schools are required to send report cards to parents twice a year at the end of each semester in order to inform students and their parents of the results of assessment and progress. The report cards are descriptive and use a four-point scale (very good, good, satisfactory, and need to endeavor) to address students' achievements in each subject, as well as their strengths and weaknesses.

At the lower secondary level, teachers assess student progress in all academic subjects, and schools issue a report card at the end of each semester. Students who have passed all the compulsory subjects are promoted to the next grade. At the upper secondary level, national examinations are administered under controlled conditions at the end of the year. The purpose of these assessments is to certify students at the end of their schooling while also providing a basis for entrance to higher education. According to the enactment of the Supreme Council for Cultural Revolution, 40% of the entrance score for higher education is assigned to the national examinations in 2023; this will be increased to 60% in 2027. The Center for Assessment and Educational Monitoring is responsible for conducting the national examinations.

In addition to assessing individual students, a sample-based national assessment monitoring system has been designed for students in Grades 6, 9, and 12 and will be conducted every 3 years. The first cycle of national assessment was held in 2021 for mathematics in Grade 6. The information gained from these assessments provides a framework for the Ministry of Education and other stakeholders to review curricula and other aspects of the education system. National assessments do not affect students' grades. In addition to monitoring student progress at the national level, participating in major comparative assessments such as TIMSS and PIRLS is part of progress monitoring.

Special Initiatives in Mathematics and Science Education

The website www.timssandpirls.ir, initiated by Iran's National Center of TIMSS and PIRLS, comprises all related materials, including policy reports for experts and policymakers, infographics and applied information for teachers, and research guides for researchers aiming to improve education quality and related policies.

Furthermore, the deputy of primary education and the deputy of secondary education organize a number of mathematics- and science-related events and exhibitions like *Jaber-bin-Hayyan* at the primary level and *Kharazmi* at the secondary level. Also, with the cooperation of some local communities, there are Houses of Mathematics that use community resources to promote mathematics.

Students with a high interest in mathematics or science may participate in annual national competitions with a mathematics, physics, chemistry, biology, or informatics focus in order to compete for a chance to participate in international Olympiads.

Suggested Reading

Hakimi, A. (2016). *A glance at education in the Islamic Republic of Iran*. Tehran: Soroush-e Sepehr Publication.

References

1 The Islamic Republic of Iran Ministry of Education. (2011). *Fundamental reform document of education (FRDE) in the Islamic Republic of Iran*. http://en.oerp.ir/sites/en.oerp.ir/files/sandtahavol.pdf

2 Constitutional Council. (1989). *Constitution of the Islamic Republic of Iran*. https://irandataportal.syr.edu/wp-content/uploads/constitution-english-1368.pdf

3 Centre for Human Resource Planning and Administrative Affairs. (2021). *Statistical yearbook 2020–2021*. Tehran: Ministry of Education.

4 Ministry of Education, Organization for Educational Research and Planning, Mathematics Department. (2011). *Mathematics national curriculum, primary school* [Unpublished document].

5 Supreme Council of Education. (2011). *National core curriculum, ministry of education*. https://bayanbox.ir/view/1800233674260427126/%D8%A8%D8%B1%D9%86%D8%A7%D9%85%D9%87-%D8%AF%D8%B1%D8%B3-%D9%85%D9%84%DB%8C.pdf

6 Ministry of Education, Organization for Educational Research and Planning, Mathematics Department. (2011). *Mathematics national curriculum, primary school* [Unpublished document].

7 Supreme Council of Education. (2011). *National core curriculum, ministry of education*. https://bayanbox.ir/view/1800233674260427126/%D8%A8%D8%B1%D9%86%D8%A7%D9%85%D9%87-%D8%AF%D8%B1%D8%B3-%D9%85%D9%84%DB%8C.pdf

8 Supreme Council of Education. (2011). *National core curriculum, ministry of education.* https://bayanbox.ir/view/1800233674260427126/%D8%A8%D8%B1%D9%86%D8%A7%D9%85%D9%87-%D8%AF%D8%B1%D8%B3-%D9%85%D9%84%DB%8C.pdf

9 Ministry of Education, Organization for Educational Research and Planning, Science Department (2011). *Science national curriculum, primary school* [Unpublished document].