

North Macedonia

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Introduction

Overview of Education System

Primary and secondary education in the Republic of North Macedonia is compulsory for all students. It is free and equally accessible to everyone. The basic principles of the national education system are set in the Constitution of the Republic of North Macedonia.¹ According to the Constitution, citizens can establish private educational institutions at all levels except primary, which is entirely public, and the autonomy of universities is guaranteed.

The education system in the Republic of North Macedonia comprises preschool, primary, secondary, and higher education. Preschool education (International Standard Classification of Education [ISCED] 0) is optional and intended for children ages 7 months to 6 years. The learning and teaching components of preschool education are the responsibility of the Ministry of Education and Science, whereas the management and organization of the work of preschool institutions fall under the remit of the Ministry of Labor and Social Policy in cooperation with municipalities.

Primary education (ISCED 1 and ISCED 2) activities are defined and regulated by the Law on Primary Education² and the Concept Note on Primary Education.³ Children attend school from roughly the age of 5 years 8 months to 14 years 5 months. There are nine grades in primary education, and they are organized in three periods as follows: Grades I to III, Grades IV to VI, and Grades VII to IX.

Secondary education (ISCED 3) comprises general secondary education (gymnasium) with a duration of 4 years; vocational education (vocational schools) with a duration of 2 years, 3 years, or 4 years (vocational-technical education); or 4-year art schools (art, music, or ballet). Secondary education is compulsory and is for students ages 15 to 19 for general secondary education or for students ages 15 to 17, 18, or 19 for vocational education and training (VET) depending on the selected track. The activities and responsibilities of secondary education are defined and regulated by the Law on Secondary Education and the Law for Vocational Education and Training. Secondary education is free of charge in public secondary schools. Students who choose 4-year secondary education usually take the State Matura exams and continue their education at a university.

Higher education (ISCED 5, 6, and 7) provides undergraduate, master's, and doctoral studies in higher educational institutions and institutes that are autonomous and independent. The activities are defined and regulated by the Law on Higher Education.⁴

The Macedonian education system is decentralized. The management of primary and secondary schools is the responsibility of the municipalities, except for secondary schools in the capital, Skopje, which are the responsibility of the city of Skopje. The State provides financial resources for education in the municipalities in the form of block grants.

According to the Constitution of the Republic of North Macedonia, the official language is Macedonian with its Cyrillic alphabet, which is used throughout the entire territory of the Republic of North Macedonia and in international relations. Any language spoken and corresponding script used by at least 20% of citizens is also an official language, as determined by Article 7 of the Constitution.^a However, all national groups are entitled to primary and secondary education in their mother tongue. In primary schools, instruction is provided in Macedonian, Albanian, Turkish, Serbian, and Bosniak, while in secondary schools, instruction is in Macedonian, Albanian, Turkish, and Serbian. Ethnic Albanian students also are instructed in Albanian at the university level.

The Ministry of Education and Science is responsible for national education policy, including financial decisions, administration of state institutions, and establishing and monitoring education laws and regulations. The Ministry implements its competencies in cooperation with several educational institutions.

One such institution is the Bureau for Development of Education (BDE), which is responsible not only for developing curricula and learning standards for all levels from preprimary to secondary education (only general subjects in schools that offer VET), but also for monitoring, expert inspection, research, and development of education, professional development of school staff, and accreditation of teacher training providers.

The Vocational Education and Training Center is responsible for developing the curriculum for vocational schools, standards for occupations and professional qualifications, and support for social partnership and teacher education.

The National Examinations Centre is responsible for organizing and conducting external examinations and assessment of students' achievement in primary and secondary education (State Matura, national assessment, and international assessments), as well as training and licensing school principals and administering credentialing exams for apprentice teachers in primary and secondary schools.

The State Education Inspectorate (SEI) conducts external evaluations of primary and secondary schools and universities and follow-up activities, and also undertakes ad hoc inspections in response to written requests from teachers, parents, school principals, or the municipality.

a See Article 7 in the Constitution of the Republic of North Macedonia (https://www.sobranie.mk/theconstitution-of-the-republic-of-macedonia-ns_article-constitution-of-the-republic-of-north-macedonia.nspix) for more information.

The Adult Education Center is responsible for promoting adult education and establishing standards and quality criteria for formal and informal education for adults.

The Pedagogical Service is responsible for the textbooks used in primary and secondary education.

The Agency for Quality in Higher Education is responsible for the curricula and syllabi for higher education.

The National Agency for European Educational Programs and Mobility is responsible for the promotion and implementation of European programs in the field of education, training, youth, and sports in the Republic of North Macedonia.

Use and Impact of TIMSS

To respond to challenges in primary education, as well as low student achievement in international assessment of students in primary education, the most recent major education reform occurred in academic year 2021–2022, through the Ministry of Education and Science's implementation of the Concept Note on Primary Education^b and the new curricula,^c where key areas for further action were defined. These areas are acquiring basic skills in mathematics, language, natural sciences, and digital competencies; acquiring transversal skills (critical thinking, entrepreneurship, creativity, and citizenship); learning multiple languages; and developing schools as environments safe from violence, hate speech, and discrimination.⁵ The new concept focuses on better integration of school subjects, use of different learning strategies and teaching materials, valuing student's interest regarding the contents, and active participation in school activities, among other topics.⁶

The curricula are competence based in accordance with national standards. In order to ensure the recognition of the competences covered by a specific curriculum, the introduction of the curriculum lists each specific knowledge, skill, and attitude in the areas of the national standards covered by the specific curriculum.⁷

The Mathematics Curriculum in Primary and Lower Secondary Grades

The new Concept Note on Primary Education recognizes the need for change based on new knowledge for the development of quality education. It also acknowledges European and worldwide trends for education based on competencies, the digitalization of education, as well as all previous experiences and aspirations to improve the quality of teaching and learning in schools that should become places for learning and development of motivated students ready to acquire the expected competencies. In addition, the new concept fully respects the observations and opinions of teachers that have been collected via research in November 2020.

b See <https://mon.gov.mk/stored/document/koncepcija%20osnovno%20obrazovanje%20en.pdf> for more information.

c See https://www.bro.gov.mk/%D0%BF%D0%BE%D0%B4%D0%BA%D0%B0%D1%82%D0%B5%D0%B3%D0%BE%D1%80%D0%B8%D0%B8/?idcat=50&customposttype=documents_category for more information.

Thus, the new concept of primary education offers changes in several areas related to the following: integration of teaching and learning subjects, the selection of subjects of interest to the student, learning through research and projects, reducing the burden of teaching materials by using factual data, adapting teaching to the needs of all students, using a variety of teaching materials, active participation of students in school life, and cooperation and professional development of teachers and motivating them with career development. All of these changes will enable opportunities to build schools tailored to children.

The adopted concept will be implemented over 6 years, and the process began in academic year 2021–2022.

With new mathematics curricula for students in Grade IV,⁸ students are expected to have acquired sufficient knowledge in the following domains by the end of Grade IV: Numbers and Counting, Geometry, Operations With Numbers, Measurement, and Working With Data (see Exhibit 1).

Exhibit 1: New Mathematics Curricula for Grade IV

Domain	Contents (and Concepts)
Numbers and Counting	<ul style="list-style-type: none"> • numbers up to 10,000 (number and quantity) • place value of digits (units, tens, hundreds, thousands, ten thousands, one-digit number, two-digit number, three-digit number, four-digit number, local value) • comparing pairs of three-digit or four-digit numbers (greater than, less than, signs > and <) • negative numbers in everyday context (a negative number, a number less than 0) • fraction (proper fraction, denominator, numerator, mixed number) • introduction to decimal numbers (equivalencies, for example, 1/2, 5/10, 0.5)
Geometry	<ul style="list-style-type: none"> • lines and angle (semistraight, acute angle, obtuse angle) • 2D shapes (semicircle, polygon, heptagon, octagon, nonagon, decagon, dodecagon, regular, irregular) • 3D shapes (vertex, edge, wall, edge shapes, cylindrical shapes) • line of symmetry (mirror line, fold line, line of symmetry) • position, motion, and direction (position, rows, columns, direction, angle, right angle, 90°, 360°, 180°)
Operations With Numbers	<ul style="list-style-type: none"> • add and subtract up to 10,000 (sum, addend, commutative property, associative property, reducer, reduced, difference) • doubling and halving numbers up to 10,000 • multiplying and dividing by 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 (ratio – scale) • addition and subtraction of proper fractions with equal denominators (integer, proper fraction, equal fractions)

Exhibit 1: New Mathematics Curricula for Grade IV (Continued)

Domain	Contents (and Concepts)
Measurement	<ul style="list-style-type: none"> • length (measurement units for length: km, m, dm, cm, mm, kilometer, meter, decimeter, centimeter, millimeter) • mass (units for mass: kg, g, kilogram, gram) • liquid measurement (liquid measures: l, dl, cl, ml, liter, deciliter, centiliter, milliliter) • time (second, minute, hour, decade, century) • perimeter and area of 2D shapes (perimeter/circumference, area of rectangle shapes, square unit, m², cm²)
Working With Data	<ul style="list-style-type: none"> • collecting, organizing, arranging, and presenting data (primary and secondary data, bar chart, table of frequency) • probability of an event occurring (always/certainly, maybe/possible, never/impossible)

The curricular reform is ongoing. Grades VII and VIII are still using the old curricula. By the end of Grade VIII,⁹ students are expected to have acquired sufficient knowledge in the following areas of mathematics:

- Numbers—Students can add, subtract, multiply, and divide integers; identify and use multiples, factors, common factors, highest common factors, lowest common multiples, and prime factors; write a number in terms of its prime factors; calculate squares of positive and negative numbers; understand place value, ordering, and rounding; work with fractions, decimals, percentages, ratio, and proportion; find equivalent fractions, decimals, and percentages by converting between them; add and subtract fractions and mixed numbers; calculate fractions of quantities (fraction answers); multiply and divide an integer by a fraction; calculate and solve problems involving percentages and percentage increases or decreases; and express one given number as a fraction or percentage of another.
- Algebra—Students know that algebraic operations, including brackets, follow the same order as arithmetic operations; use index notation for positive integer powers; construct linear expressions; simplify or transform linear expressions with integer coefficients; collect like terms; multiply a single term over a bracket; derive and use simple formulae; substitute positive and negative integers into formulae, linear expressions, and expressions involving small powers; construct and solve linear equations with integer coefficients (unknown on either or both sides, without or with brackets); generate terms of a linear sequence using term-to-term rules and *n*th-term rules to find any term in the sequence; find term-to-term and *n*th-term rules of sequences including visual representations; use a linear expression to describe the *n*th term of a simple arithmetic sequence, justifying its form by referring to the activity or practical context from which it was generated; and express simple functions algebraically and represent them in mappings.

- **Geometry**—Students are expected to know that if two 2D shapes are congruent, their corresponding sides and angles are equal; classify quadrilaterals according to their properties, including diagonal properties; identify alternate angles and corresponding angles; solve geometrical problems using properties of angles, of parallel and intersecting lines, and of triangles and quadrilaterals, explaining reasoning with diagrams and text; draw nets of 3D shapes; identify the symmetries of 2D shapes; find the midpoint of the line segment AB ; transform 2D shapes by rotation, reflection, and translation, and simple combinations of these transformations; and interpret and make simple scale drawings.
- **Measures**—Students are expected to be able to choose suitable units of measurement to estimate, measure, calculate, and solve problems in a range of contexts, including units of mass, length, area, volume, or capacity; draw and interpret graphs in real-life contexts involving more than one component; know the definition of a circle and the names of its parts; know and use formulae for the circumference and area of a circle; derive and use formulae for the area of a triangle, parallelogram, and trapezium; and calculate areas of compound 2D shapes and surface areas and volumes of cuboids.
- **Handling Data**—Students are expected to identify and collect data to answer a question; select the method of collection, sample size, and degree of accuracy needed for measurements; calculate statistics for sets of discrete and continuous data; decide when to use the range, mean, median, and mode and, for grouped data, the modal class; and draw and interpret.
- **Problem-Solving**—Students are expected to calculate accurately, choosing operations and mental or written methods appropriate to the numbers and context; use the order of operations, including brackets, with more complex calculations; understand everyday measurement systems, using them to estimate, measure, and calculate; recognize, compare, and use properties of shapes in two and three dimensions; draw accurate mathematical diagrams, charts, and graphs; estimate, approximate, and check work; and solve word problems, including multistep problems, involving calculations with whole numbers, fractions, percentages, decimals, money, or measures.

The Science Curriculum in Primary and Lower Secondary Grades

According to the new Concept Note on Primary Education, the curricula that integrate several scientific disciplines, like natural sciences, are modular, i.e., each scientific discipline is a separate part, or module, within the curriculum, with clearly defined learning outcomes, assessment standards, and time frames (number of classes). Also, the curricula of those subjects may have a common module in which disciplines are united under common learning outcomes. The curricula of subjects that include several scientific disciplines, such as

Natural Sciences and Society, pose a framework for an integrated approach and allow for multidisciplinary/interdisciplinary teaching.

The natural sciences are taught with the following number of hours:

- Grades I to V: 2 hours of instruction per week, or 72 hours per year
- Grade VI: 3 hours of instruction per week, or 108 hours per year
- Grades VII to IX: 5 hours of instruction per week, or 180 hours per year

Until academic year 2023–2024, the curricular reform is applicable up to Grade VI (see Exhibit 2), so Grade IV uses the new curriculum for natural sciences while Grades VII and VIII use the old curricula.

Exhibit 2: New Natural Sciences Curricula for Grades IV to VI

Grade	Domain	Contents (and Concepts)
IV ¹⁰	Physical Characteristics of Earth	<ul style="list-style-type: none"> • Earth's shape (Earth, planet, spherical, cosmonaut, sailor) • Earth's mantle (spheres) (Earth's mantle/spheres, rocky mantle/lithosphere, watery mantle/hydrosphere, atmospheric mantle/atmosphere, plant and animal world/biosphere, underground water, spring, river, lake, sea, natural phenomena, earthquakes, volcanoes, clouds, precipitation, rain, snow, hail) • continents and oceans (land and water areas on Earth, continent, Asia, Africa, North America, South America, Antarctica, Europe, Australia with Oceania, Ocean, Pacific Ocean [Pacific], Atlantic Ocean, Indian Ocean, Arctic Ocean, globe, map, east, west, north, south, no map) • terrain (relief, elevation, mountain, hill, plain) • weather conditions and climate (weather, climate, sunny, cloudy, rainy, snowy, foggy, windy, clouds, precipitation, rain, snow, hail, dew, frost, fog, wind, temperature, altitude, water cycle, meteorological instruments, thermometer, rain gauge, wind vane) • natural resources and their protection (natural resources, air, water, soils, forests, mineral resources, coal, oil, natural/terrestrial gas, sun, water, wind, nonrenewable sources of energy, renewable energy sources, recycling)

Exhibit 2: New Natural Sciences Curricula for Grades IV to VI (Continued)

Grade	Domain	Contents (and Concepts)
IV	Characteristics of Animals and Plants and Their Division	<ul style="list-style-type: none"> • features of animals and plants (respiration, respiration in terrestrial animals, respiration in aquatic animals, lungs, gills, movement, legs, fins, wings, diet, herbivores, carnivores, omnivores, sensitivity, senses, reproduction, eggs, live young, seed, pollination, fertilization, seed dispersal, and germination) • division of animals and plants (invertebrates, vertebrates, fish, amphibians, reptiles, birds, mammals, seedless plants, seed plants)
	Aggregate States of Matter and Changes in Aggregate States	<ul style="list-style-type: none"> • aggregate states of matter (matter, substance, aggregate state, solid aggregate state, liquid aggregate state, gaseous aggregate state, solid matter, liquid, gas) • properties of solids, liquids, and gases (particles, shape, volume) • melting and freezing • evaporation and condensation (change of the aggregate state, melting, freezing, boiling, evaporation, condensation, heat, temperature, thermometer, melting point, temperature freezing point, boiling point) • aggregate states of water • circulation of water in nature (ice, water, water vapor, water cycle)
	Sound	<ul style="list-style-type: none"> • creating, transmitting, and measuring the strength of sound (sound, oscillation/vibration, energy of sound, volume, decibel) • types of sounds (pitch, low sounds, high sounds, soft sounds, loud sounds)
	Electricity and Magnetism	<ul style="list-style-type: none"> • circuit (battery, wire, switch, lamp, buzzer) • electric current in a closed circuit (particle, electric current, electricity, light energy, heat energy, energy of sound) • magnets and magnetic forces (magnet, south pole, north pole, attracts, repels)
V ¹¹	Natural Geographic Characteristics of the Continents	<ul style="list-style-type: none"> • geographical position of the continents (continent, ocean, geographic position, equator, meridian, northern hemisphere, southern hemisphere, eastern hemisphere, western hemisphere, boundaries, size, Asia, Africa, North America, South America, Antarctica, Europe, Australia with Oceania)

Exhibit 2: New Natural Sciences Curricula for Grades IV to VI (Continued)

Grade	Domain	Contents (and Concepts)
V	Natural Geographic Characteristics of the Continents	<ul style="list-style-type: none"> • relief of the continents (relief, internal forces, tectonic movements, mountains, valleys, external forces, erosion, accumulation, volcano, eruption, lava, magma, volcanic crater, crater, volcanic channel, geyser, earthquake, hypocenter, epicenter, tsunami, layered rocks, volcanic rocks, altered rocks, volcanic relief, marine relief, lacustrine relief, glacial relief, desert relief) • atmosphere • climate of the continents (atmosphere, oxygen, nitrogen, carbon dioxide, water vapor, dust, troposphere, stratosphere, ozonosphere, ionosphere, exosphere, global warming, air temperature, air/atmospheric pressure, air humidity, thermometer, barometer, psychrometer, meteorological phenomena, wind, precipitation, fog, vane, rain gauge, climate factors, equator, altitude, relief, heat belts, equatorial rainforests, savannas, steppes, deserts, deciduous forests, coniferous forests, grasslands, taiga, tundra) • hydrography of the continents (world sea, ocean, Pacific/ Pacific Ocean, Atlantic Ocean, Indian Ocean, Arctic Ocean, Southern Ocean, sea, waves, sea currents, tide, ebb, groundwater, surface water, spring, river, riverbed, river stream, estuary, meanders, waterfall, river network, river basin, sinkhole, lake, lake basin)
	Life Cycle of Flowering Plants	<ul style="list-style-type: none"> • parts of the flower (fruit, seed, flower, peduncle, flower box, sepals, petals, anther, filament, anther sacs, pollen, pistil, stigma, style, carpel, ovule) • life cycle stages of plants (seed, germination, seedling, young plant, adult plant, pollination, fertilization, seed production, seed dispersal, life cycle, seed coat, cotyledon, sprout, woody plant, herbaceous plant, annual plant, perennial plant)
	Living Organisms and the Environment	<ul style="list-style-type: none"> • living organisms in their environment (environment, habitat, adaptation, camouflage, hibernation, aestivation, migration, competition, symbiosis, predation) • the impact of man on the environment (pollution, reduction, reuse, recycling, renewable energy sources) • ecology as a science (ecology, living organisms, environment)
	Blends	<ul style="list-style-type: none"> • composition of the mixtures • types of mixtures (substance, mixture, components of the mixture, homogeneous mixture, heterogeneous mixture)

Exhibit 2: New Natural Sciences Curricula for Grades IV to VI (Continued)

Grade	Domain	Contents (and Concepts)
V	Blends	<ul style="list-style-type: none"> • solutions and dissolution (solution, solvent, solute/solvent, dissolution) • separation of components from a mixture (seeding, decantation, filtration, evaporation, magnetic separation)
	Light and Shadows	<ul style="list-style-type: none"> • light and colors (light source, light ray, light reflection, incident ray, angle of incidence, reflected ray, normal, angle of reflection, absorption of light, glass prism, periscope, mirror) • shadow formation (shadow, transparent materials, partially transparent materials, opaque materials, light intensity, luxmeter, sundial)
VI ¹²	Properties and Changes of Substances	<ul style="list-style-type: none"> • physical properties • chemical properties (color, smell, taste, shape, aggregate state, transparency, gloss, water resistance, hardness, thermal conductivity, solubility in water, elasticity, magnetism, volume, temperature, mass, ability to burn, ability to rust) • physical changes (change of aggregate state, change of form) • chemical changes (burning, rusting)
	Construction of Organs and Organ Systems in Humans	<ul style="list-style-type: none"> • location of the main organs in the human body (locomotive system, skeleton, muscles, limbs, head, skull, brain, lungs, heart, stomach, intestines, kidneys) • digestion and excretion (digestive system, oral cavity, tongue, teeth, incisors, canines, premolars, molars, saliva, salivary glands, pharynx, esophagus, stomach, small intestine, large intestine, anus, digestion, absorption, excretory system, kidneys, ureters, bladder, urinary duct, excretion, urine) • transport of food and gases (respiratory system, nasal cavity, larynx, trachea, lungs, ribs, diaphragm, circulatory system, blood, heart, atria, ventricles, arteries, veins, capillaries, respiration, circulation, carbon dioxide, oxygen, inhalation, exhalation, pulse) • reactions of the organism to stimuli (nervous system, cranial brain, cerebrum, hemispheres of the brain, cerebellum, midbrain, medulla oblongata, spinal cord, nerves, stimulus, senses, tongue, nose, eye, ear, skin) • reproduction, growth, and development (reproductive system, vagina, uterus, fallopian tubes, ovaries, egg, penis, urethra, vas deferens, sperm, newborn, childhood, puberty, menstruation, menstrual cycle, emotions, youth, maturity, old age)

Exhibit 2: New Natural Sciences Curricula for Grades IV to VI (Continued)

Grade	Domain	Contents (and Concepts)
VI	Space and Solar System	<ul style="list-style-type: none"> • stars and constellations • solar system (space/cosmos/universe, stars, constellations, galaxy, Milky Way, solar system, Sun, core, photosphere, chromosphere, corona, inner planets, outer planets, natural satellites) • Earth movements (Earth’s rotation, Earth’s axis, Earth’s revolution, orbit/ecliptic) • Moon and Moon menu/phases (Moon, Moon menu/ phases, new Moon, first quarter, full Moon, last quarter) • planetoids, comets, and meteors (planetoids/asteroids, comets, Halley’s Comet, meteors, meteorites)
	Forces and Motions	<ul style="list-style-type: none"> • gravity (force, attraction, interaction, gravity, tides, atmospheric envelope) • mass and weight (mass, kilogram [kg], scale, weight, load, dynamometer, newton [N]) • friction and resistance of the medium (friction, frictional force, contact area, medium resistance) • energy of motion (energy of motion)
	Electricity and Magnetism	<ul style="list-style-type: none"> • electrification of bodies (charged body, noncharged body, positive charge, negative charge, positively charged body, negatively charged body) • conductors and insulators (electricity, static electricity, electricity in motion, conductors, insulators) • serial and parallel connection of consumers (consumer, serial connection, parallel connection) • an electromagnet (electromagnet)
	Environmental Care	<ul style="list-style-type: none"> • ecological organization of the environment (individual, population, habitat-biotope, living community – biocenosis, ecosystem, biome, biosphere) • environmental factors (abiotic factors, biotic factors) • food chains (producers, consumers, herbivores, omnivores, carnivores, decomposers, food chains, food webs, food pyramid) • protection of nature and biodiversity (climate change, global warming, greenhouse effect, acid rain, depletion of the ozone layer, biodiversity, national park, endangered species, endemic species, relict species)

Students in Grades VII and VIII use the old curricula, in which biology, chemistry, physics, and geography are separate subjects (see Exhibit 3).

Exhibit 3: Science Curricula for Grades VII and VIII

Grade	Subject	Topics
VII	biology ¹³	<ul style="list-style-type: none"> • cells and organisms • plants • living things in their environment
	geography ¹⁴	<ul style="list-style-type: none"> • sociodemographic characteristics, economic and geographical characteristics, location in the immediate environment, population and settlements of the Republic of North Macedonia, and its protection from pollution and degradation
VIII	biology ¹⁵	<ul style="list-style-type: none"> • human organ systems • circulation in humans • movement in humans • variation • obtaining food • classification • record in the rocks
	geography ¹⁶	<ul style="list-style-type: none"> • natural geographical characteristics, sociogeographic characteristics and regional division of Europe, geographical overview of regions in Europe (southern, western, northern, middle, and eastern)
	physics ¹⁷	<ul style="list-style-type: none"> • forces and motion • energy • light • Earth and beyond
	chemistry ¹⁸	<ul style="list-style-type: none"> • states of matter • metals and nonmetals • elements, compounds, and mixtures • chemical reactions • introduction to the chemistry of carbon compounds

Teacher Professional Development Requirements and Programs

According to the new Law on Teachers and Professionals for Primary and Secondary School Associates,¹⁹ teachers must have obtained at least a university diploma of 240 credits. In the first year of employment, teachers are trainees and teach with mentoring support from experienced mentor teachers. At the end of the probation period, the probation appraisal is based on a mentor's report on the trainee teacher's competencies. After completing this period and acquiring the necessary competencies, the trainee teachers must pass the professional

examination for teachers that is organized by the professional administration and conducted by the National Examinations Centre. After several years of work experience and meeting the appropriate professional standards, teachers can advance in the titles of teacher-mentor and teacher-advisor.

The professional development of teachers is realized through accredited training programs, projects approved by the Ministry of Education and Science, internal professional development in the school, interschool learning teams, and individual forms of learning. Teachers are obliged to dedicate at least 60 hours to training over 3 academic years, of which at least 40 hours are through participation in accredited training programs. The BDE is responsible for accredited training programs. It is also responsible for providing professional support to improvement efforts in primary schools, providing professional development of school staff, as well as providing professional assistance and guidelines, developing teaching resources and materials, and other activities.

Monitoring Student Progress in Mathematics and Science

The National Examinations Centre is mainly responsible for organizing different types of external assessments of students' achievements, such as the national assessment, State Matura, and international assessments.

Regular, objective, and relevant information on students' achievements across the country is primarily provided through national testing. According to the *The Concept of National Assessment for Primary Education*, national tests are administered at the end of Grades III, V, and IX and assess language and math literacy.²⁰ If necessary, achievements in other areas are identified to provide a more accurate and broader picture and to establish a sound basis by which students' future progress can be monitored.

Participation in international tests provides the country with insight into the achievements of the country's students compared to internationally defined levels of achievement.

The State Matura exams are national-level exams in secondary education for certification and selection for university entrance. They comprise four exams and a project. The obligatory exam is mother tongue.

Classroom assessments are administered by classroom teachers and can be both summative and formative in purpose. They include a broad range of assessment types, including closed (e.g., multiple-choice questions), semi-constructed (e.g., short-answer questions), and types where students must demonstrate their knowledge through essays or projects. Different assessment formats are appropriate for assessing different types of skills and subjects. The results for students in Grades I to III are expressed in the form of descriptive grading, which includes the standards of knowledge the student has achieved. In later primary and secondary education, descriptive and numerical grades are used. From Grades VII to IX, students receive their results in numerical grades from 1 to 5 as follows: (1) failed/insufficient, (2) sufficient, (3) good, (4) very good, and (5) excellent. Upon completion of each grade, primary and secondary schools

provide each student with a certificate that lists his or her final grades in each subject. Typically, students in lower grades (Grades I to V) are automatically promoted. Students with a maximum of two insufficient numerical grades at the end of the school year must take a makeup exam to complete the grade. Students with more than two insufficient numerical grades at the end of the school year cannot complete the grade. A student may repeat the same grade once. During the school year, teachers offer regular remedial lessons in each subject (including mathematics and science subjects) for students who need additional instruction and individual attention.

Special Initiatives in Mathematics and Science Education

Over the last 20 years, the Republic of North Macedonia has implemented several initiatives and projects to improve students' achievement. The most prominent have been the following:

- The United States Agency for International Development (USAID) funded a large project for primary schools from 2006 to 2011 called the Primary Educational Project (PEP). One component of the project aimed to improve mathematics and science education. The main objective of this component was to help students build critical-thinking skills to better prepare them for a knowledge-based global economy.
- UNICEF's Teacher Education Programme on Early Numeracy and Literacy for Grades I to III was in effect from 2009 to 2015.
- USAID's Readers Are Leaders project introduced two assessment instruments from 2013 to 2018 for students in Grades II and III in primary education: the Early Grade Reading Assessment (EGRA) and the Early Grade Mathematics Assessment (EGMA).
- British Council's 21st Century Schools Programme (2018–2021) in all primary schools was designed to equip students ages 10 to 15 with critical-thinking and problem-solving skills.
- The Primary Education Improvement Project (PEIP) (2021–2026), with support from the World Bank, aims to improve conditions for learning in primary education.

Suggested Reading

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