Jordan

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Introduction

Overview of Education System

The education system in the Kingdom of Jordan is well developed. The country has achieved universal basic education for both boys and girls, and attendance rates are high. Education Reform for the Knowledge Economy programs (ERfKE I and II) and other ongoing education reform efforts to introduce improvements have played a significant part in implementing and accomplishing this and other achievements. However, the system still faces major challenges providing education to all children residing in the Kingdom and improving the quality of education. In addition to the Ministry of Education's Education Strategic Plan 2018–2022 (ESP),[1] the National Strategy for Human Resource Development (2016–2025)[2] outlines ways to overcome external and internal challenges in the Jordanian education sector in terms of access, quality, accountability, innovation, and mindset.

Jordan's education system aims to equip citizens with various skills to prepare them to achieve their goals, meet the challenges of the future, and contribute to benefit individuals and society. A central principle of Jordan's education policy is centralizing the general planning and monitoring of the education system while decentralizing its administration.[3] Within the Ministry of Education, the Board of Education determines the curriculum, and the Ministry's divisions for monitoring, finance, and inspection have responsibility for auditing the school system.[4]

There has been an influx of Syrian students into Jordanian schools since 2011, creating a strain on the education system in terms of resources and physical infrastructure. However, the Ministry has continued to provide quality educational services to students affected by the political crisis in cooperation with its development partners. This commitment remains strong as the Ministry also seeks to ensure access and equality—moving toward the vision of "Education for All" and equity for students of all genders and students with special needs—by improving enrollment rates, accommodating all age groups, providing a stimulating educational environment, and developing awareness and health programs. To reduce the challenges of infrastructure, the Ministry is also working to decrease the number of rented and double shift schools while increasing the amount of land available for school buildings and developing a maintenance system for schools.[5]

The Ministry of Education provides high-quality curricula, textbooks, and teacher manuals that meet international standards. These materials include improved content and form; emphasize critical and creative thinking, as well as problem-solving skills; and link content to life experiences. The Ministry aims to provide quality educational services using an integrated policy that tracks the quality of teaching and learning and acts as the general framework for curricula and assessment. This policy, in turn, ensures students achieve educational goals while keeping pace with the rapid development of information and communications technology; allows for the provision of sustainable, smart electronic learning resources; and emphasizes the development of the quality of electronic services provided by the Ministry.[6]

Jordan's education system consists of the following cycles:

- kindergarten—A 2-year cycle beginning at age 4, kindergarten includes preschool and is noncompulsory. It aims to create a suitable environment for children and offer them balanced educational opportunities.
- basic education—A 10-year cycle comprising Grades 1 to 10 (ages 6 to 16), basic education is compulsory and aims to achieve general educational goals, preparing citizens for all aspects of life. In Grades 8 to 10, students are tracked and enroll in different types of lower secondary education based on their marks.
- secondary education—A 2-year cycle comprising Grades 11 and 12 (ages 17 and 18), secondary education is optional and aims to equip citizens with various capacities and skills, particularly in specialized cultural, scientific, and vocational skills that meet the current and future needs of Jordanian society. This cycle consists of two main streams: the comprehensive (academic and vocational) secondary education stream and the applied secondary education stream. The comprehensive stream is based on a common cultural basis and specialized academic subjects and culminates in the General Secondary Certificate Examination. The applied stream provides students with vocational education and training that enable them to join the labor market directly after graduation.

Education statistics indicate that 2,244,751 students were enrolled in schools in Jordan in the 2021–2022 academic year.[7] The gross enrollment rates were 38% in kindergarten, 97% in the basic cycle, and 84% in the secondary cycle.

The Ministry of Education plans to expand and improve the quality of preschool education and encourage the private sector to establish kindergartens, indicating the importance the Ministry attaches to preprimary education. The ESP is a government-supported project to transform the education system at the early childhood, basic, and secondary levels to produce graduates with the skills needed for the knowledge economy. One component of the project promotes learning readiness in early childhood education and emphasizes targeted approaches to improving the availability and quality of early childhood learning opportunities. The project contributed to the implementation of a comprehensive approach to improving the scope and quality of essential early childhood services.[8]

The Ministry of Education has established several kindergartens, particularly in remote and underprivileged areas, to achieve the following goals:

- provide children with an adequate educational environment and care for well-balanced education growth
- help children acquire positive attitudes toward school for smooth transitions from home to school
- develop good health practices
- improve children's social relationships
- enhance children's positive attitudes and love for school life

Use and Impact of TIMSS

Jordan has participated in all TIMSS cycles since 1999, with the main goals of evaluating the curriculum with reference to international benchmarks and assessing the capabilities of Jordanian students compared with their international peers.

As a direct result of participation in TIMSS assessments, committees have been formed to revise the mathematics and science curricula. Released TIMSS items from previous cycles (1995, 1999, 2003, 2007, 2011, 2015, and 2019) have been used in the development of new textbooks for mathematics and science.

Following TIMSS analyses, the Ministry of Education, in collaboration with the National Center for Human Resources Development (NCHRD), developed teacher guides and initiated nationwide discussions and teacher training to raise awareness of the importance of the TIMSS assessment and its results. These teacher guides are being used in teacher education programs and appear to have had a positive effect on student achievement in science and mathematics. The teacher guides include the following topics:

- identification of student errors on assessments, types of errors, and how errors occur
- suggested questions and tasks that may help students become aware of how errors occur
- suggested learning strategies to help students identify and resolve errors
- suggested teaching strategies to help teachers resolve students' errors

TIMSS has played a vital role in the development of the ERfKE project. The results of TIMSS 2003 were used as a baseline for the project, and TIMSS 2007, 2011, 2015, and 2019 provided sets of data that helped measure changes in student achievement. TIMSS will continue providing valid and reliable data for monitoring and evaluating reform projects across time. TIMSS results have elicited a great deal of interest in Jordan from educators, policymakers, and the media and have prompted the NCHRD to produce a series of reports related to TIMSS that include the following:[9]

- *Performance Levels of Jordanian Eighth-Grade Students in Mathematics and Science With Respect to the Availability of Educational Resources: A Comparative Study*

- *Mathematics Teachers' Guide Manual*
- *Science Teachers' Guide Manual*
- *An Analysis of Students' Errors in the Context of TIMSS 1999: The Case of Jordan*
- *An Analysis of the Obstacles to Science Teaching That Affected Jordanian Students' Performance in TIMSS 1999*
- *A Comparison of Jordanian Educational Policies With High-Achieving Countries: Singapore, Taiwan, and Japan*
- *Personal and Family Factors Discriminating Between High- and Low-Achieving Eighth-Grade Jordanian Students in TIMSS 1999*
- *Jordanian National Report on the Trends in Mathematics and Science Study TIMSS 2007*
- *Jordanian National Report on the Trends in Mathematics and Science Study TIMSS 2011*
- *Jordanian National Report on the Trends in Mathematics and Science Study TIMSS 2015*
- *Jordanian National Report on the Trends in Mathematics and Science Study TIMSS 2019*

The Mathematics Curriculum in Primary and Lower Secondary Grades

Jordan has undergone several education reforms since 1989 in which curricular revisions were a major component. In general, Jordan has made impressive progress in developing the curriculum and teaching and learning materials over the last few years. In particular, in 2020, Jordan introduced a national policy on textbooks and teaching and learning materials comparable to policies in high-performing countries in education around the world. If these policies and processes are maintained over time and expanded to all grades in basic education, major improvements in learning will be seen in Jordan.[10]

In the ERfKE, the mathematics curriculum was revised to focus on learning outcomes and knowledge economy skills. As a result, new textbooks in mathematics were produced for all grades and supplemented with electronic content.

Curriculum content is aligned with the standards of the U.S.-based National Council of Teachers of Mathematics. The main topic areas are number, algebra, geometry, measurement, and probability and statistics. Students must demonstrate competence in the cognitive domains of knowing, applying, and problem-solving. In addition, students are expected to master the following skills for the knowledge economy: communication; information management; problem-solving in real-life situations; and using symbols, figures, and graphs. The expectations for students in the basic cycle (Grades 1 to 10) are as follows:[11]

- number—demonstrate knowledge of place value and the four arithmetic operations (addition, subtraction, multiplication, and division); solve problems by computation, estimation, or approximation; compare and order fractions and decimals
- algebra—evaluate expressions for given numeric values of variables, simplify or compare algebraic expressions to determine equivalence, model situations using expressions, evaluate equations or formulas given values of variables, solve simple linear equations and inequalities, recognize and write linear equations and inequalities, solve problems using equations or formulas and functions
- geometry—recognize relationships between three-dimensional shapes and their two-dimensional representations, use visual and spatial inference to solve problems, apply geometric transformation and symmetry to analyze mathematical problems
- measurement—understand the characteristics that make things measurable, as well as measurement systems and operations; apply techniques, tools, and formulas to determine appropriate measurements
- probability and statistics—organize and display data using tables, pictographs, bar graphs, pie charts, and line graphs; recognize and describe approaches to organizing and displaying data that could lead to misinterpretation; use data from experiments to predict the chances of future outcomes; formulate questions that require appropriate data collection

Exhibits 1 and 2 show the mathematics topics that students should be taught by the end of Grades 4 and 8, respectively.

Exhibit 1: Indicative Summary Content—Mathematics Curriculum for Grade 4

Content Area	Objectives
Number	• read, write, order, and compare numbers up to 1 million and determine the place value of each digit • represent numbers in different ways • add and subtract whole numbers within 1 million, including using formal written methods (columnar addition and subtraction) • solve problems by computation, estimation, or approximation • multiply a whole number of up to three digits by a two-digit number • divide a whole number of up to three digits by a one-digit number • read, write, order, and compare fractions and decimals • operate with fractions and decimals

Exhibit 1: Indicative Summary Content—Mathematics Curriculum for Grade 4 (Continued)

Content Area	Objectives
Algebra	• create number patterns using one of the four arithmetic operations • recognize variables • write simple algebraic expressions to solve for one unknown missing number or operation in a number sentence • calculate the value of an algebraic expression at a given numerical value • recognize an equation and write the equation representing a real-life situation using a symbol to represent the missing value • represent real-life situations using models, symbols, pictures, and words
Geometry	• identify and draw points, lines, angles, triangles, and quadrilaterals • draw and distinguish between parallel, perpendicular, and intersecting lines • explore the properties of two-dimensional and three-dimensional geometric shapes
Measurement	• recognize the characteristics that make things measurable • recognize, estimate, order, and compare measurement units • choose the appropriate units to measure and estimate lengths, mass, and volume • solve problems involving perimeter and area for simple figures like a polygon
Probability and Statistics	• collect, organize, and display data using tables, pictographs, bar graphs, pie charts, and line graphs • read and interpret data in tables, pictographs, bar graphs, pie charts, and line graphs • recognize and distinguish among certain, possible, and impossible events • recognize a randomized experiment in a simplified way through examples

Exhibit 2: Indicative Summary Content—Mathematics Curriculum for Grade 8

Content Area	Objectives
Number	• understand, compare, and arrange positive and negative integers • recognize rational, irrational, and real numbers • classify, order, and compare real numbers • conduct the four basic arithmetic operations on real numbers • represent rational numbers on a number line • understand ratios, direct and inverse proportions, and percentages • calculate powers of numbers and square roots • recognize roots, rational exponents, and the relationship between them
Algebra	• recognize linear and arithmetic sequences • calculate the value of an algebraic expression at a given numerical value • simplify algebraic expressions • solve linear equations, linear inequalities, and simultaneous linear equations algebraically with two variables, including real-life situations • interpret, relate, and generate representations of linear functions in tables and graphs
Geometry	• recognize the geometric properties of angles and geometric shapes (e.g., triangles, quadrilaterals) • use the Pythagorean theorem and properties of shapes in solving problems • understand congruence and similarity • understand transformations (translations, reflections, rotations)
Measurement	• demonstrate an understanding of the relationships among units and use appropriate units for a situation • understand volume and surface area (volume of cylinders, cones, and spheres; surface area of cylinders and cones)
Probability and Statistics	• organize and display quantitative data using frequency tables with categories • compare measures of central tendency • determine and estimate the theoretical and experimental probability of an outcome • find quartiles for quantitative data • record, describe, and analyze the frequency of outcomes of simple probability experiments involving randomness using the 0–1 probability scale

The Science Curriculum in Primary and Lower Secondary Grades

Jordan's three most recent major education reforms also have focused on enhancing the science curriculum. In 2020, Jordan began to implement a comprehensive approach to improving the scope and quality of the science curriculum.

For Grades 1 to 8, there is an integrated curriculum, while in Grades 9 and 10, science is taught as four subjects: biology, chemistry, physics, and earth science. The expectations for students in Grades 1 to 8 are as follows:[12]

- force and movement—acquire concepts, facts, and basic principles of force and movement, (e.g., straight and nonstraight movement; static, density, pressure, and buoyancy, and the relationships between them; speed, distance, variable speed in one dimension, and constant acceleration) and understand their relationship; use laboratory equipment and instruments to explore concepts, facts, and various scientific measurements; follow safety rules and procedures in the classroom, school, and laboratory; use oral and written communication and mathematical and physical representations to describe scientific concepts related to force and movement
- matter and energy—acquire concepts, facts, and basic principles related to matter and energy (e.g., size, mass, and shape; separate mixtures into their components; magnets and their properties; sound, light, electrical circuits, electrostatics, and wave motion; energy and its transformations); recognize the work of God in the universe and understand that the universe's materials have significant impact on people's lives; investigate by using the scientific method; use laboratory materials and tools to explore science principles; follow safety rules and procedures in the laboratory, classroom, school, and home
- organisms and their environment—show an understanding of the characteristics of living organisms and their needs, life cycles, and relationships with each other and their environment; demonstrate the knowledge and skills necessary for understanding the nature of the human body and maintaining one's health
- meteorology—understand the components and characteristics of the atmosphere and its interaction with Earth's surface
- terrestrial materials—understand the components and characteristics of land and water systems, their interactions, and human impact on them
- astronomy—understand the components of the universe, its characteristics and origin, and the physical laws governing it
- Earth's history—describe Earth's changes over time
- geological processes—understand geological processes and their role in the formation of topographic features and geological phenomena
- oceans—understand that the oceans are a complex, dynamic system in which interactions occur among natural systems, minerals, and weather

Exhibits 3 and 4 show the science topics that students should be taught by the end of Grades 4 and 8, respectively.

Exhibit 3: Indicative Summary Content—Science Curriculum for Grade 4

Content Area	Objectives
Force and Movement	• distinguish between the concepts of movement and static and their applications • identify forms of movement through examples from one's environment (straight and nonstraight) • identify the forms of force and their relationship to movement • employ knowledge of concepts related to force in explaining phenomena and applications of life • employ practical experience to investigate the benefits of using simple machines
Matter and Energy	• practice scientific skills in identifying, describing, and distinguishing materials • identify the states of matter, its properties, and qualities • learn concepts related to the properties of matter, such as size, mass, and shape • investigate the properties of matter and understand the changes it undergoes as a result of heating and cooling • select and apply scientific processes to separate mixtures into their components • employ practical experience to identify magnets, their properties, and their interaction with materials • explain what is meant by the concepts related to static electricity and electrification and its relationship to real-life situations • use practical experience to verify concepts related to electricity and magnetism • employ practical experience to learn how sound and its characteristics arise • explain concepts related to light and its importance in life • investigate the importance of thermal conduction and insulation in life

Exhibit 3: Indicative Summary Content—Science Curriculum for Grade 4 (Continued)

Content Area	Objectives
Organisms and Their Environment	• distinguish the characteristics of plants and animals and their impact on the diversity of living organisms • show an understanding of the life cycles of some organisms and track their stages • describe different environments and characterize the relationships of organisms and their environments • describe the impact of humans on the environment • show knowledge of the main classification patterns of living organisms • show an understanding of the importance of organisms coexisting with their environments • distinguish the interrelationships between organisms in a food chain • appreciate the importance of the environment components and preserve them
Meteorology	• explore the properties of air and its benefits • explain some concepts related to the weather, such as weather elements, weather conditions, and weather forecast • measure and analyze some weather elements
Astronomy	• understand the formation of some phenomena resulting from Earth's rotation around itself and around the Sun • know the relationship between the Moon, Earth, and the Sun • know the components of the solar system and the phenomena that occur in it
Earth's History and Oceans	• know the components of land (rocks, soil), their characteristics, and their locations • know surface water resources, some of their problems, and their uses at home and in school • describe the components of Earth's crust, their importance, and the processes that contributed to their formation
Geologic Processes	• describe geologic phenomena (such as earthquakes and volcanoes) and their impact on the environment and humans • describe the factors that contribute to shaping the features of Earth's surface • identify the main layers of Earth and their characteristics

Exhibit 4: Indicative Summary Content—Science Curriculum for Grade 8

Content Area	Objectives
Force and Movement	• employ knowledge of the concepts of density, pressure, and buoyancy, and the relationships between them, to solve mathematical problems • employ scientific experiments to investigate Archimedes' and Pascal's principles, as well as Bernoulli's principle • employ the mathematical relationship between speed, distance, and time in mathematical applications • employ mathematical relationships for variable speed in one dimension, and constant acceleration in mathematical applications
Matter and Energy	• investigate the practical applications of electrostatics in life and realize its importance • employ practical experience in identifying electrical circuits, their components, and methods of connecting them • use practical experience to investigate the characteristics of sound • utilize scientific experience to identify the types of lenses and the images formed in them • explain concepts related to heat, methods of its transmission, and its effect on materials • employ knowledge of energy and its transformations to explain practical and technological applications • explain the relationships related to wave motion and apply them to solve problems
Organisms and Their Environment	• show understanding that some human characteristics are traits inherited from ancestors • show understanding of organisms' habitats and ecosystems • study the general structure of a plant cell and an animal cell, as well as the functions of each • compare unicellular organisms with multicellular organisms • investigate the importance of the reproduction of organisms in the continuation of species • show understanding of the characteristics of living organisms and that they result from heredity and interaction with the environment • track the flow of energy from the Sun to producers and then to the rest of the living organisms within a food web

Exhibit 4: Indicative Summary Content—Science Curriculum for Grade (Continued)

Content Area	Objectives
Meteorology	• understand the water cycle in nature and its relationship to weather conditions • describe the main elements of weather, their importance, and their impact on human activities
Astronomy	• understand some of the properties of stars • identify the methods of space exploration, study techniques, and their role in understanding the universe and the problems faced by astronauts
Earth's History and Oceans	• know the oceans, their topography, their importance, and the phenomena that occur in them • know the sources of ground and surface water and their local problems
Geologic Processes	• recognize some geologic elements and features resulting from geologic processes • identify the most important geologic structures, their characteristics, and their importance • identify the role of tectonic processes and their impact on shaping the features of Earth's surface, and interpret them

Teacher Professional Development Requirements and Programs

The Ministry of Education in Jordan recognizes the significance of improving the quality of education for the nation's development. Important tools for achieving this goal include developing the quality of teacher education through progressive reform of education policies and strategies and improving teacher preparation.

Decision-makers in the Ministry believe that the Jordanian education system must prepare and qualify young people to be critical thinkers who acquire life skills in a changing world. They have identified an urgent need in the education system for highly qualified, competent teachers. The Ministry responded to this need by implementing the ERfKE project in two phases: ERfKE I in 2003–2009 and ERfKE II in 2010–2015. Key components of this reform have been improved professional development and education, and improved learning resources. The ESP is a new education reform that seeks to provide, develop, and sustain qualified human resources for the education system. The Ministry of Education continuously seeks to develop its staff professionally to become education leaders able to inspire, motivate, and empower the school community to prepare students for the future. Principals should be leaders who motivate and encourage stakeholders and beneficiaries around the school to make a positive difference, which in turn is expected to lead to a better physical, social, and academic learning environment that fosters the development of healthy students capable of achievement.

Monitoring Student Progress in Mathematics and Science

Assessment policies have been updated to ensure that classroom assessment practices conform to the ERfKE project, which places students at the center of the learning process and focuses on their development as responsible citizens within the knowledge economy. A set of assessment strategies and tools has been developed and employed to monitor individual student progress, including performance-based assessment, observation, communication, reflection, checklists, rubrics, and learning logs. These resources are used to inform and generate grades, which are recorded along with grades collected from paper and pencil tests. New report cards have been designed to facilitate a new reporting system that focuses on basic skills and general learning competencies. Parents also receive supplemental information regarding their child's learning progress that may help them with future planning.[13]

According to regulations issued by the Directorate of Examinations and Tests, students in Grades 1 to 3 are promoted automatically, but in some cases, a student may repeat a grade with parental consent if the student failed mathematics and Arabic language. Students in Grades 4 to 10 will not be promoted to the next grade level if they fail three subjects. If a student fails one or two subjects, the student must pass a makeup examination with a score of at least 50%. Acceleration of students is possible after careful assessment, special tests, and interviews to ensure student capability. However, acceleration may not exceed two grades. In secondary education, promotion and retention are course based, and students may take individual tests more than once to fulfill the requirements of the General Secondary Certificate Examinations.[14] The General Secondary Certificate Examinations are administered to students who have completed 12 years of schooling. There are two versions—academic and vocational—that correspond to the same respective streams of secondary education. High stakes are attached to these examinations because the results are used for higher education admission.

Special Initiatives in Mathematics and Science Education

The Queen Rania Teacher Academy (QRTA), established in 2009, is an independent nonprofit institution committed to empowering teachers, supervisors, and school principals with the skills, recognition, and support necessary to excel at both the classroom and school levels. The QRTA is in successful partnership with Teachers College, Columbia University and the Columbia University Middle East Research Center (CUMERC). It specializes in training teachers in the use of advanced education technology and innovative teaching methodology.

The academy is keen to develop innovative curricula and training programs for teachers (including mathematics and science teachers), coupled with innovative approaches to teaching mathematics and science, and works to advance national and regional education standards. The QRTA began providing training for newly appointed teachers (including science and mathematics teachers) in the first term of the 2016–2017 academic year.

It is anticipated that these training courses will model approaches for the enrichment of science and mathematics education in the basic education grades, with a focus on making science and mathematics fun, interactive, and accessible.

The National Center for Curriculum Development (NCCD) was founded in 2017. It seeks to develop textbooks and curricula in accordance with best practices and the Kingdom's needs. The center reviews and develops the general framework of curricula from early childhood to 12th grade, as well as education outcomes, evaluation and teaching strategies, and performance indicators. Recent textbooks in mathematics and science curricula for the first and fourth grades were developed and used in the 2019–2020 academic year.[15]

Suggested Reading

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