Jordan

Abdalla Ababneh
Khattab Abulibdeh
Emad Ababneh
National Center for Human Resources Development

Introduction

Overview of Education System

The national education system in Jordan is well-developed. For Jordanians, the country has achieved universal basic education for both boys and girls, and enrollment rates are high. Education reforms through the Education Reform for the Knowledge Economy programs (ERfKE I and II) and ongoing efforts to introduce improvements have contributed to these 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), the National Strategy for Human Resource Development (2016–2025) outlines a strategy to overcome external and internal challenges in the Jordanian education sector, in terms of access, quality, accountability, innovation, and mindset.[1]

Jordan's education system aims to prepare citizens, equipped with various skills, to achieve their aspirations, meet the challenges of the future, and achieve wider benefits for 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.[2] 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.[3]

Despite the influx of Syrian students into Jordanian schools, the Ministry has continued to provide quality education services to students affected by the crisis in cooperation with its development partners. This commitment remains strong while also seeking 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—improving enrollment rates, accommodating all age groups, providing a stimulating education environment, and developing awareness and health programs. To lessen the challenges of infrastructure, the Ministry is also working to reduce the number of rented and double shift schools while also increasing amount of land available for school buildings and developing a maintenance system for schools. Such efforts require intensive cooperation, commitment, and participation.[4]

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 education services using an integrated policy tracking the quality of teaching and learning and acting as the general framework for curricula and assessment. This policy, in turn, ensures the achievement of education outputs, while keeping pace with the rapid development of Information and Communication Technology; the provision of sustainable, smart electronic learning resources; and the development of the quality of Ministry electronic services.[5]

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 education 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 education goals, preparing citizens personally in 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 to 12 (ages 17 to 18), secondary education is optional and aims to prepare citizens equipped with various capacities and skills, particularly in specialized cultural, scientific, and vocational skills that meet the existing and anticipated needs of Jordanian society. This stage 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 Education 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 2,051,841 students enrolled in schools in Jordan in the 2017–2018 scholastic year.[6] The gross enrollment rates were 84 percent in kindergarten, 99 percent in the basic cycle, and 80 percent 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 Education Reform for the Knowledge Economy project is a government-supported effort 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.[7]

The Ministry of Education has established a number of 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 principal goals of evaluating the curriculum with reference to international benchmarks and assessing the capabilities of Jordanian students compared with their international peers. Policymakers have used the international results, particularly the international rankings in achievement, to compare Jordan with the world's best performers, such as Singapore, Chinese Taipei, Korea, Japan, and Finland.

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, and 2015) 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, developed teacher guides and initiated nationwide discussions and teacher training to raise awareness of the importance of the TIMSS assessment and its results. Student responses from TIMSS 1999, 2003, 2007, 2011, and 2015 were studied thoroughly and informed the preparation of teacher guides in mathematics and science. 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. These 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 deal with errors
- Suggested teaching strategies to help teachers deal with students' errors

TIMSS has played a vital role in the development of the Education Reform for the Knowledge Economy project. The results of TIMSS 2003 were used as a baseline for the project, and TIMSS 2007, 2011, and 2015 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 National Center for Human Resources Development (NCHRD) to produce a series of reports related to TIMSS that include the following:[8]

- 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

The Mathematics Curriculum in Primary and Lower Secondary Grades

Jordan has undergone several educational reforms since 1989 in which curricular revisions were a major component. In general, Jordan has made impressive progress in developing curriculum and teaching and learning materials over the last few years. In particular, in 2015, 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.[9]

In the latest education reform project, Education Reform for the Knowledge Economy, 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:[10]

- Number—Demonstrate knowledge of place value and the four arithmetic operations (addition, subtraction, multiplication, and division); solve problems by computation, estimation, or approximation; and 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; and 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; and apply geometric transformation and symmetry to analyze mathematical problems
- Measurement—Understand the characteristics that make things measurable, as well as measurement systems and operations; and 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; and formulate questions that require appropriate data collection

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 2003, 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:[11]

- Force and Movement—Acquire concepts, facts, and basic principles of force and movement, 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; and 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; recognize the work of God in the universe and understand that the universe's materials have significant impact on our life; investigate by using the scientific method; use laboratory materials and tools to explore science principles; and 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; and 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

Professional Development Requirements and Programs

The Ministry of Education in Jordan recognizes that improving the quality of education is a priority for the nation's development and, therefore, an ultimate goal to be achieved. Important tools for achieving this goal include developing the quality of teacher education through progressive reform of education policies and strategies and improving teacher training.

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 Jordanian education system for highly qualified, competent teachers. The Ministry has 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 are improved professional development and education, and improved learning resources. Education Strategic Plan 2018–2022 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 meet Jordan's need to prepare students for the future. Jordan relies on education leaders to inspire, motivate, and empower the school community to prepare good citizens. Principals are the inspiring leaders who motivate and encourage stakeholders and beneficiaries around the school to make a positive difference. Positive change 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 Education Reform for the Knowledge Economy 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.[12]

According to regulations issued by the Directorate of Examinations and Tests, students in Grades 1 to 3 are promoted automatically unless they earn a grade of less than 40 percent in 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 percent. 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.[13] 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 the Teachers College (TC) of Columbia University and the Columbia University Middle East Research Center (CUMERC). It specializes in training teachers in the use of advanced education technology and the use of 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 educational standards. The QRTA began providing training for newly appointed teachers (including science and mathematics teachers) in the first term of the 2016–2017 scholastic 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 Ministry of Education, in collaboration with the National Center for Human Resources Development, has developed teacher guides that are expected to be introduced as compulsory materials in teacher education—one of the major impacts of TIMSS in Jordan. It is anticipated that this initiative will have a positive effect on student achievement in mathematics and science.

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 scholastic year.[14]

Suggested Readings

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