

Introduction

Overview of the Education System

In Tunisia, education is recognized by the constitution as a fundamental right guaranteed to all citizens regardless of gender, social origin, ethnicity, or religion.¹ This right is asserted by the Law of Education Orientation, which stipulates that “the State provides free education to all those who are of school age, and gives all students equal opportunity to enjoy this right.”^{2, 3}

Public education is a service provided by the national government and managed by the Ministry of Education. Private schools, which are not managed by the ministry, also operate within the framework of the national education system. Educational objectives, teaching programs, and textbooks are established nationally. As with all disciplines, the ministry defines the mathematics and science programs and curricula, and all schools are obliged to implement them.

Preschool education is for children ages 3–6 and takes place in private and public establishments. Although not compulsory, preschool is the responsibility of the Ministry of Education. The objective of preschool education is to prepare students for the first cycle of basic education (primary education). Preschool education prepares students for community life and promotes the development of oral communication, the senses, psychomotor capabilities, and a healthy perception of one’s body.

Primary and secondary education comprises two stages: basic and secondary education. Basic education lasts nine years, is compulsory from ages 6–16, and is divided into two cycles:

- ◆ First cycle takes place in primary schools, lasts six years (Grades 1–6), and includes children ages 6–12; and
- ◆ Second cycle, or preparatory cycle, takes place in lower secondary schools, lasts three years (Grades 7–9), and includes children ages 13–16.

Secondary education occurs in upper secondary schools and lasts four years (Grades 10–13). At the end of the first year of secondary education, students are directed to specialized subject areas, such as science and technology.

Parents also tend to urge their children to specialize in these areas. The policy goals of the national government with regard to specialized subject areas are to do the following:

- ◆ Encourage 70 percent of students to specialize in scientific and technological areas; and
- ◆ Increase the opportunities for study in these areas, both in secondary school and at the university level.

Since Tunisia's independence in 1956, there have been three major reforms of the Tunisian education system, the most recent of which was in 2002. In an effort to provide a quality education to everyone and prepare students to play an active role in society, the 2002 reform focused on modernizing schools and all aspects of education—programs, teacher education, educational methods, evaluation, school management, and school life.

Languages of Instruction

Tunisia's official national language is Arabic. In basic education, Arabic is the language of instruction for all subjects except computer science, which is taught in French. In secondary school, all science subjects are taught in French.

For historical reasons, French is an important language in Tunisia, and students begin learning French in Grade 3. English is taught as the second foreign language, beginning in Grade 6.

Mathematics Curriculum in Primary and Lower Secondary Grades

Exhibits 1 and 2 present the mathematics curriculum for Grades 1–2 and 3–4 in basic education in Tunisia. The processes in mathematics education in these grades focus on the following: knowing facts and procedures using whole numbers; understanding the meaning of addition, subtraction, and multiplication; and solving problems related to daily life using numbers, measurement, and geometrical figures.

Exhibit 1: Mathematics Curriculum, Grades 1–2

Content Area	Objectives and Expectations
Numbers	Read, write, represent, and compare whole numbers from 0 to 999; Add and subtract with whole numbers from 0 to 999; Identify sets of numbers according to common properties; and Use mental computing strategies.
Geometry	Identify the relative positions of objects in space, on lines, and on closed curves; and Identify and draw polygons according to the number of their sides.
Measurement	Use whole numbers to measure length, volume, mass, time, and money.
Algebra	Identify a common property of a set of elements, classify objects according to common properties, and count the number of elements in a set; and Use shapes, patterns, and models to classify objects or find an unknown quantity.

Exhibit 2: Mathematics Curriculum, Grades 3–4

Content Area	Objectives and Expectations
Numbers	Read, write, represent, and compare whole numbers from 0 to 999; Add, subtract, and multiply with whole numbers; Divide numbers within multiplication tables and find the quotient and remainder in the division of two integers; and Use mental computing strategies.
Geometry	Use geometric diagrams; and Identify and draw the following using rulers and right angles: acute, obtuse, and right angles; perpendicular and parallel lines; and squares and rectangles.
Measurement	Use whole numbers to measure length, volume, mass, time, and money; and Find the perimeter and area of squares and rectangles, and figures made up of squares and rectangles, and make estimates of area.
Algebra	Use shapes or models to find an unknown quantity.
Data	Read, select, and organize data presented in tables and graphs.

Exhibit 3 presents the mathematics curriculum for Grades 5–6 in basic education. The processes in mathematics education for these grades focus on the following: knowing facts and procedures using whole, decimal, and rational numbers; understanding the meaning of the four arithmetic operations; reasoning about shapes; solving problems using numbers; proportionality, measurement, and the properties of two- and three-dimensional figures; and providing a link between everyday language and mathematical language.

Exhibit 3: Mathematics Curriculum, Grades 5–6

Content Area	Objectives and Expectations
Numbers	<p>Compute with whole and decimal numbers using the four arithmetic operations;</p> <p>Compute with rational numbers using addition, subtraction, and multiplication;</p> <p>Compute with equivalent fractions, scales, and percentages;</p> <p>Identify and compare whole, decimal, and rational numbers; and</p> <p>Use mental computing strategies.</p>
Geometry	<p>Use geometric diagrams;</p> <p>Identify and draw acute, obtuse, and right angles, perpendicular and parallel lines, squares and rectangles, circles, and symmetric figures to a given line of symmetry;</p> <p>Construct a two-dimensional representation of a three-dimensional solid;</p> <p>Construct perpendicular and parallel lines;</p> <p>Construct triangles, squares, and rectangles according to their geometrical properties; and</p> <p>Identify complementary and supplementary angles.</p>
Measurement	<p>Measure length, area, angles, volume, mass, time, money, and velocity; and</p> <p>Find the perimeter and area of figures made up of squares, rectangles, triangles, trapezoids, and circles.</p>
Algebra	Use shapes or models to find an unknown quantity.
Data	<p>Read, classify, and select data from tables or shapes; and</p> <p>Organize and represent data in bar graphs, pictograms, and diagrams.</p>

The processes in mathematics education in Grades 7–8 focus on the following: knowing facts and procedures; using integers, decimals, and rational numbers; understanding numerical concepts; reasoning using deduction and induction; working mathematically; solving problems using numbers, proportionality, measurements, and properties of two- and three-dimensional figures; and using mathematical language. Exhibit 4 presents the mathematics curriculum for Grades 7–8 in basic education.

Exhibit 4: Mathematics Curriculum, Grades 7–8

Content Area	Objectives and Expectations
Numbers	<p>Compute with integers, decimals, and rational numbers using the four arithmetic operations;</p> <p>Use prime numbers and common factors, compute multiples, and compute powers of numbers;</p> <p>Find square roots using a calculator; and</p> <p>Compare, estimate, and round numbers.</p>

Content Area	Objectives and Expectations
Geometry	<p>Identify, measure, compare, and construct angles involving adjacent angles, vertical angles, complementary and supplementary angles, angle bisectors, alternate angles, corresponding angles, interior angles between parallel lines, and angles of special triangles or special quadrilaterals;</p> <p>Find the distance between two points, from a point to a line, and between two parallel lines;</p> <p>Recognize and identify congruent triangles;</p> <p>Identify and construct special triangles, special quadrilaterals, and circles according to their geometric properties;</p> <p>Construct a figure symmetric to a given line or point of symmetry; and</p> <p>Find and use the Cartesian coordinates of a point in two dimensions.</p>
Measurement	<p>Calculate length, volume, mass, time, money, and velocity;</p> <p>Find the perimeter, area, or volume of figures made up of squares, rectangles, triangles, trapezoids, circles, cubes, prisms, pyramids, cones, and spheres using geometrical properties, scale, or proportionality; and</p> <p>Measure angles using geometric properties.</p>
Algebra	<p>Use letters to represent numbers;</p> <p>Compute with simple algebraic expressions; and</p> <p>Solve simple linear equations.</p>
Data	<p>Collect, classify, and summarize data in tables and statistical diagrams; and</p> <p>Read, interpret, and make predictions using statistical diagrams.</p>

Science Curriculum in Primary and Lower Secondary Grades

Science instruction in Grades 1–6 emphasizes understanding concepts. In earth science and biology, students should be able to characterize living organisms according to their different methods for obtaining nutrients, respiration, and reproduction. They also should be able to identify some diseases and understand how to prevent them. In environmental science, students should recognize some factors that disrupt environmental balance and know some methods for protecting the environment. In physics and chemistry, students are expected to recognize devices that can be used to measure time. They also are expected to recognize the different states of matter and the conditions that cause matter to undergo a change of state. They should know the physical properties of air and identify different types and natural sources of energy.

In Grades 7–8, the processes of science education focus on the following: understanding chemical and physical concepts, understanding the relationships between organisms, understanding how systems function, making observations and conducting experiments, reasoning and drawing conclusions, working scientifically, and solving problems related to students' environments.

The content of the science curriculum in Grades 7–8, focuses on investigating and understanding basic principles and concepts related to the following:

- ◆ Matter, including physical properties (e.g., density and concentration); chemical properties of solids, liquids, and gases; and the symbols of some basic elements and formulas used in simple chemical reactions;
- ◆ Light, including reflection, refraction, and the spectrum;
- ◆ Electricity and magnetism, including electric current, circuits, motors, and generators;
- ◆ Common elements in the environment and the relationships between these elements;
- ◆ The life cycles of plants and animals, including reproduction;
- ◆ The mechanisms of photosynthesis and respiration in plants; and
- ◆ The structure and function of the human nervous, respiratory, and circulatory systems.

Instruction for Mathematics and Science in Primary and Lower Secondary Grades

The latest (2002) reform of the Tunisian education system led to a curriculum emphasizing science, languages, and vocational training. Information and communications technology is integrated at all educational levels in order to promote reasoning, thinking, and problem solving skills.

Instructional Materials, Equipment, and Laboratories

Primary schools do not have science laboratories. However, they do have the minimum required equipment for science instruction. Lower secondary schools have well-equipped science laboratories.

Use of Technology

There is no official policy regarding calculator or computer use in instruction at the fourth grade. At the eighth grade, students are permitted to use calculators when solving simple problems or operations in class, and teachers are encouraged to use computers when teaching mathematics, though the curriculum does not provide specific content for this purpose.

Grade at Which Specialist Teachers for Mathematics and Science are Introduced

Since the 2007–08 school year, primary school teachers teach all subjects, while lower secondary school teachers are specialists and teach only mathematics, chemical and physical science, or environmental science.

Homework Policies

Tunisia has no official policy regarding homework.

Teachers and Teacher Education

Teacher Education Specific to Mathematics and Science

Primary school teachers are managed by the Primary Education Department of the Ministry of Education, while secondary school teachers are managed by the ministry's Secondary Education Department. Teacher education (in term of both theoretical and practical aspects) in mathematics and science is monitored by mathematics or science inspectors from the ministry.

To be qualified as a primary teacher, prospective teachers must first complete a three-year university degree (BA or BSc). Students who have obtained a university degree and want to become primary school teachers also must pass a written examination given by the Ministry of Education before completing a one-year training program in an academic institute.

To be qualified as a secondary school teacher, students must complete a three- or four-year university degree. Students who have a university degree in mathematics and want to become mathematics teachers must pass a written examination given by the ministry. Students also must pass an oral examination, and those who succeed are recruited as lower- and upper-secondary school teachers. Prior to beginning their formal teaching careers, these recruits are required to participate in a three-week summer program (50 hours) focusing on their subject of specialization as well as information and communication technologies.

Requirements for Ongoing Professional Development

Since 2003, the Tunisian Ministry of Education has been reforming teacher professional development to provide teachers with more autonomy and to enhance their role in the educational process.⁴ The reformed system aims to provide teachers with opportunities to develop reflective skills, consolidate mathematical knowledge, become informed about new pedagogical tools,

collaborate with other teachers, and participate with other educational staff in improving the school's role in society.

Mathematics professional development is compulsory for all primary school teachers and occurs throughout the year. It represents 30 percent of total teacher professional development and is staffed by primary education inspectors. Mathematics professional development focuses on mastering disciplinary concepts aligned to the curriculum, problem-solving strategies (especially for problems related to everyday situations), assessment procedures, and the mathematics teaching and learning process. Specific topics concerning pedagogical approaches and technology use are integrated into general professional development.

Professional development for secondary school teachers occurs throughout the year and is staffed by inspectors. Every two weeks, one eight-hour day is reserved for professional development, and every teacher must attend a total of six days of professional development annually. In addition, a one- to three-week summer program is offered for teachers who are interested in specific professional development (e.g., in their subject discipline, information and communication technology, pedagogy, or didactics). To update and increase the depth of teacher knowledge, a professional development curriculum is produced every year focusing on changes in the mathematics or science curriculum and textbooks.

Monitoring Student Progress in Mathematics and Science

At the end of Grade 6, students may take an optional examination. Students who perform exceptionally on this examination may then continue their studies in a special lower-secondary school for outstanding students. Similarly, after completing basic education (at the end of Grades 9), students may take another optional examination; students who succeed on this examination receive a certificate allowing them to continue their studies in a special upper-secondary school for outstanding students.

At the end of upper-secondary education (Grade 13), students take the National Baccalaureate Examination (*Examen National du Baccalauréat*), the content of which consists of six subjects. Each examination subject is assigned a weight depending on the student's course of study, and the average of these weights determines the student's exam grade. Students who pass the baccalaureate can enter the university, while those who do not pass enter the workforce or study at a private school.⁵

Impact and Use of TIMSS

Article 52 of the Education Act of 2002 defines the objectives of teaching mathematics and science, and new programs were implemented to achieve these objectives.⁶ Student performance in these subjects is expected to improve as a direct outcome of these changes, and subsequent TIMSS and PISA studies will be used to verify if this expectation is realized.

Based on the performance of Tunisia's students in TIMSS 1999 and 2003, physics is now taught in Grade 7 in lower-secondary schools.

References

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