United Arab Emirates

Shaikha Alzaabi
Ministry of Education

Introduction

Overview of Education System

The Ministry of Education oversees all levels of education in the United Arab Emirates (UAE), including schools, colleges, and other higher education institutes. The Ministry aims to build and manage an innovative education system for a highly competitive knowledge society that includes all stages of life and meets the needs of the labor market. The education system includes both public and private sectors. The government fully finances public education, and it is free to citizens at all levels.

The UAE includes a range of public and private schools for preuniversity education; these schools offer multiple curriculum options to suit the needs of citizens and residents. Residents can send their children to private schools, and registration is open to students residing in government schools, after fulfilling a few conditions and paying specific fees. Every public school allocates a percentage of its vacancies to these students. The Ministry of Education oversees both public and private schools. Although it does not directly run private schools and does not bind them to a specific curriculum (except for Arabic language, social studies, and Islamic studies), it does develop general guidelines to which these schools adhere.

In 2016, the Emirates Foundation for School Education was established in accordance with independent powers, according to Cabinet Resolution No. 8. The Foundation is responsible for enhancing the efficiency of the federal education sector and providing school education within the framework of the state's general policy. It also implements policies, strategies, standards, and controls related to the education sector, including vocational and technical education and continuous education.

All public schools in the UAE operate under the supervision of the Ministry of Education through local branches or education districts in each emirate. For private schools in Abu Dhabi, Dubai, and Sharjah, responsibility for overseeing schools rests with the local education authorities alongside the Ministry, such as the Department of Education and Knowledge in Abu Dhabi, the Knowledge and Human Development Authority in Dubai, and the Sharjah Education Council.[1] Children who have not reached the required age for the first year of general education (Grade 1) are admitted and are enrolled in kindergarten for two years, KG1 and KG2, but enrollment is not compulsory. The Ministry of Education in the UAE applies the following academic levels in government schools:

- Foundation stage: Elementary level/Cycle 1 (Grades 1 to 4)
- Middle stage: Cycle 2 (Grades 5 to 8)
- Secondary stage: Cycle 3 (Grades 9 to 12)

Use and Impact of TIMSS

The UAE participated in TIMSS as a country and as two adjudicated systems, Abu Dhabi and Dubai. The sample in 2019 was very large and included all public schools plus a sample of private schools.

The UAE Vision 2021 National Agenda—created in 2010—emphasizes the development of a first-rate education system that will require the complete transformation of the current education system and teaching methods. The National Agenda aims to equip all schools, universities, and students with smart system devices as a basis for all teaching methods, projects, and research.

Furthermore, a goal of the National Agenda is for UAE students to rank among the best in the world in reading, mathematics, and science exams, and to have a strong knowledge of the Arabic language.[2] UAE TIMSS scores are used as a parameter of the UAE National Agenda and as an indicator of progress in achieving the UAE National Agenda goals.

The Mathematics Curriculum in Primary and Lower Secondary Grades

The mathematics curriculum has been through several stages of reform since 2016–2017.[3] Although it still being updated, the curriculum has almost the same general features as the previous one. The curriculum was developed based on four content domains: Numbers; Algebra; Geometry and Measurement; and Data and Probabilities.

With a problem-solving perspective, the mathematics curriculum aims to help students to acquire basic skills, such as reading for understanding and reflection; developing an action plan and modifying it, if necessary; checking solutions; and reporting results. In addition, a new content domain, Financial Literacy, was added to the curriculum in both Cycles 1 and 2.

As for the cognitive domains, the mathematics curriculum in the UAE follows a classification similar to the TIMSS framework: knowing, applying, and reasoning. Each student receives two books from the Ministry of Education: a student book and an interactive student guide. By the end of fourth grade, students in public schools should have been taught the topics listed in Exhibit 1.

Exhibit 1: Mathematics Topics for Grade 4

Domain	Areas	Contents
Numbers	▪ Whole numbers ▪ Expressions, simple equations, and relationships ▪ Fractions and decimals	▪ Applying addition and subtraction concepts ▪ Number patterns ▪ Place value (through thousands), using place value to round ▪ Addition and subtraction (relating addition and subtraction, addition and subtraction strategies to 20, four-digit addition and subtraction, patterns, addition properties and subtraction rules, using related facts to add and subtract) ▪ Multiplication and division (understanding multiplication and division; patterns; applying multiplication and division; relating division and multiplication; multiples of 10, 100, and 1,000; dividing by 10, 100, and 1,000; multiplication properties and division rules; rounding to estimate; times tables; products, multiplying with two-digit numbers; multiplication and division rules; factors and multiples; multiplying fractions by whole numbers; dividing by one-digit numbers) ▪ Fractions and decimals ▪ Operations with fractions and decimals ▪ Properties and equations ▪ Patterns and sequences ▪ Problem solving
Measurement and Geometry	▪ Measurement ▪ Geometry	▪ Measurement and time (comparing and ordering lengths; nonstandard units of lengths; problem solving; analog and digital time) ▪ Two-dimensional shapes and equal shares (square and rectangle, triangle and trapezoid, circle; comparing shapes, composite shapes; problem solving; equal parts; halves; quarters) ▪ Three-dimensional shapes (cube, prism, cone, and cylinder; problem solving; combining three-dimensional shapes) ▪ Time ▪ Geometric shapes and equal shares ▪ Metric units and volumes ▪ Perimeter and area ▪ Measurement and metric units ▪ Perimeter and area
Data	▪ Reading, interpreting, and representing data ▪ Using data to solve problems	▪ Organizing and using graphs (tally charts, problem solving, making picture graphs and bar graphs, reading picture graphs and bar graphs) ▪ Data analysis ▪ Representing and interpreting data ▪ Measurement and metric units
Financial Mathematics	▪ Money and transactions	▪ Money (counting coins, value of coins and bills, making change, problem solving)

By the end of eighth grade, students in public schools should have been taught the topics listed in Exhibit 2.

Exhibit 2: Mathematics Topics for Grade 8

Domain	Area	Content
Numbers	▪ Integers ▪ Fractions and decimals ▪ Ratio, proportion, and percent	▪ Place value ▪ Multiplying whole numbers ▪ Dividing by a two-digit divisor ▪ Adding and subtracting decimals ▪ Multiplying and divide decimals ▪ Fractions and decimals ▪ Adding and subtracting fractions ▪ Multiplying and dividing fractions ▪ Ratios and rates ▪ Fractions, decimals, and percent ▪ Computing with multidigit numbers ▪ Multiplying and dividing fractions ▪ Integers and the coordinate plane ▪ Ratios and proportional reasoning ▪ Percentage ▪ Integers ▪ Rational numbers ▪ Real numbers ▪ Problem solving
Algebra	▪ Expressions, operations, and equations ▪ Relationships and functions	▪ Expressions and patterns ▪ Equations ▪ Functions and inequalities ▪ Equations with one variable ▪ Equations with two variables
Geometry	▪ Geometric shapes and measurements	▪ Geometry (polygons, sides and angles of triangles; classifying triangles, circles, sides, and angles of quadrilaterals; classifying quadrilaterals; building three-dimensional figures; using models to find volume; volume of prisms; building composite figures; volume of composite figures; problem solving investigation; making a model) ▪ Integers and the coordinate plane ▪ Area of parallelograms, triangles, and trapezoids; problem solving investigation; drawing a diagram, area of irregular figures, composite figures; volume of rectangular prisms, triangular prisms, pyramids; surface area of rectangular prisms, pyramids; nets of triangular prisms, pyramids; volume and surface area of composite figures ▪ Geometric figures (complementary and supplementary angles; triangles; drawing three-dimensional figures; circumference, area of circles; area of composite figures, volume and surface area of pyramids; volume and surface area of composite figures) ▪ Functions ▪ Triangles and the Pythagorean theorem

Domain	Area	Content
		▪ Transformations (translations, reflections, rotations) ▪ Congruence and similarity ▪ Volume and surface area (volume of cylinders, cones, and spheres; surface area of cylinders and cones) ▪ Tools of geometry (points, lines, and planes; linear measure, distance, and midpoints; proving theorems about line segments, angles of polygons, parallelograms, rectangles, rhombi, squares, trapezoids, and kites)
Data and Probability	▪ Data ▪ Probability	▪ Measurement ▪ Data ▪ Statistical measure (mean, median, and mode; measures of variation; mean absolute deviation; appropriate measures; line plots; histograms; box plots; shape of data distribution; collecting data; interpreting line graphs; selecting an appropriate display; using appropriate units and tools) ▪ Probability (theoretical and experimental probability, relative frequency, fair and unfair games, probability of compound events, permutations, independent and dependent events) ▪ Statistics (making predictions, recognizing misleading graphs and statistics, comparing populations) ▪ Scatter plots and data analysis
Financial Literacy	▪ Money and transactions	▪ Sales tax, tips, and markup ▪ Discount ▪ Simple interest ▪ Compound interest ▪ Solving problems involving financial literacy, such as sales tax, tips, markups, discounts, simple interest, and compound interest

The Science Curriculum in Primary and Lower Secondary Grades

The science curriculum in the United Arab Emirates is adapted from a McGraw-Hill series in which students build skills in content knowledge and cognition within an integrated scientific content that covers four domains: Nature of Science and Technology; Earth and Space; Life Sciences; and Physical Sciences.[4]

By the end of Cycle 1 (Grades 1 to 4), following the Ministry of Education curriculum, students in public schools will show mastery of scientific content in the structure of parts of the human body, plants, and animals; the structure of the Earth's surface and certain components of space; forms and sources of energy; and states and interactions of matter in their surroundings. They will record observations, compare the results of prediction, and observe objects in their local environment; ask questions; and predict results and present them through investigations using images, diagram, models, and words. Exhibits 3 and 4 detail the science content in Cycles 1 and 2, respectively. The science curriculum was updated in 2019 after the TIMSS assessment. Therefore, the exhibits list elements of the science curriculum from 2017.

Exhibit 3: Science Content in Grades 1 to 4 (Cycle 1)

Domains	Contents
Nature of Science and Technology	▪ Science operations in the construction of knowledge and understanding of areas of scientific content; models, laws, and scientific theories ▪ Explaining natural phenomena; technological and engineering solutions within the framework of scientific and mathematical knowledge ▪ Science, engineering, and technology interaction; investigation skills and tools used by scientists; relationship between science, technology, and society
Earth and Space	▪ Earth's location in the universe, relative locations of the Sun and other stars; patterns, motion of planet Earth, and human activities affecting Earth; patterns due to the movement of the Earth in the Solar System, causing seasons and adaptions to these changes ▪ Characteristics and movements of water contributing to the formation of the Earth's surface and their impact on its systems ▪ Complex and dynamic interactions between the Earth's spheres (lithosphere, hydrosphere, atmosphere, and biosphere) ▪ Regulators of weather and climate ▪ Objects' physical characteristics and bodies' movement on Earth and in space, and how forces change objects' motion, shape, stability, and application of knowledge to daily life
Physical Sciences	▪ Classification of substances (elements, compounds, and mixtures); velocity, speed of bodies ▪ Uses and transformations of energy sources and methods of transfer between systems ▪ Energy conservation ▪ Matter and its transformations: material properties, diversity, states, changing states, and conservation of matter based on the molecular structure of matter; materials interacting or combining to make new materials ▪ Motion and rest (object's motion, changes in motion, or equilibrium); potential interactions behind all the forces between objects ▪ Energy transformations and uses in everyday life activities to achieve sustainable development; properties of light and its interaction with objects in the surrounding environment
Life Sciences	▪ Comparing living and nonliving organisms, plants, and animals (growth and development of living organisms) ▪ Definition of structures of cells and systems enabling them to perform vital functions; mutual relations between the body systems ▪ The relationship between various species through fossils ▪ Biological diversity: similarities and differences ▪ Human interaction with the environment; impact of the environment on the population of organisms across generations; interactions of ecological systems; how living organisms obtain energy ▪ Genetic differences: characteristics of a generation and its preceding generation

By the end of Cycle 2 (Grades 5 to 8), following the Ministry of Education curriculum, students in public schools will show mastery of scientific content related to construction of the human body, functions of the systems and organs, environmental and vital systems and their interactions, the formation of Earth, Earth's history, and other components of the universe; the interaction between matter and energy and the forms of its transformations and sources; and the structure of matter, its changes, and its reactions. Students will also study heat transfer, properties of metals,

characteristics and behavior of waves, reflection and refraction of light, physical and chemical properties, and types of bonds. Exhibit 4 details the science content in Cycle 2.

Exhibit 4: Science Content in Grades 5 to 8 (Cycle 2)

Domains	Contents
Nature of Science and Technology	▪ Science operations in the construction of knowledge and understanding of areas of scientific content; models, laws, and scientific theories to explain natural phenomena ▪ Technological and engineering solutions within the framework of scientific and mathematical knowledge ▪ Interaction between science, engineering, and technology ▪ Investigation skills and tools used by scientists ▪ Relationship between science technology and society ▪ Potential interactions behind all forces between objects
Earth and Space	▪ Human dependency on Earth's resources; ways living organisms alter Earth's processes and structures; effects of water, ice, wind, or plant cover on the weathering or erosion rate; complex and dynamic interactions within Earth's systems; solid mass, the hydrosphere, the atmosphere, and the biosphere; using the properties of rocks and minerals to determine the value of metals; interaction between ground systems leading to the formation of sedimentary, igneous, and metamorphic rocks; human activities influencing agriculture, industry, and daily life ▪ Earth's location in the universe; evidence for the formation of the Solar System; patterns caused by the movement of Earth in the Solar System ▪ The universe and the stars rotating in it; astronomical objects orbiting around the sun; the Big Bang theory (foundations, evidence, distant galaxy motion, and the formation of matter in the cosmos); astronomical evidence related to light spectra ▪ Tectonic plates and system interactions through their movement; how motion of plates is responsible for most characteristics of continents and oceans; distribution of most rocks and minerals in the Earth's crust ▪ Tides as the result of the moon's gravity effect on Earth; how tides differentiate between eclipses and their relation to the Earth' s position versus the Moon and the Sun ▪ Classification of waves in our daily life (e.g., mechanical, electromagnetic, or longitudinal and cross-sectional waves) ▪ Characteristics and movements of water from the Earth's surface and their impact on its systems; water changes and motion in the atmosphere as determinants of the local weather patterns and severe weather (hurricanes and thunderstorms) ▪ Natural hazards influencing individuals and communities ▪ Geological events of Earth and its history (analysis of rock strata and fossil register)
Physical Sciences	▪ Particulate nature of matter to explain the properties of substances, diversity of materials, states of matter, phase changes, and conservation of matter; chemical and physical properties of substances ▪ Motion and forces: potential interactions behind all the forces between objects ▪ Energy: stability of physical systems (types, conservation, energy transferred between objects or systems); energy transformations, uses in everyday activities ▪ Molecular structure of matter in the interpretation of the material properties, diversity, states, changing states, and conservation ▪ Physical properties of the elements of groups (alkali metals, alkaline Earth metals, halogens, and noble gases) in the periodic table and their uses in our life; physical properties and chemicals properties of substances; relationship between the atomic structure of an element and its location in the periodic table using simple models; concept of motion and rest; changes in motion

Domains	Contents
	▪ Characteristics and behavior of waves; properties of light and how it interacts with objects in the environment ▪ Properties of images from light reflection on mirrors; refraction of light; properties of sound and properties of acoustic waves; chemical reactions absorb or release thermal energy and control heat in transferring the energy from the environment or to it ▪ Electric generators use kinetic energy; formation of igneous and metamorphic rocks and diamonds by convection ▪ Bonds (e.g., nonpolar covalent, polar covalent, ionic, metallic); heat transfer; properties of metal ▪ Potential interactions behind all forces and between objects; properties of the natural and electromagnets, magnetic field; refraction of light; ray diagrams
Life Sciences	▪ Living organisms' interaction with living and nonliving components of the environment to get material and energy ▪ Relationship between the food web and the community; food chains, from producers to decomposers, in a specific environment ▪ Classification of living organisms, including humans (e.g., producers, consumers, or decomposers); examples of carnivores, herbivores, and omnivores ▪ Human and heredity (cause of the variation of individuals of the same species (appearance, function, and behavior) ▪ Reasons for the depletion or extinction of some species of plants or animals (e.g., hunting, diseases, invasive species, change or the destruction of the habitat), the effects on the natural community, and actions that can be taken to avoid depletions or extinctions ▪ Structure of systems; cells of living organisms; effects of biodiversity on humans ▪ Structure and function of eukaryotes, prokaryotes, and viruses (e.g., genetic material, metabolism, organelles, and other parts of the cell and its function) ▪ Producers (plants, algae, and some microorganisms) using energy from the sun to make sugar (food) from carbon dioxide and water by photosynthesis that in return release oxygen ▪ Characteristics to classify the types of plants; characteristics of living organisms in the plant and animal kingdoms ▪ Anatomy and physiology of endocrine organs, excretion, and the nervous system; how these systems interact to maintain internal stability and balance ▪ Genes and chromosomes: genetic variation, sexual reproduction, models (such as, Punnett squares, diagrams, computer simulation/presentation) ▪ Asexual reproduction resulting in offspring with identical genetic information, and sexual reproduction resulting in offspring with genetic variation ▪ Human male and female reproductive systems ▪ Organisms multiplying and transferring genetic information to their descendants

Professional Development Requirements and Programs

The Ministry of Education has created an institute that is responsible for all teacher training. Compulsory training for all teachers has been conducted in cooperation with the Ministry of Education's Curriculum Division. Mathematics and science teachers are trained mostly in three main aspects:

- Pedagogical development aspects
  - Managing students' behavior
  - Implementing lesson study strategy in teaching and learning
  - Assessment of learning 365
  - Reflective teaching
  - Creating question items
- Subject-related aspects
  - Content
  - Integrating technology in the classroom
  - Teaching strategies for math and science
  - Curriculum overview
  - Planning for teaching math and science
  - STEM integration in teaching math and science
- Assessment
  - Assessment policy overview
  - Creating questions items for math and science
  - Summative assessment strategies
  - Formative assessment strategies
  - Using SwiftAssess application for creating question items
  - Effective using of assessment tools in Microsoft Teams
  - Electronic assessments for math and science

In-service professional development opportunities include strengthening educators' teaching strategies for distance learning.

Monitoring Student Progress in Mathematics and Science

The Emirates Standardized Test (EmSAT) was established to develop assessments that will improve quality of learning and ensure the standards for qualifications are met through a unified measurement system to assess science, mathematics, and language development. The data gathered from EmSAT ensures that all candidates have met demonstrable standards of learning before engaging in further study or entering the workforce. The assessment system provides reliable and valid data to schools and senior leadership to improve the overall success of student learning in support of government economic development plans for building a knowledge-based economy.

Scores are reported to the primary agency requesting administering the assessments at both the candidate and agency levels. EmSAT is a vertically scaled battery of assessments to measure student growth in a longitudinal assessment system in core areas of language (English, Arabic), science, and mathematics. All EmSAT scores reflect knowledge and skills students develop over time—across grades—and link these results to readiness for further study or a career. EmSAT scores are reported on a four-digit vertical scale that summarizes the achievement of students from multiple administration levels. EmSAT provides instructionally insightful and actionable results. It also describes student performance in terms of the EmSAT reporting categories: Below Expectations, Meets Expectations, and Exceeds Expectations.[5]

References

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