Dubai, UAE

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Introduction

Overview of Education System[a]

Dubai's education system is a dynamic and diverse landscape that serves a range of learners from early childhood to higher education. Governed by both public and private institutions, the system is under the regulatory oversight of the United Arab Emirates (UAE) Ministry of Education for public schools[1] and the Knowledge and Human Development Authority (KHDA) for private schools.[2]

Public schools in Dubai offer free education to UAE nationals and follow a curriculum set by the UAE Ministry of Education. However, a significant portion of the student population (over 90%), comprising both expatriates and UAE citizens, are enrolled in private education, which is regulated by KHDA. In 2023, there were 368,207 students attending 220 private schools in Dubai.[3] Private schools offer 16 different curricula, including U.S.-based (where schools adopt the standards of the U.S. state curriculum they follow), International Baccalaureate, the National Curriculum for England, the Indian Central Board of Secondary Education (CBSE) curriculum, and others.

KHDA's role is to ensure high-quality education and student well-being and holds institutions accountable through annual quality assurance visits conducted by the Dubai Schools Inspection Bureau (DSIB). These visits assess various aspects of school performance, including student achievement, quality of education, inclusivity, and alignment with UAE's national priorities. The effectiveness of KHDA's policies is evident in the significant improvement in school ratings over the years.

Use and Impact of TIMSS

Central to KHDA's success in improving standards across the private school sector in Dubai is the emphasis on international assessments such as TIMSS. Dubai's participation in TIMSS since 2007 has highlighted the importance of international benchmarking. KHDA mandates annual participation in international benchmark assessments, setting aspirational targets for schools and issuing detailed performance reports.

a See https://web.khda.gov.ae/en/Resources/Publications/Papers-and-Statistics/Dubai-Private-Schools-Snapshot-2022-2023-%E2%80%93-Novembe for more information on Dubai's education system.

The TIMSS reports and international benchmark assessments are crucial tools for schools to identify areas of improvement. KHDA expects schools to utilize the information about student learning presented in these reports to adapt curricula, lesson plans, and teaching methods to address gaps in skills and knowledge. This approach has led to substantial improvements in Dubai's TIMSS outcomes, with average scores in mathematics and science consistently rising above the scale center point of 500 since 2007.

The impact of this comprehensive strategy has been a dramatic improvement in TIMSS outcomes across the private school sector in Dubai. The average TIMSS score has risen steadily from 2007 to 2019 for Grades 4 and 8 in both mathematics and science. These gains are also reflected in other international assessments such as PIRLS and the Programme for International Student Assessment (PISA).

The ongoing National Agenda Parameter project, which has specific objectives and targets that are evaluated during each annual quality assurance visit, continues to operate across the school sector. This project underscores the commitment to maintaining high standards and adapting to global benchmarks, which has been instrumental in elevating the quality of education in Dubai's private schools.

The emphasis on rigorous oversight, accountability, and alignment with international standards demonstrates Dubai's dedication to providing a high-quality education system that meets global benchmarks and prepares students for a competitive and ever-evolving world.

The Mathematics Curriculum in Primary and Lower Secondary Grades

In Dubai, only 10% of students (mostly nationals) attend the public school system and follow the mathematics curriculum set by the Ministry of Education. As indicated above, there are 16 different curricula implemented across well over 200 private schools. However, the following four curricula are the most widely used among private schools:

- National Curriculum for England (NCfE) (38% of private school students follow this curriculum)[4]
- Indian Central Board of Secondary Education (CBSE) curriculum (26% of private school students follow this curriculum)[5]
- U.S. curriculum (15% of private school students follow this curriculum)
- International Baccalaureate (IB) (including some hybrid NCfE/IB) curriculum (11% of private school students follow this curriculum)[6,7]

Students who took the TIMSS assessments in 2023 attended schools that offered the various mathematics curricula at the fourth- and eighth-grade levels as summarized below.

National Curriculum for England[b]

In Grade 4 (Year 5), the focus is on developing confidence in using number systems, including all four arithmetic operations (addition, subtraction, multiplication, and division). Students learn to solve problems using mental methods and develop an understanding of shapes, spaces, and measurements. Communication of mathematical ideas using language, diagrams, and charts is emphasized.

In Grade 8 (Year 9), the curriculum deepens students' knowledge, skills, and understanding. It includes exploring mathematical concepts more broadly and deeply, covering competence, creativity, and applications. Critical understanding and mastering key processes like representation, analysis, interpretation, and communication are essential components.

U.S. Curriculum

In Dubai private schools that use a U.S. curriculum, there are a range of curricula implemented. These curricula typically align with specific state standards that are used in the United States and focus on a comprehensive set of mathematical concepts and skills. Increasing in complexity from Grade 4 to Grade 9, key aspects of these curricula include problem-solving, communicating, reasoning, and making connections.

The American Education Reaches Out (AERO) standards,[c] often supporting state mathematics curricula and thus the Dubai private schools that use a U.S. curriculum, promote mastery, are coherent and connected, and foster a broad mathematical understanding.

International Baccalaureate (IB) Curriculum

Not all IB private schools in Dubai implement all IB programs. All follow the IB diploma program (DP), and some follow the middle years program (MYP) and/or the primary years program (PYP) as well.

In the PYP (Grade 4),[d] mathematics is often taught partly through an interdisciplinary approach with science and partly as a discrete subject. The focus is on inquiry, problem-solving, and the practical application of mathematics.

In the MYP (Grade 8),[e] students study mathematics with an emphasis on inquiry and application. The curriculum continues to emphasize problem-solving, critical thinking, and practical applications of mathematics.

b See https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study for more information.

c See http://www.projectaero.org/aero_standards/math-standards/AEROCommonCoreMath.pdf for more information.

d See https://www.ibo.org/programmes/primary-years-programme/ for more information.

e See https://www.ibo.org/programmes/middle-years-programme/curriculum/mathematics/ for more information.

Indian (CBSE) Curriculum[f]

In the primary grades of many Dubai Indian curriculum schools, there remains a legacy but decreasing emphasis on rote learning for foundational mathematical facts. In this, there is a focus on developing rapid mental calculation skills from an early age. In such classes, while basic facts and formulas might initially be memorized, the overall goal is to build a strong foundation for higher mathematical concepts. From there, the focus increasingly moves toward application, critical thinking, and analytical skills, particularly in higher grades.

By Grade 8, the curriculum includes broader topics like number, algebra, geometry, and statistics. Problem-solving in real-life contexts becomes a more prominent focus, with an aim to apply mathematical knowledge practically.

The Science Curriculum in Primary and Lower Secondary Grades

Just like for mathematics, the 10% of students who attend public schools also follow the national curriculum provided by the UAE Ministry of Education. The most widely used science curricula in Dubai private schools are summarized below.

National Curriculum for England[g]

In schools that use the NCfE, students in Grade 4 (Year 5) learn about a range of living things, materials, and phenomena; begin to make connections among ideas and to explain things using simple models and themes; apply their knowledge and understanding of scientific ideas to familiar phenomena, everyday things, and personal health; conduct investigations working alone and with others; and begin to use a range of reference sources in their work.

Students at the secondary level, which includes Grade 8 (Year 9), are engaged at many levels, linking direct practical experience with scientific ideas. Experimentation and modeling are used to develop and evaluate explanations, encouraging critical and creative thought. Students learn to question and discuss issues that may affect their own lives, the direction of society, and the future of the world.

IB Curriculum[h]

In schools offering the IB, students taking the TIMSS assessment are in the PYP (Grade 4) and MYP (Grade 8). In the PYP, science is taught in an interdisciplinary program with mathematics, not as a separate subject. Eighth-grade students usually take a combined science and mathematics course. Inquiry, problem-solving, and the application of science are strongly emphasized, as well as the acquisition of scientific knowledge. The IB program expects that students will have opportunities to act as scientists rather than learn about science. As a

f See https://cbseacademic.nic.in/cbe/documents/Learning_Standards_Maths.pdf for more information.

g See https://www.gov.uk/government/publications/national-curriculum-in-england-science-programmes-of-study for more information.

h See https://www.ibo.org/globalassets/new-structure/research/pdfs/science-in-the-pyp.pdf for more information.

consequence, students may be less familiar with a large body of factual content knowledge but skilled in the process of scientific inquiry.

U.S. Curriculum

Similar to the mathematics context, most schools in Dubai using a U.S. curriculum adopt a set of curriculum standards for science relevant to a specific state and adapt these standards to meet their students' needs. Many private U.S. curriculum schools in Dubai support their science curricula with the Next Generation Science Standards (NGSS),[i] which embrace the following principles age appropriately, including in Grades 4 and 8:

- three-dimensional learning—NGSS integrates the following three distinct dimensions into science education:
  - science and engineering practices—These are the skills students need to engage in scientific inquiry and engineering design, such as asking questions, developing models, planning and carrying out investigations, analyzing data, and constructing explanations.
  - crosscutting concepts—These are concepts that apply across all scientific domains, like patterns, cause and effect, scale, proportion, systems and system models, energy and matter flows, cycles, and conservation.
  - disciplinary core ideas—These are the fundamental ideas in science that have broad importance across multiple science or engineering disciplines or are key to understanding a particular field, like physical science; life science; earth and space science; and engineering, technology, and applications of science.
- focus on inquiry and application—NGSS emphasizes learning science through inquiry, encouraging students to learn by doing and to apply their knowledge to solve real-world problems.
- integration with other subjects—NGSS aims to integrate science with other subjects such as mathematics and English language arts, promoting a more interdisciplinary approach to education.
- grade-level specific standards—NGSS provides specific standards for each grade level, ensuring that science education builds coherently from kindergarten through high school.
- alignment with college and career readiness—The standards are designed to prepare students for college and careers, equipping them with the scientific knowledge and skills necessary for the 21st century.

i See https://www.nextgenscience.org/ for more information.

Indian (CBSE) Curriculum[j]

In Dubai private Indian curriculum schools (CBSE and Indian Certificate of Secondary Education [ICSE][8]), science plays an important role and is seen as developing students' cognitive, affective, and psychomotor abilities. Emphasis is placed on cultivating a spirit of inquiry, creativity, objectivity, and aesthetic sensibility.

The key principles of the 2023 update to the Indian National Curriculum, increasingly followed by such schools across Dubai, incorporate the following:

- developing understanding of scientific knowledge—Students develop an understanding of the concepts, principles, laws and theories, and process capacities of science in keeping with their developmental stage. They use this understanding to explore and make sense of the world independently and in collaboration with peers.
- developing the ability to use the scientific method—Students develop the ability to put forth arguments, predict, analyze, draw logical conclusions, make decisions, and evaluate situations using the scientific method.
- developing an understanding of how scientific knowledge evolves—Students develop a historical and developmental perspective of science. They understand that scientific knowledge developed as a result of the efforts of many individuals across many years. They also understand how the methods of science evolved over time.
- developing an understanding of the connection between science and other curricular areas—Students view science as part of a larger canvas of disciplines. They become aware of interlinkages across disciplines. They understand that concepts, principles, laws, and theories cannot be viewed as isolated parts, but together contribute to a holistic understanding of the world.
- developing an understanding of the relationship between science, technology, and society—Students appreciate the contribution of science to society and how different societal needs led to the generation of scientific knowledge. They develop an understanding of issues related to connections between science, technology, and society, including the ethical aspects and implications.
- developing a scientific temperament—Students develop critical and evidence-based thinking, and freedom from fear and prejudice. They develop curiosity, a sense of aesthetics, and creativity in science. They imbibe scientific values and dispositions—honesty, integrity, skepticism, objectivity, tenacity, perseverance, collaboration and cooperation, concern for life, and preservation of the environment.

j See https://www.education.gov.in/sites/upload_files/mhrd/files/infocus_slider/NCF-School-Education-Pre-Draft.pdf for more information.

Teacher Professional Development Requirements and Programs

KHDA requires applicants for all teaching positions (including mathematics and science) to meet stringent requirements prior to the appointment being approved.[k]

After a private school in Dubai selects a teacher for an available teaching position, the school applies for an Initial Appointment for the teacher, which is needed to obtain a UAE work permit. For the Initial Appointment, a teacher must have a degree in a particular field, depending on whether the teacher is a class teacher or subject teacher:

- A class teacher (e.g., Grade 4) must have a recognized bachelor's degree in education (B.Ed) or postgraduate certificate/diploma in education or a master's degree in education (M.Ed).
- A subject teacher (e.g., Grade 8) must have a minimum of a recognized bachelor's degree relevant to the subject taught.

Upon receiving the Initial Appointment, the teacher at a Dubai private school is required to register on the Educator Permit System. To complete the registration, a teacher must meet the following requirements:

- subject qualification
- teacher preparation qualification for subject teachers
- additional qualification requirements
- language proficiency
- legal status
- fitness to teach
- good standing
- mandatory professional development

Graduates of education colleges in Dubai complete significant periods of practical experience as a fundamental part of their studies. At some colleges, students devote several weeks each semester to training in schools through a student teacher program, while other colleges allocate the final semester for this purpose.

Graduates do not receive any mandatory further subject-based training once placed in a teaching position. However, during a school inspection, the extent to which subject knowledge and pedagogical skills are demonstrable by teachers in all grades is fully evaluated. Nearly all teachers in Dubai's private schools received their qualifications from overseas educational institutions.

k See https://web.khda.gov.ae/en/Guides/Educators/Requirements-for-Teacher-Appointment-in-Dubai-Priv for more information.

Monitoring Student Progress in Mathematics and Science

Public schools follow the UAE's national system of assessment, which includes midyear and end-of-year examinations in Grades 1 to 12. The end-of-year assessments are integrated across each education zone (a region managed by the Ministry of Education to oversee schools and ensure uniform education standards and practices), and all of them are linked to Ministry of Education objectives.

Private schools throughout Dubai adopt the monitoring and assessment procedures related to their specific curricula, which vary considerably. Many schools adapt the national assessment procedures of the country the curriculum was originated in to suit the needs of their student population. For example, most schools that use the NCfE adopt the NCfE assessment processes.

Private schools that use the NCfE, U.S., IB, and Indian curricula also participate in external national or international examinations relevant to the curricula offered. Some schools that use the U.S. curriculum participate in international benchmark tests in the upper grades relevant to further and higher education placement.

Student progress in mathematics and science (including in Grades 4 and 8) is also evaluated from year to year as part of the National Agenda Parameter initiative, involving annual internationally recognized standardized assessments taken under controlled conditions. More details are in the next section.

Special Initiatives in Mathematics and Science Education

As indicated, in all private schools where English is the language of instruction (for approximately 80% of students throughout Dubai), KHDA requires that schools conduct annual external, standardized benchmark assessments in mathematics, science, and English (and a separate reading literacy and cognitive profiling assessment) for all students in Grades 3 to 9. This is intended to include skills and conceptual gap analysis, as well as curriculum adaptation.

The requirements for these annual benchmark mathematics and science assessments (including for Grades 4 and 8) are set out in published guidance for schools[l] as follows:

- They should test mathematical and scientific literacy, all in line with a particular school's curriculum and include general competencies on how well students can apply their knowledge and skills to real-life challenges.
- Tests must arise from a single assessment provider for all required grades. That provider must offer both subjects (plus English).
- These assessments should routinely be used to evaluate education systems worldwide, testing the skills and knowledge of students for all required grades and at least on an annual basis.
- Assessments must be externally designed and externally assessed.

l See page 6 of https://web.khda.gov.ae/getattachment/b1e12d88-4c70-42cb-b5d3-1d3f51bc1e45/External-assessment-Guide_EN.pdf for more information.

- They must offer a clear measure of students' attainment based on the same depth of curriculum knowledge as do schools' internal and external curriculum-based assessments.
- Test results should provide a clear measure of students' progress against curriculum standards and changes in attainment over time.
- Schools must ensure assessment integrity and security at all times, from the point of test material delivery to schools, through invigilation and submitting test materials back to the assessment provider, through to marking and reporting of results by the assessment provider.
- Test providers must offer schools comprehensive data analyses and reports on attainment, progress, and skills development for mathematics, language/reading, and science for all assessed grades. Ideally, this will include detailed and clear identification of curriculum gaps for each student/teacher/group/year and for the school.
- The results of each assessment should be aligned to and be compared with the results of cognitive abilities tests.

For each of the chosen assessments, the following curriculum-relevant requirements must be met:

- U.S. curriculum schools: The assessment should be aligned to the U.S. curriculum, based on state standards, Common Core standards, and Next Generation Science Standards. There should be an option to test students at least three times during 1 academic year.
- NCfE and Indian curriculum schools: The assessment should test attainment and progress against the NCfE and the Indian curriculum, respectively.
- IB curriculum schools: The assessment should test attainment and progress against PYP and MYP programs. Therefore, schools can choose any of the assessments, depending on how their curricula are designed.
- schools that use other curricula: The schools should choose assessments depending on how their curricula are designed.

Suggested Reading

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