

Republic of Yemen



TIMSS
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Introduction

Overview of the Education System

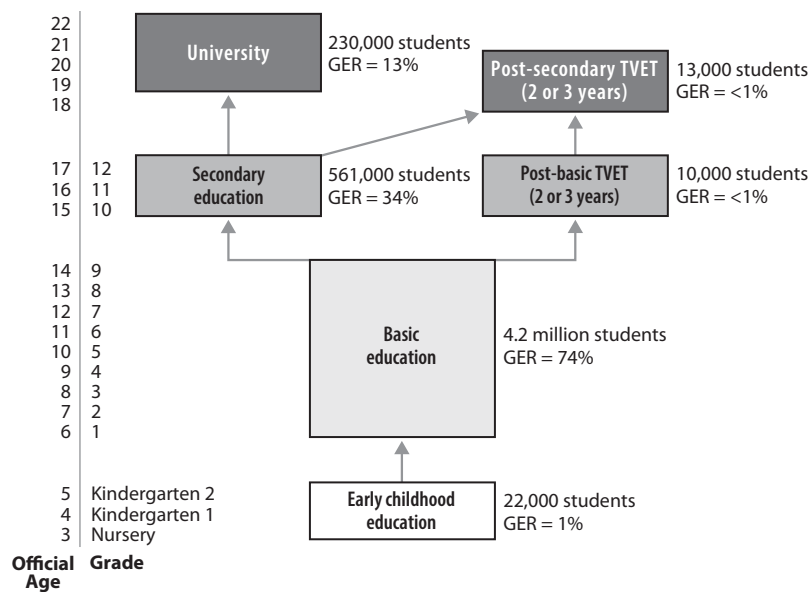
The present structure of Yemen's formal education system has been in place since the unification of North and South Yemen in 1990. Formal education currently encompasses nine years of compulsory Basic Education (Grades 1–9) followed by three years of General Secondary Education of which the first year, Grade 10, is general (i.e., all students study all curriculum subjects). From Grade 11 on, students choose between two tracks: Literary or Scientific. Literary students study humanities subjects. Students in the Scientific track study biology, chemistry, mathematics, and physics in addition to the common subjects. Students in both tracks study Quran sciences, Islamic education, Arabic, and English. In lieu of General Secondary Education, a two- to three-year Post-basic Technical Vocational Education and Training (TVET) track also is offered.

While early childhood education is part of Yemen's formal system, it generally only exists in the private sector, which may explain the low gross enrolment rate (GER) of only one percent at this stage (see Exhibit 1).

Yemen's Ministry of Education (MoE) oversees Basic Education and General Secondary Education nationally. MoE is responsible for strategic planning, training, and curriculum development, including textbook development and production. Two other ministries are responsible for higher education (university) and technical/vocational education. MoE delegates managerial roles to local education offices (LEOs) in Governorates and Districts, who work with local councils to determine financial allocations and staffing based on guidelines set by the respective ministries at the national level.

Since unification in 1990, Yemen's general education curriculum has changed twice. Immediately following unification, an interim curriculum was enacted, combining elements of the curricula taught in former North and South Yemen. This temporary curriculum remained in place until MoE designed and implemented a new curriculum for Grades 1–6 in 2000, for Grades 7–9 in 2001,

Exhibit 1: Structure and Enrollments in the Yemeni Education System¹



for Grades 10 and 11 in 2002, and for Grade 12 in 2003. Yemen's current curriculum for Grades 1–12 consists of a detailed set of documents that include general curriculum principles, syllabi and overall learning objectives for each subject, and detailed and clearly sequenced content, skills, and objectives for each grade.²

Languages of Instruction

Arabic is the official language of Yemen³ and of Yemeni public education. However, private sector schools commonly have two tracks—one in which all subjects are taught in Arabic and the other in which science and mathematics are taught in English, with syllabi and textbooks borrowed from international education systems.

In 2007, the Republic of Yemen's population was estimated at 22.3 million,⁴ the majority (71% in 2004) being rural. In addition, 70 percent of Yemenis (15 million) were under the age of 25, over one-third of whom (approximately 5.6 million) were age 6–14, corresponding to the age cohort for Basic Education (Grades 1–9).

From the early 1990s to the early 2000s, population growth rates decreased from 4.8 percent to 3.0 percent annually. Nevertheless, fertility rates and population growth rates in Yemen remain among the highest in the world. If this current pattern of growth continues, the country's population is expected to more than double to 47 million by 2040.

Mathematics Curriculum in Primary and Lower Secondary Grades

The mathematics curriculum for Grades 1–6 includes the following:

- ◆ Numbers and Algebra—Addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals; computing, comparing, and ordering of numbers; approximation and estimation; ratio, proportion, and percentage; factors and prime numbers; square and cubic roots; patterns and powers; practical problem solving.
- ◆ Geometry and Measurement—Acute, straight, right, and obtuse angles; vertical angles; parallel and perpendicular lines; properties of geometric shapes (quadrilaterals, triangles, and circles), and solids (cubes, rectangular parallelepipeds, spheres, cones, and cylinders); congruent triangles; measures of length, angle, volume, time, and money; areas and perimeters of triangles, circles, and quadrilaterals; volume of cubes; and practical problem solving.
- ◆ Data and Statistics—Summarizing, classifying, and organizing data; and presenting information in pictograms, tables, and diagrams.

The mathematics curriculum for Grades 7–9 includes the following:

- ◆ Algebra and Numbers—Addition, subtraction, multiplication, division, and properties of rational, irrational, and real numbers; square and cubic roots of rational numbers; perfect squares; factoring using greatest common factor; sets, relations, and linear functions; linear equations in one and two variables; and linear inequalities in one variable.
- ◆ Geometry—Adjacent, complementary, and supplementary angles; angles associated with parallel and perpendicular lines; angle sum theorem, congruence, and equivalence of triangles; the Pythagorean theorem; properties of circles; two dimensional Cartesian coordinates; reflection, translation, rotation, and magnification in the Cartesian plane; areas and volumes of rectangular parallelepipeds, cubes, prisms, cylinders, pyramids, cones, and spheres.
- ◆ Trigonometry—Trigonometric ratios of 30-, 45-, and 60-degree angles.
- ◆ Data and Statistics—Presenting and interpreting data in tables, graphs, and diagrams using information from local sources; simple experiments; and measures of central tendency (mean, median, and mode).

Science Curriculum in Primary and Lower Secondary Grades

The science curriculum for Grades 1–6 includes the following:

- ◆ Living Things—The five senses and their functions; major human body structures and systems (digestive, respiratory, circulatory, nervous, and urinary); human health and nutrition; relationship between cells, tissues, organs, and systems; interdependencies of living things in ecosystems; animals (classification, nutrition, reproduction, motion, defense mechanisms, and habitats); domestic and wild animals; vertebrates (characteristics and economic importance); invertebrates (characteristics, economic importance, and their impact on human health); micro-organisms and parasites (bacteria, viruses, and parasites, and their impact on human health); plants (major body structures, nutrition, growth, respiration, reproduction, and the food chain).
- ◆ Matter and Its Properties—Definitions, properties, states, and structure of matter.
- ◆ Energy—Types, resources, renewable and non-renewable sources, uses, and wise consumption; heat (sources, effects of heat on objects, and temperature measurement); electricity (static electricity, alternating current, electrical circuits, uses in the home, and basic safety); magnetism (types, properties, attraction and repulsion, magnetic force, and uses); light (sources, reflection and refraction, and spectra); sound (transmission and comparison to light); and power and work.
- ◆ Earth and Atmosphere—Structure of the Earth; the Earth’s crust, rocks, and soil; water (location, uses, water cycle in nature, water pollution); air (properties, components, atmospheric pressure, and pollution); and weather and climate.
- ◆ Force and Motion—Types of force (friction, gravity, and magnetic); work and motion; and simple machines.
- ◆ Solar System and Space—The sun, moon, and stars; the sun as a source of light and heat; rotation and revolution of the Earth; revolution of the moon (months and phases of the moon); eclipses (solar and lunar); and telescopes.
- ◆ Cleanliness at Home and at School—Cleaning tools, and cleanliness and health.
- ◆ Safety—At home, in school, on the street; traffic safety; and first-aid.

The science curriculum for Grades 7 to 9 includes the following:

- ◆ Biological Diversity—Diversity of living organisms and environment (unicellular organisms, bacteria, fungi, algae, and insects), ecosystems, adaptations of living organisms in different environments (aquatic, forest, and desert), and conservation and sources of biological diversity.
- ◆ Life Processes—Cells (plant, animal, and functions), microscopes, the five senses (tissues, organs and, systems associated with the senses), the body's systems (skeletal, nervous, digestive, circulatory, respiratory, excretory, and reproductive), and the properties of blood.
- ◆ Human Health—Viral diseases (especially common childhood diseases), communicable infections and prevention, diseases associated with malnutrition, parasitic diseases, common cancers, and first-aid.
- ◆ The Earth and the Universe—The Earth in the context of the solar system and universe, planetary motion, night and day, the four seasons; eclipses of the sun and moon, space ships and satellites, and humans in space.
- ◆ The Earth and Its Resources—Water (the water cycle, water and the food chain, water and energy production, water and agriculture, and water pollution and purification); and land (soil, rocks, agriculture, building materials, ores, and pollution).
- ◆ Matter—Elements, compounds, mixtures, states of matter, and separation techniques; physical changes (melting, freezing, and evaporation); chemical changes (iron rust, soap manufacturing, and industrial pollution); periodic table, chemical symbols, metals, and non-metals; atomic structure, atomic number, and atomic mass; ions, electronic configuration, and chemical bonds; chemical reactions and equations; and applications (water purification and environmental protection from industrial pollution).
- ◆ Force—The metric system and derived units; forces and their effects (work, power, and energy); tools; pressure, density, buoyancy, and their applications.
- ◆ Energy—Types of energy, heat, the sun as a source of energy and heat, and energy transfer.
- ◆ Electricity and Magnetism—Static electricity and electrical discharge; alternating current; generators and motors; electric circuits; conservation of electricity; safety; and magnetism, magnetic fields, types of magnets and electromagnets.

- ◆ Sound and Light—Sound and sound waves, sound properties, and echoes; applications of sound; the human voice; light and light waves; the electromagnetic spectrum (radio waves, infrared, visible, and ultraviolet light, x-rays, and gamma-rays) and transmission of information using the electromagnetic spectrum; laws of reflection, mirrors, and images; law of refraction, total internal reflection, and mirages; lenses and sight; optical tools (cameras and simple microscopes); and eye safety.

Instruction for Mathematics and Science in Primary and Lower Secondary Grades

From Grades 1–10, mathematics and science are treated as general subjects. Beginning in Grade 11, however, they are separated from humanities subjects into their own track called “Scientific Section.”

The school week is composed of six half-days (8:00 AM to 12:45 PM), each comprised of 5.5 periods, on average. In Grades 1–3, instructional time for mathematics is five periods per week, with each period averaging 42.5 minutes. In Grades 4–9, time dedicated to mathematics instruction increases to six periods per week. Instructional time for science is two periods per week for Grades 1–3, three periods per week for Grades 4–6, and four periods per week for Grades 7–9.

Instructional Materials, Equipment, and Laboratories

Teachers mainly rely on instructional textbooks from MoE, which also supplies some teaching aids, such as charts. Student laboratories are found in most secondary schools, and many schools in larger cities have established computer labs with development funding assistance from the private sector and international agencies.

Most Yemeni students do not have access to learning materials, libraries, or reference materials (at home or outside), particularly in rural areas.⁵ In the 2007–08 school year, 10 percent of schools nationwide had libraries;⁶ of these, five were in rural schools and 48 were in urban schools.

Use of Technology

Learning and teaching resources, including technology resources, are scarce in Yemeni public schools. As a result, there is little systematic instructional use of technology in schools.

Grade at Which Specialist Teachers for Mathematics and Science are Introduced

Presently, Yemeni public school teachers have three tiers of specialization. Grades 1–6 are typically taught by general classroom teachers prepared at teaching training institutes (TTIs). Grades 7–9 are taught by university graduates who are assigned subjects based on their area of study (e.g., science teachers have biology, physics or chemistry degrees, and social studies may be taught by a geographer or historian). In Grades 10–12, science is taught as separate subjects by teachers who specialized in the respective field (e.g., biology, chemistry, physics).

Homework Policies

Homework is an integral part of classroom assessment and carries a percentage weight in determining a student's marks. In Grades 1–8 and 10–11, homework constitutes 8 percent of the cumulative grade determining student promotion at the end of the school year. At Grades 9 and 12, homework is one of the factors contributing to a student's total final assessment score, which accounts for 20 percent of the cumulative grade determining entry to or graduation from secondary school (at Grades 9 and 12, respectively).

Teachers and Teacher Education

The history of modern education in Yemen is only several decades long. In the 1970s through the 1980s, Yemeni schools were staffed by teachers from other Arab countries, mainly from Egypt, in addition to Syria and Sudan. The number of Yemeni teachers has since increased as a result of the following factors:

1. A nationalization policy in the context of a massive system expansion;
2. Differing needs in rural and urban areas (mismatch between recruitment policies and needs);
3. Availability of large numbers of graduates from Faculties of Education; and
4. Weak sector governance.⁷

The qualification of Yemeni teachers varies dramatically. Sixty-five percent of teachers in Grades 1–6 do not have a post-secondary diploma, 21 percent have a post-secondary diploma, and 14 percent have a university or graduate degree. Thirty-five percent of teachers in Grades 7–12 do not have a university or graduate degree, and 65 percent have a university or graduate degree.

Monitoring Student Progress in Mathematics and Science

School-based assessment is used to monitor student progress in Grades 1–8 and 10–11. Teacher-administered monthly assessments constitute 40 percent of a student’s overall assessment, and include oral quizzes, pencil-and-paper quizzes, homework, and classroom conduct (each comprising 20, 40, 20, and 20% of teacher-administered assessment, respectively). Mid-year and end-of-year examinations are administered by school administrators and contribute equally to the remaining 60 percent of student’s final mark. The examination at the end of Grade 9 is the primary determiner of entry into secondary school, and the examination at the end of Grade 12 determines graduation.

However, evaluation of Yemeni teacher examinations by the International Bank of Reconciliation and Development/The World Bank and the Republic of Yemen has concluded that the system has “little value for the intended purposes” for the following reasons:

1. A lack of clear standards or benchmarks that specify student-learning outcomes for each subject;
2. A lack of teacher skills in designing reliable and effective tests;
3. Tests not promoting problem-solving and critical thinking skills, focusing instead on textbook memorization; and
4. Teachers rarely providing useful analyses of test results as feedback to students.⁸

A Higher Committee headed by the Vice Minister of Education is responsible for the general examination system for Grades 9 and 12. This system, however, has been found faulty. Namely, perceptions of abuse focus on the level of the examination center, at which committee members may be selected based on favoritism instead of qualifications.⁹

Impact and Use of TIMSS

Since 2005, when TIMSS 2003 International reports were disseminated and a new TIMSS Technical Team (TTT) was formed to manage Yemen’s participation in the study, most Yemeni educators and educationalists have learned about TIMSS.

In reality, much is yet to be done. Rapid, substantial quality reform is a financial burden for a poor country still struggling to achieve universal basic education by 2015. However, following the first-ever analysis of national data of TIMSS 2007, two written proposals have been presented to MoE leadership.

The first of these proposals was the Foundation Grades Initiative, aimed at improving performance of Yemen in TIMSS 2011. It suggested introducing a new organization to classrooms in Grades 1–3, printing and dissemination of released TIMSS test items, and conducting a 70-school pilot of a new teacher education program. The latter may only be accomplished by MoE with support of the German Society for International Cooperation’s General Education Improvement Program (GIZ, GEIP).¹⁰

The second proposal, the All Must Read by Grade 3 project, has the long-term goal of enhancing quality education, and called for a four-pillared reform: curriculum, teaching, class size and organization, and learning assessment. The project is still in its initial stage, however, some work by MoE and TTT is underway to establish a National Assessment System for Grades 1–6, again, with support of GIZ, GEIP. A pool of more than 2000 test items in Arabic, mathematics, and science has been drafted to correspond to objectives of the Yemeni curriculum. The assessment will test students in Grades 4 and 7, with the field test of items for Grade 7 scheduled for February 2012.

Finally, according to the World Bank, “an independent Center for Measurement and Evaluation is in early stages of development. Participating in TIMSS enabled Yemen to gain experience in conducting learning assessments using modern scientific methodologies.”¹¹

Suggested Readings

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- Republic of Yemen, Ministry of Education. (1999). *Science curriculum document of grade 1–6 basic education*. Sana’a: Author.
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- 2 Smart, A. (2005). “A Review of Curriculum and Textbook Activities Planned under World-Bank-Funded Projects,” cited by Ibid, p. 58.
- 3 Ministry of Legal Affairs. (2001). *Gazette, Issue 7, part 2*. Sanaa: Author.
- 4 The World Bank. (2010). *Republic of Yemen education status report: Challenges and opportunities* (pp. 8–9). Washington, DC: Author.
- 5 Ibid., p. 59.
- 6 Ibid., p. 66.

- 7 Ibid., p. 72.
- 8 Ibid., p. 60.
- 9 Ibid., p. 150.
- 10 Deutsche Gesellschaft für Internationale Zusammenarbeit. (2011). *General education improvement programme*. Retrieved from <http://www.gtz.de/en/weltweit/maghreb-naher-osten/jemen/11660.htm>
- 11 Ibid., p. 60.