Malaysia

Ministry of Education Malaysia

Introduction

Overview of Education System

The Malaysian education system is based on the fundamental principles in the National Education Philosophy that focus on the holistic development of individuals who are "intellectually, spiritually, emotionally and physically balanced and harmonious, based on a firm belief in and devotion to God."[1]

Preschool education aims to meet the needs of young children by enabling them to acquire basic communication, social, and other positive skills before primary education. The National Preschool Curriculum (NPC) is based on the principles in the National Education Philosophy and is designed to provide a basic foundation in cognitive, affective, and psychomotor domains.[2]

Education at the primary level (Years 1 to 6) begins at the age of 6. To cater to the multiethnic nature of its population, Malaysia has set up two categories of schools: national and national-type schools.[a] The Compulsory Education Act was enforced on January 1, 2003, to ensure that all children complete primary education in 6 years, but some students may complete it in 5 to 7 years. The intent is to reduce illiteracy and dropouts, especially in rural areas. Under the Compulsory Education Act [Section 29A Education Act (Amendment) 2002], every child who has reached the age of 6 in January must be enrolled in school and receive formal primary school education.

Education at the secondary level is provided for students between the ages of 12+ and 17+. The secondary school system is divided into two levels. The lower secondary level takes 3 years to complete (Forms 1 to 3). The focus of the curriculum at this level is to provide general education to expose students to various fields. The upper secondary level takes 2 years to complete (Forms 4 and 5) and is more specialized. At the end of this level, students sit for the Malaysian Certificate of Education (*Sijil Pelajaran Malaysia*, SPM) examination. Upon completing the examination, students can choose to further their studies or enter the job market.

The Malaysian education system is led by the Ministry of Education (MoE), which is responsible for administering and managing the national education system at the school

a National schools are government primary and secondary schools that are established and maintained by the MoE. These schools utilize the national curriculum, and Malay is used as the main language of instruction. Chinese or Tamil shall be made available if the parents of at least 15 students in the school request those languages. National-type schools are government or government-aided primary schools using Chinese or Tamil as the main language of instruction and in which the national language and English are compulsory subjects of instruction.

level. It covers preschool, primary, secondary, and postsecondary education, namely Form Six Matriculation and the institutes of teacher education. The administrative structure and organization of education in Malaysia is centralized. The structure comprises four levels, namely ministerial (federal), state, district, and school. At the federal level, the Ministry is responsible for the planning, development, and implementation of the education policy, curriculum, assessment, monitoring, quality assurance, and supervision of the administration of the education system. Different divisions at the ministerial level are responsible for different areas of the education system. The Ministry is also supported by the State Education Department (JPN) at the state level and the District Education Office (PPD) at the district level.

Use and Impact of TIMSS

Malaysia first participated in TIMSS 1999, followed by TIMSS 2003, 2007, 2011, 2015, 2019 and, most recently, TIMSS 2023. Malaysia's performance in these cycles generated a lot of interest and discourse among academics, politicians, stakeholders, and even the public, which raised awareness among Malaysians on the importance of upgrading the quality of teaching mathematics and science to improve learning, in addition to reviewing the curriculum. Malaysian performance showed a downward trend between TIMSS 2003 and TIMSS 2011, which raised concerns over the quality of education in Malaysia.

TIMSS results are mainly used to inform policymakers about initiatives that can be implemented to improve the education system. Among the measures taken were the training of teachers to integrate Higher-Order Thinking Skills (HOTS) objectives into their classroom instruction, reviewing textbooks, and increasing the proportion of HOTS items in national examinations. A revised curriculum for both mathematics and science at the secondary level was implemented in 2017 beginning with Form 1. The revised curriculum at the primary level was first introduced in 2011 and further revised in 2017 to Year 1 students and is known as the Standard-Based Curriculum for Primary School (KSSR).[b]

TIMSS results have also impacted the design of the SPM examination instruments. The assessment was first conducted in 2021 based on the new curriculum syllabus (KSSM) and tests students' thinking skills by including questions that require higher cognitive-level responses such as analyzing, evaluating, and creating. Questions that require the cognitive domains of reasoning and applying are also implemented in the instruments to stimulate HOTS among candidates.

b In Malaysia, Years 1 to 6 in primary school are equivalent to Grades 1 to 6. Forms 1 to 5 in secondary school are equivalent to Grades 7 to 11. In general, the term "grades" is not used in Malaysia when referring to education levels.

The Mathematics Curriculum in Primary and Lower Secondary Grades

The Mathematics Standard-Based Curriculum for Primary School is aimed to develop students who are mathematically inclined with an understanding of the concept of numbers, basic calculation skills, simple mathematical ideas, and competency in applying mathematical knowledge and skills effectively and responsibly in order to solve problems and make decisions in compliance with attitudes and values to overcome challenges faced in daily life.[3,4,5,6]

The mathematics curriculum for Years 1 to 6 is organized into four interrelated learning areas, as shown in Exhibit 1.

Exhibit 1: Interrelated Learning Areas in the Mathematics Curriculum for Years 1 to 6

Learning Area	Topic	Scope
Numbers and Operations	whole numbers and basic operations	• read, say, and write any numbers up to 10,000,000 • place value, digit value, extended notation up to 100,000 • compare the values of two numbers up to 100,000 • arrange numbers in ascending and descending order up to 100,000 • classify odd numbers and even numbers up to 100,000 • estimate based on a given reference up to 100,000 • round up to the nearest hundred thousand • complete number patterns up to tens, hundreds, and thousands • add up to five numbers with the sum within 1,000,000 • subtract two numbers from any number within 100,000 • multiply a number with up to five digits by a number with up to two digits, 100, and 1,000 with product up to 100,000 • divide any number up to 100,000 by a number with up to two digits, 100, and 1,000 with product up to 100,000 • perform mixed operations (add and subtract, multiply and divide) • classify numbers up to 100 into prime numbers and composite numbers • solve problems with whole numbers, prime numbers, composite numbers, and mixed operations within 100,000 in daily situations

Exhibit 1: Interrelated Learning Areas in the Mathematics Curriculum for Years 1 to 6 (Continued)

Learning Area	Topic	Scope
Numbers and Operations	fractions	• compare the value of two proper fractions • state equivalent fractions • convert proper fractions to the simplest form • name and write proper fractions • convert improper fractions to mixed numbers and vice versa • add and subtract proper fractions with denominators up to 10 • multiply and divide fractions of two numbers • solve mixed operations of addition and subtraction involving whole numbers, two proper fractions, and mixed numbers • solve problems involving fractions
	decimals	• convert fractions to decimals • compare the value of two given decimals up to three decimal places • multiply and divide decimals by a one-digit number, 10, 100, and 1,000 • add and subtract decimals • solve problems involving decimals
	percentage	• convert fractions to percentages and vice versa • calculate the percentages of quantity of objects • solve problems involving percentages
	money	• determine the value of money • perform mathematical operations (addition, subtraction, multiplication, and division) with amounts up to RM100,000 (RM, Malaysian ringgit, is the national currency) • solve problems involving money up to RM10,000 • record savings and expenses • determine cost price, selling price, profit, loss, discount, rebate, interest, and dividend • recognize currencies of Association of Southeast Asian Nations (ASEAN) and other major countries in the world • state the value of RM1 in the current exchange rate for other countries • solve problems of basic operations and mixed operations within RM100,000 in daily situations • solve problems involving cost price, selling price, profit, loss, discount, rebate, interest, and dividend in daily situation

Exhibit 1: Interrelated Learning Areas in the Mathematics Curriculum for Years 1 to 6 (Continued)

Learning Area	Topic	Scope
Measurement and Geometry	time	• state and show time in hours and minutes • state the relationship between weeks and days, years and months, and minutes and seconds • convert units of time involving hours and days; days and weeks; months and years; and years, decades, and centuries • solve addition, subtraction, multiplication, and division problems involving units of time • determine duration involving hours and minutes within 24 hours • determine the time difference between two cities located in different time zones • solve problems involving time in daily situations
	measurement	• measure length, mass, and volume of liquid in metric units • convert units of length involving meter and kilometer, millimeter and centimeter • solve addition and subtraction problems with up to three units of length • solve multiplication and division problems involving one unit of length • solve problems involving length and mass, volume of liquid, and mass and volume of liquid in daily situations
	shapes and space	• identify two-dimensional and three-dimensional shapes and their characteristics • identify a regular polygon, square prism, rectangular prism, and triangular prism and their characteristics • recognize and name right angle, acute angle, and obtuse angle in a rectangle, square, and triangle • measure the interior angles of regular polygons • calculate the perimeter and area of a square, rectangle, right angle triangle, equilateral triangle, and isosceles triangle • solve problems involving space

Exhibit 1: Interrelated Learning Areas in the Mathematics Curriculum for Years 1 to 6 (Continued)

Learning Area	Topic	Scope
Relationships and Algebra	coordinates	• identify the location of an object based on a reference point • determine and state the location of an object according to the horizontal and vertical axes • determine the coordinates of a point • determine horizontal and vertical distance between two locations on a given scale • solve problems involving coordinates
	ratio	• represent the relationship between two quantities based on the ratio 1:1, 1:10, 1:100, and 1:1,000 • represent the ratio of two quantities in the simplest form
	proportion	• determine an unknown value using the unitary method • determine the proportionate quantity based on a given ratio • solve problems involving proportions
Statistics and Probability	data handling and likelihood	• interpret data and analyze information from pictographs, bar graphs, and pie charts • construct pictographs and bar charts of ungrouped data • complete a pie chart with 45°, 90°, and 180° based on given quantities • state the likelihood of occurrence of an event as impossible, less likely, equally likely, more likely, or certain and give a plausible reason • solve problems involving data handling and likelihood in daily situations

The mathematics curriculum for secondary school is essentially a continuation of the knowledge and skills learned at the primary level. The curriculum aims to develop mathematically competent individuals who will have the ability to think mathematically, creatively, and innovatively, as well as be able to apply mathematical knowledge and skills effectively and responsibly to solve problems and make decisions, especially when dealing with challenges in their daily lives. Furthermore, attitudes and values, the development of science and technology, and the skills of the 21st century are emphasized across the curriculum.

Four key elements that contribute toward the development of mathematical competence in students are

- learning areas,
- values,
- skills, and
- mathematical processes.

For each learning area, topics are organized from basic to more abstract concepts. By the end of Form 3, students should be able to demonstrate and apply their understanding and solve problems involving several topics, as shown in Exhibit 2.

Exhibit 2: Interrelated Learning Areas in the Mathematics Curriculum for Forms 1 to 3

Learning Area	Topic	Scope
Numbers and Operations	• rational numbers • multiples and factors • squares, square roots, cubes, and cube roots • patterns and sequences • indices • standard form • consumer mathematics: savings and investments, credit and debt	• integers, basic arithmetic operations involving integers, positive and negative fractions, positive and negative decimals • factors, prime factors, and highest common factor; multiples, common multiples, and lowest common multiple • squares and perfect squares, cubes and perfect cubes, square roots and cube roots • patterns of various number sets and objects, patterns of a sequence • index notation and the law of indices • significant figures, basic arithmetic operations involving numbers in standard form • various types of savings and investments; simple interest and compound interest for savings; the value of the return of investments; potential risks, return, and liquidity of various types of savings and investments; the average cost per share; wise management of credit and debt; advantages and disadvantages of a credit card; impact of minimum and late payments for credit card usage; the total amount of loan repayment and installment

Exhibit 2: Interrelated Learning Areas in the Mathematics Curriculum for Forms 1 to 3 (Continued)

Learning Area	Topic	Scope
Measurement and Geometry	• lines and angles • basic polygons • perimeter and • area • the Pythagorean theorem • polygons • circles • three-dimensional • geometric shapes • isometric transformations • scale drawings • trigonometric ratios • angles and tangents of circles • plans and elevations ○ loci in two dimensions	• congruency of line segments and angles, properties of angles, construction of lines and angles, the rationale of construction steps, angles related to intersecting lines, angles related to parallel lines, transversals • number of sides, vertices, and diagonals of polygons; properties of triangles and the interior and exterior • angles of triangles, properties of quadrilaterals, and the interior and exterior angles of quadrilaterals • perimeter of various shapes; area of triangles, parallelograms, kites, and trapeziums; relationship between perimeter and area • relationship between the sides of a right-angled triangle and the converse of the Pythagorean theorem
		• regular polygons, interior angles and exterior angles of polygons • properties of circles, symmetrical properties of chords, circumference, area of a circle • geometric properties, nets, surface area, volume of three-dimensional shapes • idea of one-to-one correspondence between points in a transformation, idea of congruency in transformations, translation, reflection, rotation, rotational symmetry • scale and drawing of a scale drawing • sine, cosine, and tangent of acute angles in right-angled triangles • angle at the circumference and central angle subtended by an arc, cyclic quadrilaterals, tangents to circles • orthogonal projections, drawing of a plan and elevations of an object to scale, synthesizing the plan and elevations of an object, sketching the object • locus of points and construction of the locus, a locus that satisfies two or more conditions

Exhibit 2: Interrelated Learning Areas in the Mathematics Curriculum for Forms 1 to 3 (Continued)

Learning Area	Topic	Scope
Relationships and Algebra	• ratios, rates, and proportions • algebraic expressions • linear equations • linear inequalities • factorization and • algebraic fractions • algebraic formulae • coordinates • graphs of functions • speed and acceleration • gradient of a straight line • straight lines	• relation between three quantities in the form of a:b:c; equivalent ratios; relationship between ratios and rates; relationship between ratios and proportions; relationship between ratios, rates, and proportions with percentages, fractions, and decimals • variables, like and unlike terms, basic arithmetic operations involving algebraic expressions • linear equations in one variable and two variables, simultaneous linear equations in two variables • linear inequalities in one variable • expansion, factorization, laws of basic arithmetic operations and algebraic fractions • write a formula based on a situation and change the subject of the formula of an algebraic equation • distance and midpoint in the Cartesian coordinate system, the Cartesian coordinate system • functions, tables of values for linear and nonlinear functions, draw and interpret graphs of functions
		• uniform and nonuniform speed, average speed, acceleration, deceleration • gradient of a straight line in the Cartesian plane • equation of a straight line, the relationship between the points on a straight line and the equation of the line, gradients of parallel lines, point of intersection of two straight lines
Statistics and Probability	• data handling • measures of central tendencies • simple probability	• data collection, organization, and representation process; interpretation of data representation • mode, mean, and median of ungrouped data; frequency table for grouped data; modal class and mean of grouped data; make predictions, form convincing arguments, and make conclusions based on the understanding of measures of central tendencies • experimental probability, probability theory involving equally likely outcomes, probability of the complement of an event
Discrete Mathematics	• introduction to sets	• description of sets, element of a set, equality of sets, Venn diagrams, universal sets, complement of a set, subsets

In Malaysia, the teaching of values is embedded in the national curriculum. The following values are developed in students through the teaching and learning of mathematics:

- mathematical values—values within the knowledge of mathematics that include the emphasis on the properties of mathematical knowledge
- universal values—noble universal values that are applied across all subjects

Mathematical processes that are emphasized in the mathematics curriculum are problem-solving, reasoning, communicating, representing, and connecting. Teachers are expected to design lessons that develop students' mathematical processes and skills through an effective and meaningful learning environment.

The use of technology such as dynamic software and graphing calculators is integrated into the teaching and learning of mathematics across the mathematics curriculum at the secondary level. This enables students to form a deep and meaningful understanding of mathematical concepts, especially those that are abstract in nature.

The Science Curriculum in Primary and Lower Secondary Grades

The science curriculum aims to instill interest and develop students' creativity through experiences and investigations to acquire science knowledge, scientific skills, thinking skills, and scientific attitudes; and to develop a conscientious, dynamic, and progressive society with a culture of science and technology that values nature and the preservation and conservation of the environment.[7] The curriculum is organized based on three domains: knowledge, skills, and values. These three domains are obtained by students through inquiry-based approaches such as student-centered learning, constructivism, contextual learning, problem-based learning, and mastery learning, as well as related strategies and methods.

Science emphasizes methods of inquiry and problem-solving. In the process of inquiry and solving problems, scientific skills and thinking skills are applied. Scientific skills consist of science process skills and manipulative skills. Science process skills are a specific set of thinking skills applied in scientific contexts, allowing individuals to engage in creative, analytical, and systematic thinking through structured inquiry and experimentation. Mastery of science process skills, along with suitable attitudes and knowledge, will enable students to think effectively.

The science curriculum standard for primary school is designed to develop science literacy through learning basic science concepts that will enable students to pursue science education at the secondary level. Knowledge, skills, and values are inculcated in the primary school science curriculum to provide meaningful learning for students by taking into consideration their cognitive levels and context in life.

The science curriculum standard for primary school also focuses on thoughtful learning involving inquiry as the main approach in science education. Thoughtful learning is achieved when students are actively involved in the teaching and learning process. In this process, teaching and learning activities are planned to elicit ideas and encourage students to conceptualize, solve problems, and make decisions.

The curriculum is organized thematically into six learning fields: Inquiry in Science, Life Science, Physical Science, Materials Science, Earth and Space, and Technology and Sustainability of Life.[8] The scope covered in each theme is presented in Exhibit 3.

Exhibit 3: Topics in the Primary School Science Curriculum for Years 1 to 6

Level	Theme	Scope
1 (Years 1–3)	Inquiry in Science	• science process skills • manipulative skills • rules of the science classroom
	Life Science	• lliving and nonliving things • basic needs of living things • humans: senses, reproduction and growth, teeth, food classes, digestion • animals: parts of body, reproduction and growth, eating habits • plants: parts of plants, reproduction and growth
	Physical Science	• light and dark • magnets • electrical circuits • area and volume measurements • objects or materials that are more or less dense than water
	Materials Science	• ability of materials to absorb water, mixture, acid, and alkali
	Earth and Space Science	• surfaces of the Earth, soils, water, air, solar system
	Technology and Sustainability of Life	• construction of basic models, built-up set (i.e., building toys), pulley
2 (Years 4–6)	Inquiry in Science	• science process skills
	Life Science	• humans: breathing process, excretion and defecation, human response to stimuli, skeletal system, blood circulatory system, relationship between body systems, reproductive system and nervous system • animals: breathing organs, vertebrates, survival of the species and the food relationship between living things and interactions between animals • plants: plants respond to stimuli, photosynthesis, survival of the species, plant dispersal, interaction between plants, and preservation and conservation • microorganisms: life processes and effects of microorganisms

Exhibit 3: Topics in the Primary School Science Curriculum for Years 1 to 6 (Continued)

Level	Theme	Scope
2 (Years 4–6)	Physical Science	• properties of light, sound • sources and forms of renewable and nonrenewable energy • electricity • heat, temperature, force, friction, air pressure, and speed
	Materials Science	• natural materials • properties of materials • rusting • state of matter and changes in state of matter • water cycle • food spoilage, food preservation, and waste material
	Earth and Space	• solar system • gravity of Earth, rotation and revolution of Earth around the Sun • phases of the Moon • constellations, eclipses, and galaxies
	Technology and Sustainability of Life	• simple and complex machines (e.g., lever) • the use of tools in life • stability and strength of objects and structures • advantages and disadvantages of technology

The science curriculum standard for secondary school aims to strengthen and develop creativity among students through experience and investigation in order to master science knowledge, scientific skills, thinking skills, and scientific attitudes and values, which will enable them to solve problems and make decisions in daily life. The science curriculum also aims to prepare students to face rapid technological development and various challenges of the 21st century, such as the 4.0 industrial revolution.

The science curriculum standard for secondary school is developed based on the following six strands: Communication; Spirituality, Attitude, and Value; Humanity; Personal Development; Physical Development and Aesthetic; and Science and Technology.[9] The six strands support each other and are integrated with critical, creative, and innovative thinking. This integration is aimed at developing the nation's human capital who are knowledgeable, competent, and able to think creatively, critically, and innovatively, as well as appreciate noble values based on one's religion.

The content for the science curriculum standard for secondary school is also developed based on four disciplines of science: biology, chemistry, physics, and earth science. All four disciplines are organized into five themes: Scientific Methodology, Maintenance and Continuity

of Life, Exploration of Elements in Nature, Energy and Sustainability of Life, and Exploration of Earth and Outer Space. The scope covered in each science content area is presented in Exhibit 4.

Exhibit 4: Topics in the Secondary School Science Curriculum for Forms 1 to 3

Level	Theme	Scope
Lower Secondary (Forms 1–3)	Scientific Methodology	• introduction to scientific investigation
	Maintenance and Continuity of Life	• cell as basic unit of life • coordination and responses • reproduction • biodiversity • ecosystem • nutrition • human health stimuli and responses • respiration transportation
	Exploration of Elements in Nature	• matter • periodic table • air • water and solution • acid and alkali • reactivity of metals thermochemistry
	Energy and Sustainability of Life	• light and optics • electricity and magnetism • force and motion • heat • sound waves • energy and power radioactivity
	Exploration of Earth and Outer Space	• Earth • stars and galaxies in the universe • solar system • meteoroid • asteroid • comet • space • weather • space exploration

Teacher Professional Development Requirements and Programs

Professional development programs in Malaysia are designed to help mathematics and science teachers have a sound foundation in subject content knowledge, pedagogical skills, information technology, and moral values. The programs are structured to enhance the skills needed by subject teachers. The goal of these programs is to produce knowledgeable and skillful teachers capable of quality teaching, effectively delivering the curriculum, and engaging students in an experiential learning process in which teachers act as facilitators rather than information providers. This is in line with the national education policy that aims to produce a group of professionals who can meet the current needs of a dynamic education system as it faces the challenges of globalization.

Professional development programs in Malaysia welcome active participation from Malaysian agencies other than those at the ministerial level, namely the National Science Centre, Aquaria at Kuala Lumpur City Centre (KLCC), Southeast Asian Ministers of Education Organisation Regional Centre for Education in Science and Mathematics (SEAMEO RECSAM), and the Malaysian Digital Economy Corporation (MDEC).

In addition, the MOE collaborates with agencies outside of the country, namely ExxonMobil and *La main à la pâte* (LAMAP) Foundation in France. The ExxonMobil-UKM STEM Club is a program in collaboration with the Malaysia Institute of Teacher Education (MITE) and has operated since 2019. This program aims to raise teachers' interest, literacy, soft skills, and values through an integrated and new science, technology, engineering, and mathematics (STEM) learning approach and curriculum.

The Training Workshop on Innovative Teaching & Learning of Science Through Inquiry-Based Science Education (IBSE) for Science Teacher Trainers was organized by the International Science Technology and Innovation Centre (ISTIC) in collaboration with the LAMAP Foundation and supported by MITE. Participants were introduced to the LAMAP Foundation, a hands-on teaching philosophy, and the effort to increase interest in science education.

A STEM Teacher Competency Document has been developed by the MOE to serve as a reference in measuring teachers' theoretical and practical competencies.[10] By referring to this document, teachers can identify their current competencies and areas for improvement so that they can plan self-directed learning based on their interests and competency needs.

Each year, the MOE has allocated a stipulated amount for continuous professional development (CPD) activities to develop teacher competencies, including STEM education. Specialized training programs are provided regularly by the MOE's own training institutions, which are located nationwide, as well as by local and international third-party training providers, such as SEAMEO RECSAM and Quality Improvement of Teachers and Education Personnel (QITEP) in mathematics and science. Teachers employed by the MOE can also pursue higher-degree academic programs (master's and doctorate) such as the Federal Training Prize (*Hadiah Latihan Persekutuan*, HLP) and fully paid study leave (*Cuti Belajar Bergaji Penuh*, CBBP).

Monitoring Student Progress in Mathematics and Science

In monitoring students' achievement in learning, Malaysia does not rely entirely on examination results. The National Educational Assessment System (NEAS) was introduced in 2011 by formalizing, strengthening, and standardizing school-based assessment (SBA). By shifting the focus from national examinations to SBA, Malaysia acknowledges the various methods used in collecting students' data.[11] The idea behind NEAS is to standardize and formalize four assessment methods used in SBA to enable teachers to gather more information about their students' profile, involvement, development, and achievement. These assessment methods are in addition to conventional tests of academic achievement at the end of a learning period. The four assessment methods used in SBA are as follows:

1. Classroom assessment comprises formative assessment that is conducted during the teaching and learning process to assess student learning progress, as well as summative assessment administered at the end of a learning unit, term, month, or year.
2. A physical, sports, and cocurricular activity assessment is administered, recorded, and reported by noting student participation, involvement, and achievement in sports and cocurricular activities. Students are expected to get involved in nonacademic activities inside or outside the classroom.
3. Psychometric assessment is a systematic method used to collect information that reflects students' psychological traits, such as aptitude and personality. The information obtained from the psychometric assessment enables teachers and parents to understand the students and students to understand themselves to enhance learning.
4. Tests at the end of academic sessions aim to provide a report on students' learning progress and is part of the classroom assessment. Schools have the authority to design the instruments, administer the tests, and score and report students' responses with support from the District Education Departments, State Education Departments, and the MOE in terms of quality assurance. Teachers are trained to write items that are of high quality (in terms of validity and reliability) based on guidelines provided by the MOE. These guidelines are produced for each subject in the tests, including science and mathematics for students in Years 4 to 6 and Forms 1 to 3.

These four assessment methods are the components of SBA, as they are administered and reported by teachers in schools.

Special Initiatives in Mathematics and Science Education

The education system in Malaysia places significant emphasis on science and mathematics, recognizing them as key drivers for economic growth and development. Strategic initiatives to advance science and mathematics education in Malaysia include elevating the quality of teaching and learning of the subjects, increasing students' interest and participation in science and mathematics, enhancing the quality and relevance of science and mathematics resources, strengthening the capacity of science and mathematics teachers, and fostering public-private partnerships to support science and mathematics education. Several initiatives and policies supporting both top-performing students and low performers, as well as addressing achievement gaps between genders and among disadvantaged groups, have been put in place.

For top-performing students, a challenging and enriching learning environment is offered through the development of more challenging academic programs such as those offered by Malaysian premier schools and through gifted education programs. These programs aim to nurture students' talents and potential by offering a wider range of academic, cocurricular, and enrichment activities. In Malaysia, premier schools refer to institutions providing an enriched academic environment to nurture high-achieving students. These schools are known for their high academic standards, cocurricular activities, and leadership development. Among Malaysia's most prominent premier schools are Sekolah Berasrama Penuh (SBP), or fully residential schools (FRS), which are government-funded boarding schools designed for academically gifted students. SBPs are prestigious institutions that offer an enhanced academic curriculum and holistic development programs. They cater to students who have demonstrated excellence in their academic performance, usually identified through competitive entrance exams. These schools are located throughout Malaysia, and they emphasize not only academic achievement but also the development of leadership, teamwork, and moral values.

For low-performing students, more targeted and personalized approaches to learning are used, including early interventions and remedial programs to address learning difficulties, as well as alternative education pathways and flexible learning programs.

To address achievement gaps among disadvantaged groups, access to quality education and reduced barriers to learning have been put in place for these groups. This includes the expansion of preschool education for children from low-income families, the provision of additional support and resources for students with disabilities, and the implementation of programs to address the needs of rural and indigenous students.

Malaysia also recognizes the importance of closing gender gaps in education, particularly in STEM fields, and outlines several initiatives to support girls' participation and success in these areas. This includes the provision of scholarships and incentives to encourage girls to pursue STEM fields, as well as the development of programs and learning resources that promote gender equity in education.

Suggested Reading

Bahrum, S., Wahid, N., & Ibrahim, N. (2017). Integration of STEM education in Malaysia and why to STEAM. *International Journal of Academic Research in Business and Social Sciences*, *7*(6), 645–654. http://dx.doi.org/10.6007/IJARBSS/v7-i6/3027

Ghani, A. A., Rosli, R., Iksan, Z., Halim, L., Osman, K., Maat, S. M., Mahmud, S. N. D., Mahmud, M. S., Rambely, A. S., & Lay, A. N. (2023). STEM professional development programs for science and mathematics primary school teachers: A systematic literature review. *European Journal of Science and Mathematics Education*, *11*(4), 738–753.

Halim, L., Lay, A. N., & Mohd Shahali, E. H. (2021). STEM education in Malaysia: Policies to implementation. In *STEM education from Asia: Trends and perspectives* (pp. 33–48).

Hatisaru, V., Fraser, S., & Beswick, K. (2020). "My picture is about opening up students' minds beyond our school gate!" School principals' perceptions of STEM learning environments. *Journal of Research in STEM Education*, *6*(1), 18–38. https://doi.org/10.51355/jstem.2020.79

Jayarajah, K., Saat, R. M., & Rauf, R. A. A. (2014). A review of science, technology, engineering & mathematics (STEM) education research from 1999–2013: A Malaysian perspective. *Eurasia Journal of Mathematics, Science and Technology Education*, *10*(3), 155–163. https://doi.org/10.12973/eurasia.2014.1072a

Osman, K., & Saat, R. M. (2014). Editorial: Science, technology, engineering and mathematics (STEM) education in Malaysia. *Eurasia Journal of Mathematics, Science and Technology Education*, *10*(3), 153–154. https://doi.org/10.12973/eurasia.2014.1077a

References

1 Ministry of Education Malaysia. (2017). *Dasar Pendidikan Kebangsaan* [National education policy]. Educational Planning and Research Division.

2 Ministry of Education Malaysia. (2018). *Garis Panduan Pengurusan Prasekolah* [Guidelines for preschool management].

3 Curriculum Development Division. (2010). *Dokumen Standard Kurikulum dan Pentaksiran KSSR Matematik Tahun 1* [Curriculum standard documents and assessments KSSR mathematics year 1]. Ministry of Education Malaysia.

4 Curriculum Development Division. (2011). *Dokumen Standard Kurikulum dan Pentaksiran KSSR Matematik Tahun 2* [Curriculum standard documents and assessments KSSR mathematics year 2]. Ministry of Education Malaysia.

5 Curriculum Development Division. (2012). *Dokumen Standard Kurikulum dan Pentaksiran KSSR Matematik Tahun 3* [Curriculum standard documents and assessments KSSR mathematics year 3]. Ministry of Education Malaysia.

6 Curriculum Development Division. (2013). *Dokumen Standard Kurikulum dan Pentaksiran KSSR Matematik Tahun 4* [Curriculum standard documents and assessments KSSR mathematics year 4]. Ministry of Education Malaysia.

7 Curriculum Development Division. (2015). *National science curriculum standard and assessment*. Ministry of Education Malaysia.

[8] Curriculum Development Division. (2015). *Dokumen Standard Kurikulum dan Pentaksiran KSSR Sains Tahun 1* [Curriculum standard documents and assessments KSSR science year 1]. Putrajaya: Ministry of Education Malaysia.

[9] Curriculum Development Division. (2017). *Dokumen Standard Kurikulum dan Pentaksiran KSSR Sains Tingkatan 1* [Curriculum standard documents and assessments KSSR science form 1]. Ministry of Education Malaysia.

[10] Ministry of Education Malaysia. (2023). *Dokumen Kompetensi Guru Bidang Sains, Teknologi, Kejuruteraan dan Matematik* (STEM) [Science, technology, engineering and mathematics (STEM) teacher competency document]. Teacher Professionalism Division.

[11] Ministry of Education Malaysia. (2017). *Dasar Pendidikan Kebangsaan* [National education policy]. Educational Planning and Research Division.