Malaysia

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Introduction

Overview of Education System

Malaysia bases its education system on the fundamental principles of its National Education Philosophy, which focuses 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."

These principles are reflected in an education system that includes preschool, primary, and secondary levels. Preschool education is provided by public and private sectors, with the private sector playing a prominent role. The Ministry of Education provides six years of compulsory, free primary education that starts at age 6, and five years of secondary education. (Level 1 of primary education comprises Grades 1 to 3, and Level 2 comprises Grades 4 to 6.) Upon completion of lower secondary education (Grades 7 to 9), students continue their schooling at the upper secondary level (Grades 10 to 11) in the arts, sciences, or technical and vocational streams. Students may then opt to enroll in Grade 12 (typically, the first of two final years of schooling for students who intend to enroll in a public university in Malaysia); preuniversity foundation programs including matriculation programs offered by the Ministry of Education and universities in Malaysia; or skills, technical, and vocational programs.

In October 2011, the Ministry of Education launched a comprehensive review of the Malaysian education system to develop a new Malaysia Education Blueprint 2013–2025.[1] This decision was made in the context of raising international education standards, achieving government aspirations in preparing Malaysia's children students for the needs of the 21st century, and increasing public and parental expectations of education policy. The Blueprint highlights five system aspirations—access, quality, equity, unity, and efficiency—and six student aspirations. It will continue to employ the National Educational Philosophy's vision of a balanced education as its foundation in attaining these aspirations.

Use and Impact of TIMSS

Malaysia first participated in TIMSS 1999, followed by TIMSS 2003, 2007, 2011, 2015, and 2019. Malaysia's performance in these cycles generated a lot of interest and discourse among academics, politicians, stakeholders, and the general public, in turn raising awareness among Malaysians about the importance of upgrading the quality of mathematics and science teaching to improve learning,

apart from reviewing the curriculum. The downward trend in Malaysian students' performances from TIMSS 2003 to TIMSS 2011 was a wake-up call that raised concerns about the quality of education in Malaysia. Students' poor performance was attributed largely to their lack of higher order thinking skills (HOTS).

TIMSS results are mainly used to inform policymakers about initiatives that can be implemented to improve the education system. Among the measures taken were preparing teachers to integrate HOTS objectives into their classroom instruction, reviewing textbooks, and increasing the proportion of HOTS items on national examinations. A revised curriculum for both mathematics and science at the secondary level was implemented in 2017, beginning with seventh grade students. The curriculum was previously introduced in 2011 to first grade students. TIMSS results havealso impacted the design of the Grade 9 PT3 exam, which was first administered in 2014 and asks students to respond to questions that require thinking at a higher cognitive level. Other measures of improvement include the development of mathematics and science resource materials; the implementation of *Hayati Eksplorasi Berfikir Aras Tinggi* (*HEBAT*; Appreciation, Exploration, and Higher Order Thinking Skills), which was developed collaboratively with experts from local and international universities; and the development of HOTS items to be used in classrooms for the teaching and learning of mathematics and science.

The Mathematics Curriculum in Primary and Lower Secondary Grades

Mathematics is a core subject for all students in Malaysia's national education system. Each student has an opportunity to complete at least six years of basic primary education and five years of secondary education. Mathematics is the best medium to develop each student's potential, intellectual proficiency, and human capital, because it encourages logical and systematic thinking. Thus, the development of the mathematics curriculum takes into consideration the needs of the country and factors that contribute to developing a workforce that can think logically, critically, analytically, creatively, and innovatively. This goal is consistent with the need to provide future generations with adequate mathematics knowledge and skills to ensure that Malaysia can compete globally and meet the challenges of the 21st century. Special attention is given to students with different backgrounds and learning abilities to ensure they also acquire the mathematics knowledge, skills, and practice values that the curriculum emphasizes.

The primary mathematics curriculum aims to develop students' conceptual understanding of numbers, basic calculation skills, understanding of simple mathematical ideas, and competence in applying mathematical knowledge and skills effectively and responsibly in daily life.[2,3,4,5]

The mathematics curriculum at the primary level (Grades 1 to 4) is organized into four interrelated learning areas:

- Numbers and Operations
- Measurement and Geometry

- Relationships and Algebra
- Statistics and Probability

For each learning area, topics are organized from basic to abstract. At the end of Grade 4, students should be able to do the following, shown in Exhibit 1.

Exhibit 1: Interrelated Learning Areas for Grade 4 - Mathematics

Learning Area	Topics	Scope
Numbers and Operations	Whole Numbers up to 100,000	▪ Value of numbers - read, say and write in words and numerals ▪ Place value, digit value, expanded notation, ascending and descending order ▪ Perform mathematical operations - add up to four numbers up to five digits, subtract consecutively two numbers from any number, multiply by one-digit, two- digit, 100 and 1000, divide by one-digit, two-digit, 100 and 1000 and mixed operations (add and subtract, multiply and divide) ▪ Solve problems involving whole numbers up to 100,000 ▪ Solve problems involving addition and subtraction of two proper fractions
	Fractions	▪ Compare, express equivalent fractions, ▪ Recognize, name and write improper fractions and mixed numbers ▪ Convert improper fractions to mixed numbers and vice versa ▪ Add and subtract proper fractions with denominators up to 10
	Decimals	▪ Write decimals, convert fractions to decimals ▪ Perform mathematical operations - addition, subtraction, multiplication and division up to three decimal places ▪ Solve problems involving a maximum of two decimal places
	Percentages	▪ Converting decimals to two decimal places and to percentage, and vice versa
	Money	▪ Writing values of money and rounding money to the nearest RM (RM, Malaysian Ringgit, is the national currency) ▪ Performing mathematical operations: addition, subtraction, multiplication, and division up to RM100,000 ▪ Solving problems involving money up to RM10,000 ▪ Recognizing currencies of ASEAN (Association of Southeast Asian Nations) and major countries in the world ▪ Recognizing various payment instruments
Measurement and Geometry	Time	▪ Understand time, including the 12-hour system, perform mathematical operations, and solve problems involving units of time and the calendar
	Measurement	▪ Length, mass, and volume of liquid in metric units; calculate unit conversions; perform mathematical operations; and solve problems involving length, mass, and volume of liquid

Learning Area	Topics	Scope
	Shapes and space	▪ Identify two- and three-dimensional shapes ▪ Calculate perimeter, area, and volume of two- and three dimensional shapes ▪ Solve problems involving perimeter, area, and volume of squares, rectangles, cubes, and cuboids
Relationships and Algebra	Coordinates	▪ Determine and state the objects based on the position on the horizontal axis and vertical axis.
	Proportion	▪ Determine a value using the unitary method
Statistics and Probability	Data handling	▪ Extract and interpret information from pictographs, bar graphs, and pie charts

The mathematics content for secondary school is essentially a continuation of the knowledge and skills learned at the primary school level. Mathematics at the secondary school level aims to develop individuals who have mathematical competence. A mathematically competent individual is able to think mathematically, creatively, and innovatively, as well as apply mathematical knowledge and skills effectively and responsibly to solve problems and make decisions when dealing with challenges in their daily lives. Decisions made are based on attitudes and values in line with the development of science and technology and the challenges of the 21st century.

Four key elements that contribute to the development of mathematical competence are:

- Learning areas
- Values
- Skills
- Mathematical processes

The mathematics curriculum at the lower secondary level (Grades 7 to 9) is organized in five interrelated learning areas, namely:[6]

- Numbers and Operations
- Measurement and Geometry
- Relationships and Algebra
- Statistics and Probability
- Discrete Mathematics

For each learning area, topics are organized from basic to abstract. By the end of Grade 9, students should be able to demonstrate and apply their understanding and solve simple routine, complex routine, and nonroutine problems involving the topics shown in Exhibit 2.

Exhibit 2: Interrelated Learning Areas for Grades 7 to 9 - Mathematics

Learning Area	Topics	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, and pattern of a sequence ▪ Index notation and law of indices ▪ Significant figures, basic arithmetic operations involving numbers in standard form ▪ Types of savings and investments, simple interest and compound interest for savings, value of return of investments, potential risks, return and liquidity of various types of savings and investments, average cost per share, wise management of credit and debt, advantages and disadvantages of credit cards, impact of minimum and late payments for credit card usage, total amount of loan repayment and installments
Measurement and Geometry	▪ Lines and angles ▪ Basic polygons ▪ Perimeter and area ▪ The Pythagorean theorem ▪ Polygons ▪ Circle ▪ 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, rationale of construction steps, angles related to intersecting lines, angles related to parallel lines and transversals ▪ Number of sides, vertices and diagonals of polygons, properties of triangles and the interior and exterior angles of triangles, properties of quadrilaterals and 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 Pythagorean theorem ▪ Regular polygons, interior and exterior angles of polygons. ▪ Properties of circles, symmetrical properties of chords, circumference and area of a circle ▪ Geometric properties, nets, surface area and volume of three-dimensional shapes. ▪ One-to-one correspondence between points in a transformation; congruency in transformations; translation, reflection, rotation; and rotational symmetry ▪ Scale and drawing of a scale drawing ▪ Sine, cosine, and tangent of acute angles in right triangles ▪ Angle at the circumference and central angle subtended by an arc, cyclic quadrilaterals, tangents to circles ▪ Orthogonal projections, drawing the plan and elevations of an object to scale, synthesizing plan and elevations of an object, and sketching the object ▪ Locus of points and construction of the locus; locus that satisfies two or more conditions

Learning Area	Topics	Scope
Relationship 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	▪ Relationship 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 formula of an algebraic equation ▪ Distance and midpoint in the Cartesian coordinate system ▪ Functions, tables of values for linear and nonlinear functions, drawing and interpreting graphs of functions ▪ Uniform and nonuniform speed, average speed, acceleration and deceleration ▪ Gradient of a straight line in the Cartesian plane ▪ Equation of a straight line, relationship between the points on a straight line and the equation of the line, gradients of parallel lines, 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 and subsets

Values that are being developed among students through the teaching and learning of mathematics are:

- Mathematical—values that emphasize the properties of mathematical knowledge
- Universal—noble values that are applied across all subjects

The Science Curriculum in Primary and Lower Secondary Grades

The Primary Science curriculum is designed to develop science literacy by providing students with science knowledge through the understanding of basic science concepts that enable students to pursue science education at 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 surroundings. The science curriculum was benchmarked

with high performing countries in international assessments to ascertain that it is relevant and equivalent with other countries in the world.

The aims of the science curriculum are to instill interest and develop students' creativity through experiences and investigations in acquiring 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 primary science curriculum focuses on thoughtful learning involving scientific and thinking skills. The main approach in science education is the acquisition of knowledge through inquiry. Thoughtful learning is achieved when students are actively involved in the teaching and learning process. Teaching and learning activities are planned to stimulate ideas and encourage students to conceptualize, solve problems, and make decisions. Therefore, thinking skills are indirectly inculcated among students.

The science curriculum is organized around three domains: Knowledge, Skills, and Values. Students explore these domains through an inquiry approach to become thoughtful science learners. The inquiry approach includes student-centered learning, constructivism, contextual learning, problem-based learning, and mastery learning, as well as related strategies and methods.

- Knowledge—This domain encompasses interrelated concepts, facts, rules, and principles associated with biological, chemical, and physical processes, as well as astronomy and technology.
- Skills—Scientific, creative, and critical thinking skills are necessary for inquiry and problem solving in science. Scientific skills are important in scientific investigations, such as conducting experiments and carrying out projects. Creative thinking skills are the ability to produce or create something new and valuable by using genuine imagination and unconventional thinking. Enhancing students' creative and critical thinking potential is one of the objectives of the national education policy, and the curriculum emphasizes critical thinking skills as a foundation for thoughtful learning.
- Values—Scientific attitudes and noble values are instilled through experiential learning, either spontaneously or through planned activities. Proper planning is required to optimize the inculcation of scientific attitudes and noble values during science lessons.

Science emphasizes inquiry and problem solving. In these processes, students apply scientific and thinking skills. Scientific skills consist of science process skills and manipulative skills. Science process skills are mental processes that enhance creative, analytical, and systematic thinking. Mastery of science process skills together with suitable attitudes and knowledge ensure students think effectively. Exhibit 3 presents a description of each science process skill.

Exhibit 3: Science Process Skills

Science Process Skills	Description
Observing	Using the senses of sight, hearing, touch, taste, or smell to gather information about objects and phenomena
Classifying	Using observations to group objects or phenomena according to similarities and differences
Measuring and using numbers	Making quantitative observations using numbers and tools with standard units
Making inferences	Using data collection and previous experiences to conclude and explain events
Predicting	Forecasting events based on observations and previous experiences or reliable data
Communicating	Using words or graphic symbols such as tables, graphs, diagrams or models to describe an action, object or event.
Using space-time relationship	Describing changes in parameters with time, such as location, direction, shape, size, volume, weight, and mass
Interpreting data	Giving rational explanations about an object, event, or pattern from collected data
Defining operationally	Defining concepts by describing what must be done and observed
Controlling variables	Identifying manipulated, responding, and constant variables. In an investigation, a variable is manipulated to observe its relationship with the responding variable. At the same time, the other variables are kept constant.
Making a hypothesis	Making a general statement about the relationship between a manipulated variable and a responding variable to explain an observation or event
Experimenting	Planning and conducting investigations to test a hypothesis, collecting and interpreting data until a conclusion can be obtained

The Integrated Curriculum for Primary School was in effect for students assessed in science in TIMSS 2019. The science component of the integrated curriculum was designed to enable students to acquire scientific knowledge and skills, develop critical thinking skills, and apply their knowledge and skills in everyday life. It was also designed to instill scientific attitudes and noble values through learning activities. The curriculum stipulates that learning activities should stimulate students' critical and creative thinking skills and should not confine students to routine or rote learning practices.

The revised primary science curriculum is arranged into six learning fields: Introduction to Science, Life Science, Physical Science, Material Science, Earth and Space Science, and Technology and Sustainability of Life. Exhibit 4 presents the scope covered in each content area.

Exhibit 4: Science Topics in the Primary Science Curriculum

Level	Learning Field	Scope
Science Level I (Grades 1 to 3)	Introduction to Science	▪ Science process skills, manipulative skills, rules of the science room
	Life Science	▪ Living and nonliving things ▪ Parts of human body, basic needs of humans, growth, teeth ▪ Parts of animals' bodies, basic needs of animals, growth, special features, teeth ▪ Parts of plants, basic needs of plants
	Physical Science	▪ Human senses, light and dark, magnets
	Materials Science	▪ Floating and sinking, ability of materials to absorb water
	Earth and Space	▪ Soils
	Technology and Sustainability of Life	▪ Construction of basic shape blocks, basics of technology
Science Level II (Grades 4 to 6)	Introducing to Science	▪ Science process skills, manipulative skills, rules of the science room
	Life Science	▪ Life process in humans, animals, and plants; microorganisms; interaction among living things; preservation and conservation
	Physical Science	▪ Measurement, energy, properties of light, electricity, heat, force, and speed
	Materials Science	▪ Properties of materials, rusting, matter, acids and alkalis
	Earth and Space	▪ The solar system; the Earth, Moon and Sun; eclipses, and constellations
	Technology and Sustainability of Life	▪ Development and importance of technology, strength and stability of objects, simple and complex machines

The Science Standards-Based Curriculum for Lower Secondary Schools was in effect for students assessed in science in TIMSS 2019. The science curriculum for secondary school aims to strengthen and develop creativity among students through experience and investigation to master knowledge in science, scientific skills, thinking skills, and scientific attitudes and values.

The application of knowledge in science, scientific skills, thinking skills, and scientific attitudes and values enables students to solve problems and make decisions in daily life and prepares them to continue their studies in science and technology. The science curriculum also aims to prepare students to face rapid technological development and various challenges of the 21st century, such as the Fourth Industrial Revolution (IR 4.0).

The Standard Curriculum for Secondary School is built on six strands: (1) Communication; (2) Spirituality, Attitudes, and Values; (3) Humanity; (4) Personal Development; (5) Physical Development and Aesthetic; and (6) Science and Technology.[8] The six strands support each other and are integrated with critical, creative, and innovative thinking. This integration is aimed at developing human capital that appreciates noble values based on religion and being knowledgeable, competent, and able to think creatively, critically, and innovatively.

The content for the Science Curriculum Standard for Lower Secondary Schools is based on four disciplines of science (biology, chemistry, physics, and Earth science) arranged 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). Exhibit 5 presents the science topics covered in each content area.

Exhibit 5: Science Themes in the Lower Secondary Science Curriculum

Level	Theme	Scope
Science (Grades 7 to 9)	Scientific Methodology	Introduction to scientific investigation
	Maintenance and Continuity of Life	Cells as the basic unit of life, coordination and responses, reproduction, biodiversity, ecosystems, nutrition, human health, stimuli and responses, respiration, transportation
	Exploration of Elements in Nature	Matter, periodic table, air, water and solutions, acids and alkalis, reactivity of metals, thermochemistry
	Energy and Sustainability of Life	Lights 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; the solar system; meteoroids; asteroids; comets; space weather; space exploration

Professional Development Requirements and Programs

Professional development programs are designed to help mathematics and science teachers in Malaysia build a sound foundation in subject content knowledge, pedagogical skills, information technology, and moral values. The programs aim to produce knowledgeable and skillful teachers capable of quality teaching who deliver the curriculum effectively and engage students in an experiential learning process in which teachers act as facilitators rather than information providers.

Malaysia also participates actively in programs developed by other agencies, namely the National Science Centre, Aquaria at Kuala Lumpur City Centre, the Southeast Asian Ministers of Education Organization Regional Centre for Education in Science and Mathematics (SEAMEO-RECSAM) and Malaysian Digital Economy Corporation (MDEC).

In addition, the Ministry of Education is collaborating with international agencies, such as ExxonMobil and *La main à la pate* (LAMAP) Foundation of France to build a group of Science, Technology, Engineering and Mathematics (STEM) STEM master trainers to develop sustainability in educating teachers and students on various practical aspects of innovative pedagogic strategies; enhancing teachers' ability to be creative and innovative in developing STEM projects that address global problems, in line with IR 4.0; and enhancing teachers' skills in developing students' values and soft skills through integrated STEM and innovative learning.

Additionally, the Training Workshop on Innovative Teaching and Learning of Science through Inquiry-Based Science Education for Science Teacher Trainers was organized by International

Science Technology and Innovation Centre in collaboration with the LAMAP Foundation and supported by the Teacher Education Institute.

A training needs framework for STEM teachers was created and developed to ensure that STEM teachers obtain certain standards in their skills, knowledge, and values. It was also created to provide a foundation and framework for teachers to analyze their own ability to teach STEM subjects. The framework includes six domains:

- Beliefs about STEM Learning
- STEM Content Knowledge and Skills
- STEM Related Pedagogies
- Real World Application
- Capacity to Integrate STEM and Non-STEM Learning
- Data, Digital, and Technological Literacy

Monitoring Student Progress in Mathematics and Science

Malaysia intends not to rely solely on examination results to monitor student achievement. Therefore, it introduced the National Educational Assessment System (NEAS) in 2011 to formalize, strengthen and standardize school-based assessment (SBA). By shifting the focus from national examinations to SBAs, Malaysia acknowledges the various methods available to collect student data.[9] NEAS is intended to standardize and formalize four assessment methods used in SBAs to enable teachers to gather more information about students, including a student profile and information about students' involvement, development, and achievement beyond the conventional tests of academic achievement at the end of learning. Five assessment methods are conducted in schools:

- Classroom Assessment
- Physical, Sports, and Co-Curricular Activity Assessment
- Psychometric Assessment
- Central Assessment
- Central Examinations

Assessments fall into two categories: SBAs and central examinations. The Classroom Assessment; Physical, Sports, and Co-Curricular Activity Assessment; Psychometric Assessment; and Central Assessment are SBAs, conducted and reported by teachers in schools. The use of marks, grades, mastery levels and other qualitative reports from SBAs are the prerogative of the schools and mainly summarize student achievement, monitor and improve students' learning, improve teacher instructions, and facilitate administrative decisions.

Central Examinations were developed by the Examination Syndicate Malaysia. Their primary purpose is to measure students' achievement in learning subjects, and they are used to evaluate the effectiveness of teaching and learning programs and methods throughout the country. Results of

Central Examinations are reported quantitatively and qualitatively to the public and used to facilitate students' admission to selected schools and higher learning institutions, to enable students to obtain scholarships, to evaluate quality of teachers and schools for placement or streaming, and for employment. A standardized primary school achievement test known as *Ujian Pencapaian Sekolah Rendah (UPSR)*, or the Primary School Achievement Test (PSAT), is conducted at the end of Year 6 of primary education. Primary students with special needs and learning disabilities can opt to take *Pentaksiran Alternatif Sekolah Rendah (PASR)*, or Primary School Alternative Assessment (PSAA).[10]

Special Initiatives in Mathematics and Science Education

To achieve the goal of becoming a developed nation able to meet the challenges of IR 4.0, the Ministry of Education has made various efforts to implement initiatives including the 60:40 Policy (which aims to enroll 60 percent of students in science streams and 40 percent of students into art streams); the National Policy on Science, Technology and Innovation (DSTIN), and Vision 2020. As a result, science and mathematics education has renewed importance. The introduction of STEM education enables students to apply science and mathematics concepts that make their learning more meaningful and challenging. It can also serve as a platform to solve real-life problems and provide a highly effective learning experience for students. The Ministry of Education has made various efforts to strengthen STEM education through the strengthening of the STEM Education Initiative under the Malaysian Education Blueprint 2013–2025.[11] STEM initiatives are expected to nurture STEM-literate students to think logically, solve problems, innovate, create new ideas, design or invent new products, and become adept at using technology.

Strategies to support students under the STEM Education Initiative include the introduction of the STEM+ Club, outreach programs initiated by higher learning institutions and STEM related agencies, and STEM mentor-mentee programs. Additionally, programs for STEM teachers include a STEM roadmap, a STEM teachers' intervention course, a STEM peer learning community, best practices in STEM leadership, a workshop on the preparations of STEM teaching and learning resource materials in open online courses, and development of a repository of resource materials for STEM teaching and learning. Furthermore, the government has given emphasis to mathematics and science skills, 21st century skills, and HOTS. In 2016, Malaysia introduced *Pentaksiran Alternatif Sekolah Rendah* (*PASR*), or Primary School Alternative Assessment (PSAA), for primary school students with learning disabilities.

The Ministry of Education has worked with other government agencies as well as private sector entities in Malaysia to organize competitions, hands-on STEM sessions, and STEM camps. Additionally, it has initiated a collaboration between schools and parents to improve children's awareness about the importance of STEM fields and STEM-related careers. The government has also established a national STEM center that focuses on developing teacher professionalism, school leaders, lab assistants, and computer technicians to enhance involvement in STEM education.

Suggested Readings

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 & Technology Education*, 10 (3): 155-163. Retrieved from 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. Retrieved from https://doi.org/10.12973/eurasia.2014.1077a

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): 45-654. Retrieved from http://dx.doi.org/10.6007/IJARBSS/v7-i6/3027

References

[1] Ministry of Education Malaysia. (2012). *Pelan Pembangunan Pendidikan Malaysia 2013-2025* [Malaysia Education Blueprint 2013-2025]. Putrajaya: Author.

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

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

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

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

[6] Curriculum Development Division. (2017). *Dokumen Standard Kurikulum dan Pentaksiran KSSR Matematik Tingkatan 1* [Curriculum standard documents and assessments KSSR mathematics Form 1]. Putrajaya: Ministry of Education Malaysia.

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

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

[9] Ministry of Education Malaysia. (2017). *Dasar Pendidikan Kebangsaan* [National Education Policy]. Putrajaya: Educational Planning and Research Division.

[10] Ministry of Education Malaysia. (2019). *Panduan Pentadbiran Pentaksiran Alternatif Sekolah Rendah (PASR)* [Primary school alternative assessment administration guidelines]. Putrajaya: Examination Syndicate.

[11] Ministry of Education Malaysia. (2012). *Pelan Pembangunan Pendidikan Malaysia 2013-2025* [Malaysia Education Blueprint 2013-2025]. Putrajaya: Author.