

Malta

Desiree Bugeja Scicluna

Isabel Zerafa

Melanie Sammut Casha

*Directorate for Curriculum, Lifelong Learning, and Employability
Ministry for Education and Employment*

Introduction

Overview of Education System

The Ministry for Education and Employment (MEDE) is responsible for education in Malta, with equity and inclusion underscoring the government's objective of providing high quality education for all. Commitment to these principles is evidenced by inclusivity at all levels and the provision of free public school education to all, from kindergarten to tertiary level. The government also subsidizes church schools, which do not charge tuition fees, while parents whose children attend schools in the independent sector benefit from tax rebates.

The Education Act of 1988 is the legal framework regulating education provision in Malta.¹ A 2006 amendment to the act established two directorates. The amended Education Act further decentralized decision making by forming college networks in the state sector.² There are 11 college networks, each with its own legal and distinct identity. Ten of the college networks consist of multiple preprimary centers, primary schools, a middle school, and at least one secondary school, while the 11th college network is responsible for post-compulsory education institutions falling within the remit of the education directorates.

The Directorate for Quality and Standards in Education (DQSE) was responsible for establishing and monitoring the standards and quality of the programs and services provided in all schools, both state and nonstate, throughout the compulsory education cycles. Eventually this responsibility was passed on to the Directorate for the Curriculum, Lifelong Learning, and Employability (DCLLE). Currently, the Quality Assurance Department (QAD) and the Accreditation Unit fall under the remit of DQSE.

The DCLLE is responsible for formulating, implementing, and monitoring the curriculum. The National Curriculum Framework for All (NCF),³ which guides education provision in compulsory schooling in Malta, was launched in 2012. The NCF addressed the gaps in Malta's learning processes by shifting the emphasis of classroom instruction from teaching the subject to teaching the learner. The NCF is presented within a lifelong learning perspective and celebrates diversity by catering to all learners at each stage of their education. It aims to introduce greater equity and decentralization to

the national education system while presenting a seamless curriculum that emphasizes smooth transitions and builds on a firm foundation of early childhood education.

In essence, the NCF aims to provide quality education for all learners, to encourage student enrollment in further and higher education, and to reduce the percentage of early school leavers. The NCF proposed a Learning Outcomes Framework (LOF) as the keystone for learning and assessment throughout compulsory schooling. The aim of the LOF is to free schools and learners from centrally imposed knowledge-centric syllabi, which in turn will give schools the freedom to develop programs that fulfill the objectives of knowledge, attitudes, and skills-based outcomes to which all learners in Malta are entitled. The LOF is intended to create greater curricular autonomy for colleges and schools that will enable them to better address the learning needs of their students. In February 2014, the Framework for the Education Strategy for Malta 2014–2024⁴ was launched with the aim of coherently and comprehensively aligning all strategies, policies, and plans being implemented by the Ministry for Education and Employment.

Compulsory education in Malta covers ages 5 to 16 and comprises three main cycles: early years (ages 5 to 7), junior years (ages 7 to 11), and secondary years (ages 11 to 16). Prior to the start of primary education, there is provision for early childhood education and care through the Free Childcare for All Scheme, established in April 2014 for children aged 3 months to 3 years, and kindergarten for children from 3 to 5 years. Although preprimary education is not compulsory, attendance is very high and reaches close to 100 percent between the ages of 4 and 5.

Parallel to the public education sector there is a nonstate sector composed of church and independent schools. All primary and secondary state schools are coeducational.

Schooling in the first two years of the secondary cycle consists of general education. However, beginning in Grade 9, students can choose two subjects from a range of options. Since the 2011–2012 school year, these subjects have included several vocational areas and, as of September 2019, they also include applied subjects. Thus, students in Grades 9 to 11 may opt to study aspects of both vocational and applied education.

Following compulsory education, students can choose to follow a general education path or a vocational education path. Two-year general education courses leading to tertiary education are provided by state or by nonstate education institutions. On the other hand, students may follow vocational courses at two state educational institutions, the Malta College of Arts, Science, and Technology (MCAST) and the Institute of Tourism Studies (ITS). Tertiary education is provided by the University of Malta and MCAST.

Use and Impact of TIMSS

Malta participated in TIMSS 2007 and TIMSS 2015 at the eighth grade level (Year 9) and in TIMSS 2011 at the fourth grade level (Year 5). Following each TIMSS cycle, the resulting country information was analyzed to assist policymakers in identifying areas for further focus and development. Malta has envisaged that the National Curriculum Framework and the development

and implementation of the Learning Outcomes Framework and the related pedagogy would lead to improved results in both mathematics and science.

In science, the Learning Outcomes Framework is based on the conclusions of the policy document *A Vision for Science Education in Malta*, published in December 2011.⁵ The document recommended major changes in science education, such as increasing instructional time allocated for science in primary schools and introducing integrated science throughout secondary education, replacing physics as the compulsory science subject during the last three years of secondary education. It also recommended that teachers adopt a pedagogy of inquiry-based learning in their classes.

The Mathematics Curriculum in Primary and Lower Secondary Grades

Mathematics is an important tool by which information can be organized, manipulated, and communicated. It is also an ever expanding body of facts, skills, concepts, and strategies that may be used to solve a range of problems.

Mathematics teachers, in both primary and secondary schools, emphasize the following aspects of mathematics:

- Utilitarian—Mathematics is useful, equipping learners with the knowledge, skills, and competencies to understand and interact with the world around them
- Aesthetic—Mathematics is a beautiful subject with an evolving body of knowledge, skills and competencies characterized by order, precision, conciseness, and logic

The *Handbook for the Teaching of Mathematics*⁶ states that teachers should support and facilitate students' engagement to:

- Understand and appreciate the role and purpose of mathematics in culture and society, in the past as well as the present
- Apply mathematical knowledge and understanding to solve a range of standard and nonstandard problems, ideally from real life situations
- Think and communicate mathematically (i.e., precisely, logically, and effectively)
- Develop a positive attitude toward mathematics that fosters creativity, confidence, perseverance, and enjoyment of the subject
- Develop the ability to work both independently and cooperatively when doing mathematics
- Acquire a secure foundation for the further study of mathematics
- Appreciate the interdependence of the different branches of mathematics
- Appreciate the interdisciplinary nature of mathematics and its use in other areas of knowledge
- Make efficient, creative, and effective use of appropriate technology in mathematics

The Learning Outcomes Framework for Malta includes Subject Learning Outcomes (SLOs) for Mathematics that span from Attainment Level 5 to Attainment Level 10. Within the Learning Outcomes Framework, Level 10 is viewed as the “gifted and talented” level. Outcomes within this level sit at the upper end of the ability spectrum and extend learning further. The core concept is better rather than more. Level 10 learners demonstrate a deeper understanding and wider application of Level 9 content, which marks the end of compulsory schooling. Level 10 outcomes may draw on three main areas:

- Increased sophistication of understanding of the Level 9 content
- Greater learning autonomy in developing understanding and skills
- Increased application and problem solving

Each Attainment Level can be extended further. Exhibit 1 presents the curriculum attainment levels along with their corresponding academic years and age ranges.

Exhibit 1: Curriculum Attainment Levels with Corresponding Years and Age Ranges

Level of Attainment	Years	School Cycle	Educational Institution	Ages
1–3	Childcare	Early childhood education	Childcare centers	0–7
	Kindergarten 1		Kindergarten school	
Kindergarten 2	Primary school			
4		1, 2	7, 8, 9	
5	3, 4	Junior years	Primary school	9, 10, 11
6	5, 6			
7	7, 8	Middle years	Secondary school	11, 12
8	9, 10	Secondary years		13, 14
9	11			15, 16
10				Lifelong

The National Curriculum Framework encourages a move away from emphasizing specific subject content teaching in favor of pedagogies that enhance curricular links and thus facilitate learning processes in the early years.⁷ Throughout the early years, children should be provided with different learning opportunities based on their skills, needs, and interests within an emergent curriculum. While children are engaged in meaningful practices, mathematizing should be encouraged, thus stimulating mathematical literacy.

Children should be provided with opportunities to:

- Get acquainted with early mathematical language of measurement, shapes, space, position, numbers, and patterns
- Develop and strengthen their number sense (use of numbers, numerosity)
- Count and perform the basic number operations
- Classify, order, and sort

- Learn through number rhymes and songs
- Become aware of conservation
- Explore and create number sequences and shape patterns
- Use positional words—e.g. in, on, outside
- Become familiar with the concept of time
- Recognize shapes in the environment
- Become aware of one-to-one correspondence
- Apply strategies to solve problems, argue, reason, and communicate
- Work independently and collaboratively with peers and teacher
- Explore use of mathematics manipulatives, “loose parts,” and digital technologies

Mathematics from Level 5 to Level 10 is organized in eight Learning Area Outcomes that are translated to Subject Foci and then to Specific Learning Outcomes. Exhibit 2 shows the eight Learning Area Outcomes and Subject Foci for Attainment Levels 5 to 10.

Exhibit 2: Learning Area Outcomes and Subject Foci for Attainment Levels 5 to 10

Learning Area Outcomes	Subject Foci
I understand the structure of the number system and the relationship between numbers	Numbers: The Number System
I can calculate mentally and using pencil and paper and assistive technology. I can calculate to the most appropriate level of accuracy. I can check the reasonableness of the answers obtained in calculations by rounding numbers and making rough approximations.	Numbers: Numerical Calculations
I can recognize and describe patterns and relationships in various mathematical ways and can use algebraic manipulations.	Algebra: Fundamentals of Algebra
I understand and can use forms of measurement and can make reasonable estimations.	Shape, Space, and Measures: Measures
I can recognize and describe the properties of shapes. I can use these properties to construct shapes using appropriate mathematical instruments and to prove given geometric statements.	Shape, Space, and Measures: Euclidean Geometry
I can describe the position and movement of shapes in a plane.	Shape, Space, and Measures: Transformation Geometry
I can collect, analyze, interpret, and communicate statistical information.	Data Handling: Statistics
I understand ideas of chance and uncertainty.	Data Handling: Probability

The implementation of the Learning Outcomes Framework was launched in the 2018–2019 school year and is being phased in gradually. Grade 4 students (equivalent to Year 5 in Malta) who participated in TIMSS 2019 did not follow the new Mathematics Learning Outcomes described above but followed the Primary Mathematics Syllabus (2014), which is different yet aligned in its approach. Learning outcomes in the Primary Mathematics Syllabus (2014) present topics in four strands: Numbers and Algebra, Measurement, Space and Shapes, and Data Handling, as shown in Exhibit 3.

Exhibit 3: Strands and Topics in Primary Mathematics Syllabus 2014

Strands	Topics
Number and Algebra	<ul style="list-style-type: none"> ▪ Number and Place Value ▪ Addition and Subtraction ▪ Multiplication and Division ▪ Fractions, Decimals, Percentages, and Proportion
Measurement	<ul style="list-style-type: none"> ▪ Mass ▪ Capacity ▪ Length, Perimeter, and Area ▪ Time ▪ Money
Space and Shapes	<ul style="list-style-type: none"> ▪ Shapes and Symmetry ▪ Position, Direction, and Angles
Data Handling	<ul style="list-style-type: none"> ▪ Tables, Graphs, and Averages

The Primary Mathematics Syllabus (2014) promotes a problem-solving approach (teaching for, about, and through problem solving), and mathematics lessons encourage the actions displayed in Exhibit 4.

Exhibit 4: Opportunities Through Mathematics Lessons



Since 2015, many primary schools have adopted a Mastery Approach (or elements of it). Emphasis is mainly on the Concrete–Pictorial–Abstract process.

The Science Curriculum in Primary and Lower Secondary Grades

The launch of the policy document A Vision for Science Education in Malta and the National Curriculum Framework⁸ has provided the impetus for the educational reform currently taking place in Maltese state schools and most nonstate schools. A learning outcome, competency-based approach to teaching and learning is presently being encouraged with the introduction of the Learning Outcomes Framework. The introduction of the new learning outcomes has brought about reforms in the assessment process, with half-yearly summative assessments replaced by a continuous and more formative mode of assessment. This education reform is also recognizing science as a core subject, not just on paper but also in practice. The focus for primary science is to foster knowledge but more importantly nurture attitudes and develop problem-solving skills and 21st century life skills and competencies. In this context, an inquiry-based approach to teaching and learning is highly encouraged in primary and lower secondary grades with the aim of nurturing scientifically literate citizens and lifelong learners.

New learning outcomes are being introduced at different stages across different year groups in the early, and primary, and secondary years, as highlighted in Exhibit 5 below.

Exhibit 5: Timeline for Introduction of Learning Outcomes

Introduction of Learning Outcomes				
Year group	School Year			
	2018–2019	2019–2020	2020–2021	2021–2022
Kindergarten 1	✓			
Kindergarten 2		✓		
Year 1			✓	
Year 2				✓
Year 3	✓			
Year 4		✓		
Year 5			✓	
Year 6				✓
Year 7	✓			
Year 8	✓			
Year 9		✓		
Year 10			✓	
Year 11				✓

In this context, Grade 4 (Year 5) students who were assessed in TIMSS 2019 did not follow the new science curriculum and the new learning outcomes but followed the previous primary science syllabus, as outlined below.

The primary science syllabus is divided into three core areas of science related to biology, physics, and chemistry, Sharing Our World, Energy, and Materials, respectively. Altogether, there are 11 topics:

- Other Animals and Us
- Plant Life
- Habitats
- Weather Watch
- Forces
- Electricity
- Sounds
- Light
- Change
- Uses and Properties of Materials
- Our Planet and its Neighbors

In the early primary years (Years 1 to 3), students are expected to use their senses to observe and group objects and events in their immediate environment. Students are encouraged, with the help of the teacher, to identify opportunities for scientific investigation resulting from their observations. They use observations to make predictions, suggest possible solutions and simple investigations, and take basic measurements using nonstandard units. Students also conduct investigations in groups, make simple evaluations, and compare their results to their predictions. They are also encouraged to share their procedures and findings with the class.

In the later primary years (Years 4 to 6), students are expected to compare and classify objects and events in their immediate environment, use these ideas to make testable predictions, and discover ways to conduct a fair test. They also learn to select appropriate resources and equipment and use standard measurements with appropriate precision. Investigations are generally carried out in groups, and students record and analyze data using simple tables and/or graphs, discuss their findings, and compare findings to the initial prediction. Based on the information gathered, students are encouraged to draw conclusions and relate research findings to everyday life experiences. Students are highly encouraged to communicate research findings to the class.

The Integrated Science Curriculum for secondary education builds on the Primary Science Framework, and guides students in learning integrated science during Years 7 and 8. This curriculum has three strands: Life Processes and Living Things, Materials and Their Properties, and Physical Sciences.

- Life Processes enables students to understand and investigate life processes as well as appreciate the diversity of living things and how they interact with each other and with the surrounding environment.

- Materials and Their Properties makes students aware of a diversity of naturally occurring materials, particularly through inquiry and investigations, to become familiar with the structures and properties of mixtures, and to understand ways of processing raw materials to form new products with different properties.
- Physical Sciences enables students to understand the properties of a variety of forces existing in the universe and to investigate their effects. Consequently, students discover how interactive forces produce conversion in energy from one form to another.

Each strand is organized into several units while each unit comprises a number of teaching objectives, examples of teaching activities and experiences, and indicators of learning outcomes. The approach to teaching and learning science is inquiry-based and student-centered, and units support a constructivist approach by following the 5E model: engage, explore, explain, elaborate, and evaluate. During each session, teachers determine the topic of inquiry or focus question to engage students' interest and curiosity. Students observe, explore, predict, plan, and conduct investigations; collect and interpret data; and give explanations. Students are then challenged to elaborate on their understanding by linking the known with the new and by applying concepts and skills in new contexts. Students are encouraged to evaluate their understanding and competencies, and teachers assess areas of strength and weakness highlighted by student performance in the activities.

During the last three years of secondary education (Years 9 to 11), students choose two subjects to study as core curriculum options. In Years 9 to 11, students are required to study at least one science subject (physics, chemistry, or biology) and may choose one or two additional science subjects. Students in state schools may choose biology and/or chemistry, as physics is compulsory in Years 9 to 11. In most nonstate schools, students may choose any one of the science subjects together with one or both of the other science subjects as an elective.

Geography is taught by specialist teachers as a separate subject in secondary schools, and students may choose the subject as a core curriculum option during the last three years of secondary education.

Professional Development Requirements and Programs

All in-service teachers are required to attend a maximum of 10 hours of Community of Professional Educators (CoPE) training sessions specific for the needs of the primary science peripatetic teachers and primary mathematics support teachers which are held throughout the school year. The CoPE training sessions for both Mathematics and Science teams are organized by the Directorate for Learning and Assessment Programmes (DLAP) within the Ministry for Education and Employment. Both teams also meet regularly to discuss pedagogical and content issues, share good practices, and plan for upcoming training sessions. The science peripatetic teachers and the mathematics support teachers also participate in voluntary training courses and/or seminars organized both locally and abroad. The Primary Mathematics and Primary Science teams also offer support in schools during CoPE training sessions for primary teaching staff. Such CoPE training sessions are very often aligned with school development plans. CoPE

training sessions are also organized for year group teachers, particularly with the introduction of the new Learning Outcomes across different year groups. These sessions address the implementation of the new Learning Outcomes and formative assessment strategies.

The Mathematics Support Team within DLAP has been involved in organizing continuous professional development for primary classroom teachers, both during CoPE sessions and regularly throughout the school year.

Monitoring Student Progress in Mathematics and Science

Evaluation of student achievement is an essential component of mathematics education. It is necessary to give teachers feedback on the methods and approaches used and to assist in planning for new learning (formative assessment), as well as to assess student readiness for new learning and to find out what they have learned (summative assessment). Diagnostic assessment procedures enable teachers to become aware of individual student difficulties and plan learning activities designed to meet these learning needs. Mathematics assessment focuses both on what students know and can do, and on how they think about mathematics. It involves a broad range of tasks and problems, and requires the application of a number of mathematical ideas. Assessments evaluate student skills, such as the ability to communicate findings, present an argument, and explain an intuitive approach to a problem.

Assessment is an integral part of the normal teaching and learning program and involves multiple techniques, including written, oral, and demonstration formats. Group and team activities are also periodically assessed. Teachers avoid giving tests that focus on a narrow range of skills, such as the correct application of standard algorithms (procedures), for example. Although assessing skills is important, a consequence of isolating skills and knowledge in a narrow assessment procedure is that students tend to learn only in that way, approaching mathematics as a set of separate skills and concepts with little obvious connection to other aspects of learning or to the world.

In the primary years, several types of continuous assessment tasks are being carried out. These tasks include Maths Trail, Quiz, Test, Show & Tell, Low Floor High Ceiling Task, Integrated Task, Journal, superTmatik challenge, mathematics clubs, and other projects that class teachers may suggest. Teachers choose up to four types of continuous assessment for the school year. These continuous assessment tasks will make up 40 percent of the global mark in Year 4 (and in Year 5 beginning in the 2020–2021 school year). The other 60 percent comes from a national annual oral and written examination. Other feedback includes the reviewing whether broad learning outcomes have been achieved each term.

Assessment in science reflects a similar philosophy. During the school year, students in upper primary years are presented with one hands-on investigation on which they are assessed. Such an investigation assesses a student's ability to investigate scientifically, observe, predict, carry out the investigation task, record results, draw conclusions from results, and apply such results to everyday life situations. As previously referred to, the new Learning Outcomes Framework gives more

weight to continuous assessment tasks that are more formative in nature—namely, investigations, fieldwork activities, and project work. The annual written science assessment evaluates content knowledge, higher order skills, and competencies including the application of knowledge

In Years 4 and 5, students take end-of-year examinations in Maltese, English, and mathematics, as well as a science assessment. In Year 6 (the final year of primary education), students take the national End of Primary Benchmark assessment, which covers Maltese, Mathematics, and English. For all the above-mentioned examinations, papers are graded to recognize different abilities.

At the secondary level, student learning is monitored by both formative and summative assessment. There are different examinations in each grade because students are tracked according to their ability level. The summative assessment process is similar to that for primary education with a national annual examination. At the end of secondary education, students may choose to take high stakes Secondary Education Certificate examinations in the subjects they have studied. The Secondary Education Certificate covers all subjects taught in Maltese schools and is a requirement for proceeding to further general education.

Special Initiatives in Mathematics and Science Education

A number of special Science, Technology, Engineering and Mathematics (STEM) popularization initiatives in science and mathematics have been planned, developed, and implemented by DLAP. The initiatives target different cohort groups at both primary and secondary levels.

Now a popular Mathematics and Science initiative, *X'hemM?* was launched in 2014 with an event entitled *X'hemM? il-Birgu*. The event targeted Year 6 students in all primary schools in Malta. The main aim of the event was to engage students in hands-on mathematical and scientific activities and investigations promoting a problem-solving approach, as well as provide students with basic competencies in learning, language, social interaction, and motor function.

Following the positive feedback received after this event, other similar events were organized for different primary school cohorts:

- *X'hemM? il-Ġnien*—targeting Year 3 and Year 4 students
- *X'hemM? il-Mellieħa*—targeting Year 6 students
- *X'hemM? l-Imġarr*—targeting Year 6 students
- *X'hemM? il-Forti*—targeting Year 6 students
- *X'hemM? Ta' Qali*—targeting Year 6 students and including physical education
- *X'hemM? l-Iskola*—targeting Year 6 students
- *X'hemM? l-Aquarium*—targeting Year 4 students

X'hemM? Weekend is another STEM initiative organized by DLAP that targets primary school age students and their parents/guardians. Participants are engaged in a range of activities/workshops related to mathematics and science. During these events, students experience different aspects of science and mathematics through an inquiry-based problem-solving methodology.

Other science initiatives are coordinated throughout the year. The Junior Science Club is an afterschool initiative that aims to provide young students (Year 3 to Year 6) the opportunity to experience science investigations and practical science-related activities that extend their learning beyond the classroom environment. The focus is on providing students with practice of science-related process skills and increased potential to develop and practice critical thinking, communication skills, and self-appraisal.

The Teen Science Café initiative targets Year 7 and Year 8 students in secondary schools, aiming to offer teenage students opportunities to encounter professionals and experts in STEM careers. Professionals and experts in different fields of science visit schools throughout the first two terms of the school year to share their career insights and experiences related to STEM. The initiative focuses on creating an interactive, informal exchange between students and professionals to engage young students in conversation about relevant STEM themes and career paths, making a positive impact on students' study and career choices. Teen Science Cafés primarily serve as an outreach program for promoting careers in science and technology, and facilitate improved career guidance and interest in studying STEM subjects. The Teen Science Café initiative developed further to address the gender gap between males and females in STEM careers. Indeed, a number of Teen Science Café girls' initiatives, including the Teen Science Café girls' festival, were held and addressed the issue of gender gap and gender stereotypes. The Tiny Teen Science Café also evolved from the Teen Science Café initiative. Tiny Teen Science Café targets primary school students and aims to promote young children's interest in STEM and raise awareness of STEM careers among students and parents.

The Science Safari is an annual science popularization event targeting Year 8 students that gives students an opportunity to put science into practice through a treasure hunt activity. The event is open to students from all school sectors, and most secondary schools participate. Science Safari Kids offers primary school students and their families the opportunity to engage in an exciting outdoor treasure hunt with clues related to scientific skills and competencies.

The Malta Junior Science Olympiad is an annual event for gifted and talented Year 11 science students in the state and nonstate sectors. Students are presented with a three-hour laboratory task that goes slightly beyond the established curricula. The task is themed around a topic, and students are asked to solve a physics task, a chemistry task, and a biology task related to that theme. The Directorate for Learning and Assessment Programmes has also launched internship opportunities for both STEM students and teachers through the Go4Research Student Internship Programme (in collaboration with the Faculty of Science, University of Malta) and the Go4Industry Teacher Internship Programme (in collaboration with the Malta Chamber of Commerce).

Numerous other activities are organized in state and nonstate primary schools to promote inquiry. Mathematics clubs are common and often facilitated by the Primary Mathematics Support Team, while a number of schools organize an annual mathematics week or mathematics-themed days. Parents are often invited to participate in these events and in workshops intended to help them support their children at home by developing an understanding of how their children learn.

To celebrate these events and other practices and initiatives, the Mathematics Support Team issues a monthly online newsletter called *Maths Matters*.

Maths Family Connect sessions invite families to do mathematics together. During these after-school sessions, Year 5 and Year 6 students, accompanied by a parent/guardian, are invited to take part in engaging, challenging, hands-on mathematics tasks, puzzles, and games. These sessions provide participants with an excellent opportunity to develop a range of skills, such as perseverance, decision making, and problem solving. Maths Family Connect sessions introduce students to the idea of a growth mindset and using the word “yet” to encourage students to persevere. Students practice this concept while solving puzzles and brain teasers and carrying out graded hands-on tasks.

The *tikka MATEMATIKA* two-day seminar for mathematics educators (from primary to post-secondary) promotes quality mathematics teaching and learning. The seminar aims to disseminate examples of sound pedagogical practices in teaching mathematics. The underpinning perspective of the *tikka MATEMATIKA* seminar is quality mathematics teaching and learning for all.

Students in Years 5 and 6 are nominated by their class teachers to participate in the High 5 Junior Mathematicians Challenge, a program designed to create opportunities for gifted and talented primary school students to develop their talents through practice with stimulating mathematical problems. Five 2-hour training seminars are held after school hours, during which students are:

- Presented with rich tasks that require skills beyond computation, through which they reinforce their spatial as well as analytic abilities
- Given the opportunity to enrich their heuristic skills
- Further challenged to create questions
- Encouraged to explore mathematics topics and develop skills that may be new to them
- Given access to a range of resources, including assistive technology
- Asked to participate in individual and group challenges
- Requested to keep a portfolio

The Maths Venture activity targets Year 9 students. This annual event consists of a Maths Trail that integrates history and mathematics in one activity. It aims at giving students the opportunity to experience mathematics outside the classroom. Students work in groups of four and tackle problem solving tasks applying mathematical skills learned in the classroom. To further exercise students’ mathematical abilities, the event also provides them with an opportunity to discuss solutions to the problems set and collaborate as a team.

Mathematical activities for the gifted and talented consist of four hands-on activities held throughout the school year. These activities are intended for Year 10 students with an interest and keen aptitude in mathematics. Throughout these activities, students discuss and experience the importance of mathematics in history, art, nature, and the world around us.

Around 140 Year 10 students participate in a biannual Mathematics Olympiad. The contest offers the chance for students to compete both individually and on teams. The Mathematics Olympiad aims to foster an interest in mathematics and improve the mathematical skills of participants who are chosen by their respective schools based on their interest and aptitude in Mathematics.

Suggested Readings

European Agency for Special Needs and Inclusive Education. (2014). *Education for all: Special needs and inclusive education in Malta - external audit report*. Retrieved from

<http://education.gov.mt/en/Documents/Special%20Needs%20and%20Inclusive%20Education%20in%20Malta%20%C2%AD-%20External%20Audit%20Report.pdf>

Eurydice Network. (n.d.). *Countries: Description of national education systems*.

<https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/index.php/Countries>

Ministry for Education and Employment, Council of Europe. (2015). *Language education policy profile: Malta*.

Retrieved from http://education.gov.mt/en/resources/Documents/Policy%20Documents/Profile-Malta_final2015_EN.pdf

Ministry for Education and Employment. (2014). *A national literacy strategy for all in Malta and Gozo: 2014-2019*.

Retrieved from

http://education.gov.mt/en/resources/Documents/Policy%20Documents%202014/A%20national%20Literacy%20Strategy2014eng_V2.pdf

Ministry for Education and Employment. (2014). *A strategic plan for the prevention of early school leaving in Malta, 2014*. Retrieved from

<http://education.gov.mt/en/resources/Documents/Policy%20Documents%202014/School%20Leaving%20in%20Malta%20June%202014.pdf>

Ministry for Education and Employment. (2014). *Country report: Malta*. Retrieved from

http://education.gov.mt/en/resources/Documents/Policy%20Documents/Country_Report_Malta_EN.pdf

Ministry for Education and Employment. (2015). *Malta national lifelong learning strategy 2020*. Retrieved from

<http://education.gov.mt/en/Documents/Malta%20National%20Lifelong%20Learning%20Strategy%202020.pdf>

References

¹ Education Act, Chapter 327, Laws of Malta (Part 1 Section 7). (2010). Retrieved from <http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=8801>

² Ministry of Education, Youth and Employment. (2005). *For all children to succeed: A new network organisation for quality education in Malta*. Valletta: Ministry of Education, Youth, Culture and Sports, and Salesian Press. Retrieved from http://education.gov.mt/en/resources/documents/policy%20documents/for_all_children_to_succeed.pdf

³ Ministry of Education and Employment. (2012). *A National Curriculum Framework for all*. Malta: Ministry of Education and Employment, and Salesian Press. Retrieved from <https://curriculum.gov.mt/en/Resources/The-NCF/Documents/NCF.pdf>

-
- ⁴ Ministry of Education and Employment. (2014). *Framework for the education strategy for Malta (2014-2024)*. Retrieved from <http://education.gov.mt/en/resources/Documents/Policy%20Documents%202014/School%20Leaving%20in%20Malta%20June%202014.pdf>
- ⁵ Ministry of Education, Employment, and Family. (2011). *A vision for science education in Malta*. Malta: Ministry of Education, Employment, and Family, and Salesian Press. Retrieved from https://curriculum.gov.mt/en/Resources/The-NCF/Documents/Consult_Docs/1_Book%205%20Eng.pdf
- ⁶ Ministry of Education. (2012). *Handbook for the teaching of mathematics*. Malta: Curriculum Management and eLearning Department.
- ⁷ Ministry of Education and Employment. (2012). *A National Curriculum Framework for all*. Malta: Ministry of Education and Employment, and Salesian Press. Retrieved from <https://curriculum.gov.mt/en/Resources/The-NCF/Documents/NCF.pdf>
- ⁸ Ministry of Education and Employment. (2012). *A National Curriculum Framework for all*. Malta: Ministry of Education and Employment, and Salesian Press. Retrieved from <https://curriculum.gov.mt/en/Resources/The-NCF/Documents/NCF.pdf>